

## DESCRIPTION OF STUDENT SCIENCE PROCESS SKILLS ON TEMPERATURE AND HEAT PRACTICUM

Tanti<sup>1</sup>, Dwi Agus Kurniawan<sup>2</sup>, Rahmi Putri Wirman<sup>1</sup>, Retno Wulan Dari<sup>2\*</sup>, Eva Yuhanis<sup>1</sup>

<sup>1</sup>Department of Physics Education, Universitas Islam Negeri Sultan Thaha Saifuddin Jambi  
Jl. Jambi-Muara Bulian Km. 16, Muaro Jambi, Jambi 36361, Indonesia

<sup>2</sup>Department of Physics Education, Universitas Negeri Jambi  
Jl. Jambi-Muara Bulian, Muaro Jambi, Jambi 36361, Indonesia

\*Corresponding Author. E-mail: [wulan21789@gmail.com](mailto:wulan21789@gmail.com)

### ABSTRACT

This study aimed to describe the science process skills of Senior High School 8 Muaro Jambi students on temperature and heat material (shape changes). The approach used in this study is an approach with a quantitative method that uses a research design using Survey Research design. The sample used in this study was Senior High School 8 Muaro Jambi, totaling 96 students of grade XI MIPA 1 to XI MIPA 3 odd semester 2019/2020. Data collection techniques in this study were observation and interviews. The observations of students' mastery of science process skills showed a percentage of 55.2% classified as poor. This means that students have low process skills. The lack of students' process skills is because the teacher dominates the learning process more. The learning process is still oriented towards mastering the material, and rarely does the experiment. This is in line with interviews conducted by researchers.

**Keywords:** *science process skills, temperature and heat practicum, changes in form*

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## INTRODUCTION

The 2013 curriculum is designed to develop overall student potential (Puspita et al., 2017, p. 164). Based on the 2013 curriculum, students are required to learn more meaningfully. Meaningful learning is a learning process in which new information is related to the understanding structure that is already possessed by someone who is in the learning process (Najib & Elhefni, 2017). The aspects developed in the current curriculum are not only in knowledge and values but in the form of skills in finding concepts and facts. Students are directed to discover for themselves various facts, develop concepts, and new values needed for their lives (Sari, 2017). This goal will be achieved if the Government and the whole community, especially teachers as a learning agent practice, implement the 2013 Curriculum properly (Jaedun et al., 2014). Thus, the current curriculum requires students to develop skills in finding concepts.

We can see the skills in finding concepts in physics. Physics has become one of the subjects related to the discovery of scientific concepts (Astalini et al., 2019, p. 91). Physics learning that is based on concepts requires high understanding (Putri et al., 2018). Physics is seen as a process and at the same time a product, so in learning must consider strategies or methods of learning that are effective and efficient (Astuti, 2015, p. 70). Physics learning not only learns about concepts, mastery of a collection of knowledge in the form of natural facts, or principles but also is a process of discovery. Therefore, based on research that has been done

(Anisah et al., 2018) science process skills are needed by students in conducting learning, especially in learning physics.

According to Budiyo and Hartini (2016, p. 142), science process skills (SPS) are skills that are needed and possessed by students to face a competition between people in the globalization era. Manu and Nomleni (2018, p. 170) believe that science process skills are a set of complex abilities commonly used by scientists in conducting scientific investigations into a series of learning processes. Besides, Hutagalung (2013, p. 11) states that science process skills are the ability of students to apply scientific methods in understanding, developing and discovering science. Wulanningsih et al. (2012, p. 34) assert that science process skills encourage students to discover their facts, concepts of knowledge and develop the attitudes and values demanded.

Science process skills are divided into two types, namely basic science process skills and integrated science process skills (Darmaji, Kurniawan, Astalini, et al., 2019). Ambarsari et al. (2013) explain that students' basic science process skills include observation, classification, measuring, predicting, inferring, and also communicating. Basic science process skills are the basic skills that are used to carry out scientific investigations (Darmaji, Kurniawan, & Suryani, 2019), such as the ability to describe objects naturally. Integrated science process skills consist of identifying variables building data tables, building graphs, describing relationships between variables, obtaining and processing data, analyzing investigations, constructing hypotheses, defining variations operationally, designing investigations, and experimenting (Darmaji et al., 2018b). Integrated Science Process Skills are skills for solving problems or conducting science experiments (Karamustafaoğlu, 2011). Science process skills are very important to improve. It is based on basic science process skills that can help students solve problems well and can interact well with each other. In order to form science process skills, students conduct practicum activities.

Sudrajad (2009) stated that the implementation of physics practicum is very important to support learning and emphasize aspects of the process. From some of the material learned in high school physics lessons, one of the materials practiced is temperature and heat material, because to know and maximize the concepts of temperature and heat in students practicum, activities are needed so that students gain direct experience in making discoveries based on concepts and the facts.

Temperature and heat are physics learning materials related to daily life. Temperature and heat are interrelated but not the same. Temperature is a quantity that states the degree of heat and cold of an object and the instrument used to measure temperature is a thermometer (Indarwati et al., 2019). Heat is defined as the heat energy possessed by a substance (Muhsin, 2019). Temperature is a measure of the average kinetic energy in transit-related to the movement of atoms and molecules. Heat is the energy state that an object has concerning the kinetic energy of its molecules or atoms (Sullivan & Edmondson, 2008). Sub matter that is learned from temperature and heat is a change in form. Changes in the form of substances are classified as freezing, melting, yawning, condensing, and also subliming (Sofiana et al., 2012). Practical activities or also called laboratory activities that are intended here are learning experiences that allow students to interact with the material to the observation of phenomena. Practicum is done so that students can connect theory with relevant experiments under daily life so that it is easily accepted. Practicum is one of the activities that play an important role in increasing the success of the teaching and learning process (Baeti et al., 2014). Practicum activities foster students' level of confidence as well as skills in mastering concepts under the actual situation (Khanam, 2015, p. 690). Practical activities can develop skills that have or are not yet owned by students, such as making observations, formulating hypotheses, conducting experiments, processing data, and concluding. Therefore, students are required to learn meaningful, not only knowledge and values that are developed but the skills in finding existing concepts and facts.

Research on basic science process skills and integrated science skills was conducted on students at SMAN 8 Muaro Jambi on temperature and heat material. Science process skills are very important possessed by students (Maison et al., 2019, p. 48), because science process skills affect student achievement. This is reinforced by Sa-ngiamjit (2016) research, students who are required to develop science process skills show a higher level of academic achievement in the learning process. Scientific learning that applies science process skills increases student learning outcomes (Hadis & Nurhayati, 2018). Prospective teachers need to understand the material that will be taught as a basis and form of planting practices for students in implementing learning and adapted to the objectives, especially in science learning (Asrial et al., 2019). Science teachers must be proficient in science process skills at many levels and must have the knowledge and understanding to teach science process skills (Chabalengula et al., 2012). Therefore, in order to improve the science process skills of students, the teacher must effectively improve the cognitive and psychomotor domains of students through the learning process.

Based on these explanations, the development of science process skills is highly relevant to the 2013 curriculum. Schools that have implemented the 2013 curriculum are considered to have accustomed students to develop their science process skills. Based on the aforementioned description, the researchers analyze the science process skills in learning physics at SMAN 8 Muaro Jambi. This study was conducted to describe the science process skills of Muaro Jambi Senior High School 8 students on temperature and heat matter (change in form).

## RESEARCH METHOD

The approach used in this research is an approach with a quantitative method that uses a research design is Survey Research. Survey research is a procedure in quantitative research in which the researcher administers the survey to a sample or to an entire population that is used in order to describe students' science process skills or special characteristics of the population (Creswell, 2013). The design of this study was applied because it was following the objectives of the study, where the aim was to describe the science process skills of students of SMAN 8 Muaro Jambi on the material temperature and heat (change in form).

Table 1. Range of Mastery of Science Process Skills

Science Process Skills	Indicator	Category			
		VP	NG	G	VG
<b>Basic</b>	Observation	6.0 - 10.5	10.51 - 15.0	15.1 - 19.5	19.51 - 24.0
	Classification	1.0 - 2.5	1.76 - 2.5	2.51 - 3.25	3.26 - 4.0
	Measure	3.0 - 5.25	5.26 - 7.5	7.51 - 9.75	9.76 - 12.0
	Prediction	1.0 - 2.5	1.76 - 2.5	2.51 - 3.25	3.26 - 4.0
	Communication	2.0 - 3.5	3.51 - 5.0	5.1 - 6.5	6.51 - 8.0
	Conclude	5.0 - 7.5	8.76 - 12.5	12.51 - 16.25	16.26 - 20
<b>Integrated</b>	Variable identification	3.0 - 5.25	5.26 - 7.5	7.51 - 9.75	9.76 - 12.0
	Arrange data tables	4.0 - 7.0	7.1 - 10	10.1 - 13	13.1 - 16
	Make a graph	1.0 - 2.5	1.76 - 2.5	2.51 - 3.25	3.26 - 4.0
	Obtain and process data	3.0 - 5.25	5.26 - 7.5	7.51 - 9.75	9.76 - 12.0
	Describe the relationship between variables	2.0 - 3.5	3.51 - 5.0	5.1 - 6.5	6.51 - 8.0
	Identify variables operationally	2.0 - 3.5	3.51 - 5.0	5.1 - 6.5	6.51 - 8.0
	Make a hypothesis	1.0 - 2.5	1.76 - 2.5	2.51 - 3.25	3.26 - 4.0
	Trial analysis	2.0 - 3.5	3.51 - 5.0	5.1 - 6.5	6.51 - 8.0
	Design an investigation	2.0 - 3.5	3.51 - 5.0	5.1 - 6.5	6.51 - 8.0
	Carry out experiments	6.0 - 10.5	10.51 - 15.0	15.1 - 19.5	19.51 - 24.0

The use of quantitative methods has a role in obtaining measurable and descriptive quantitative data. Quantitative methods are used to obtain data about students' science process skills in physics subject to temperature and heat (change in form). The samples used in this study were students of Muaro Jambi High School 8, amounting to 96 students of class XI MIPA 1 to XI MIPA 3 in the odd semester of 2019/2020. This study uses a sampling technique, namely total sampling. Data collection instruments used observation and interview sheets. Observation sheets were used to measure students' science process skills. Observation sheets were analyzed using a Likert Scale, to measure students' scientific process skills during practicum with a four-choice model (four scales) with the categories of 1 = Very Poor, 2 = Not Good, 3 = Good, and 4 = Very Good. The science process skills in observation are divided into two categories, namely, basic science process skills and integrated science process skills. The basic process skills observed are observation, classification, measuring, prediction, communication, and inferring. The integrated process skills that are observed include identifying variables, compiling data tables, making graphs, obtaining and processing data, describing relationships between variables, defining operational variables, making hypotheses, experimenting analyzes, designing investigations, and conducting experiments. To determine the mastery of critical thinking skills, 16 criteria were used as presented in Table 1.

## FINDINGS AND DISCUSSION

### Findings

Based on the data obtained, the results of observations of mastery of students' science process skills in the material temperature and heat practicum (changes in a form) are shown in Table 2. Table 2 show that the science process skills of students are dominant in the temperature and heat practicum (change in form) with a percentage of 64.5% classified as not good, as many as 42 children categorized as not good.

Table 2. Mastery of Science Process Skills of Students of Temperature and Heat Material

Range	Category	f	%	Mean	Median	Min	Max
44 -77	VP	10	10.4	2.1563	2	1	4

Table 3. Mastery of the Science Process Skills of Students in the Temperature and Heat Material (Change in a Form) of Each Indicator

Science Process Skills	Indicator	Category			
		VP (%)	NG (%)	G (%)	VG (%)
<b>Basic</b>	Observation	2.1	44.8	31.3	21.9
	Classification	7.3	52.1	26.0	14.6
	Measure	11.5	37.5	29.2	21.9
	Prediction	22.9	26.0	37.5	13.5
	Communication	6.3	44.8	24	25
	Conclude	7.3	50.0	29.2	13.5
<b>Integrated</b>	Variable Identification	32.3	38.5	16.7	12.5
	Arrange data tables	32.3	38.5	16.7	12.5
	Make a graph	30.2	37.5	22.9	9.4
	Obtain and process data	24.0	30.2	34.4	11.5
	Describe the relationship between variables	21.9	55.2	13.5	9.4
	Identify variables operationally	17.7	36.5	24.0	21.9
	Make a hypothesis	9.4	35.4	44.8	10.4
	Trial analysis	16.7	52.1	18.8	12.5
	Design an investigation	9.4	35.4	32.3	22.9
	Carry out experiments	1.0	41.7	39.6	17.7

Table 3 demonstrates mastery of students' science process skills in basic and integrated science process skills for each indicator, indicators of science process skills including observation, classification, measuring, prediction, communication, inferring, identifying variables, compiling data tables, making charts, obtaining and process data, describe relationships between variables, identify variables operationally, make hypotheses, experiment analyzes, design investigations, conduct experiments.

## **Discussion**

### ***Observation Skills***

In the indicator of observation skills, students are predominantly classified as not good with a percentage of 44.8%. Observation skills include skills using multiple senses, identifying differences and similarities of an object, using tools to obtain data, and searching for relevant data (Sahnaz et al., 2018). The indicator of observing can be seen when students observe the tools and materials used in an experiment about changing shape, observing the scale on the thermometer, observing the thermometer during measurements to determine the measurement results of the temperature of the wax powder during heating and cooling, observing the time required to do heating and cooling with a stopwatch, and students observe the data in the table to graph the relationship of variables in determining changes in the appearance of substances when heating and cooling (Lumbantoruan et al., 2019). This observation ability is more emphasized on practicing experimental thinking skills which include the administration of experiments by recognizing the equipment used in measurements both in the laboratory and outside the laboratory (Rusmiyati & Yulianto, 2009). Thus, when observing, students do not do it seriously because they do not understand the concepts they receive and these students have low reasoning abilities because educators focus on achieving the material being taught without regard to student understanding. The ability of reasoning is a process of thinking in concluding the form of knowledge (Nisraeni & Arifanti, 2018). Formal reasoning abilities have been identified as abilities that are essential for success in science learning. Thus, because of the low reasoning ability, the level of observation skill is classified as not good.

### ***Classification Skills***

The classification skills indicator shows that students are in the bad category with a percentage of 52.1%. The indicator of classification can be seen when students classify the characteristics of experimental data changes in the form of substances during heating and cooling. Meanwhile, the level of success of students doing classification can be seen in making data tables (Lumbantoruan et al., 2019). If students cannot classify tools and materials during the practice, students will have difficulty in obtaining and processing data (Darmaji et al., 2018a). Classification skills are important process skills in obtaining and processing data used to get concepts (Andini et al., 2018). Thus, in this study students were not skilled in grouping experimental data on changes in the form of substances during heating and during cooling, therefore students were classified as not good.

### ***Measuring Skills***

The indicators of measurement skills show that students are in the bad category with a percentage of 37.5%. The indicator of measuring can be seen when students take temperature measurements with a group of friends, reading the thermometer scale, and reading the time scale on the stopwatch (Lumbantoruan et al., 2019). However, in this study students are independent, meaning that they do not conduct experiments in groups. This is due to the lack of attention to the information provided, so the lack of understanding of the material presented, lack of cooperation between students so that there is no exchange of thoughts/opinions when

the measurement takes place (Tiya, 2013). Only students who want to conduct experiments only take measurements and students also experience difficulty in taking measurements using a thermometer and stopwatch.

### ***Prediction Skills***

The prediction skills indicator shows that students are in the good category with a percentage of 37.5%. Indicators of making predictions can be seen when students compare of the appearance of wax powder before, after heating, and after cooling (Lumbantoruan et al., 2019). In this study, it can be seen that these students can compare well what will happen to the candle before and after heating and cooling can be said to have good predictive skills. This is consistent with the research of Handayani et al. (2013), stating that students who have good predictive skills can anticipate or make predictions about everything that will happen in the future, based on estimates on certain patterns or trends, or the relationship between facts, concepts, and principles in knowledge.

### ***Communication Skills***

The communication skills indicator shows that students are classified as not good with a percentage of 44.8%. The communication indicator can be seen when students discuss the measurement results with a group of friends, and students present the results of the measurement experiments (Lumbantoruan et al., 2019). However, in this study, students tend to be more passive when conducting experiments. This can occur because these students do not understand the concept of changing forms that is taught (Manurung, 2019). Thus, passive students tend not to do much communication when asked to present the results that students tend to be quiet and wait for encouragement from the researcher's explanation (Dewantara, 2012).

### ***Concluding Skills***

The concluding skills indicator shows that students are in the bad category with a percentage of 50.0%. The conclusion indicator can be seen when students express a measuring instrument that will be used to measure temperature, express the value on the scale indicated by the thermometer when measuring the temperature of a candle when heating and cooling, expressing the data in a table for measuring the temperature of a candle when heating and cooling (Lumbantoruan et al., 2019). In this study, most students cannot express the measuring instrument that will be used to take temperature measurements, cannot express the value that is indicated on the thermometer, and cannot express the data in the table for measuring the temperature of the candle after heating and cooling. The obstacle that still arises is that students do not work collectively and tend to rely on one of their friends in concluding concepts (Kurnianto et al., 2010). To overcome this, the teacher allows students who are passive to play an active role in the discussion of determining conclusions.

### ***Variable Identification Skills***

The indicator of the skills of identifying variables shows that students are in the bad category with a percentage of 38.5%. The indicators identifying the variables can be seen when students determine the independent variables, the dependent variable, and also the constant variable (Lumbantoruan et al., 2019). In this study, it was seen that students could not identify the variables that are used in the experiment of changing forms, even though the tools and materials they used were related to daily life. The ability to identify variables is low due to the practice of students being able to formulate hypotheses and analyze observational data using existing formulas (Handayani, 2017). Therefore, it is necessary to plant concepts in the learning process.

### ***Skills in Compiling Data Tables***

The skills in compiling data tables indicate that students are classified as not good with a percentage of 38.5%. In the indicators of skills to compile data tables can be seen when students create tables (time, heating temperature and cooling temperature) and measurement results data, students create labels (column headings) that are appropriate for each column, students create repeatable data tables for experiments, and students make a column of numbers to clarify the existence of repeated measurements (Lumbantoruan et al., 2019). In this study, it appears that students are less able to make the appropriate tables for each column and less able to make data tables repeatedly. This is because students do not understand the variables measured at the time of the experiment (Mauliyani et al., 2014). The teacher must change the learning patterns that usually provide finished formulas without giving further understanding, into learning that allows students to represent their concepts.

### ***Graphic Skills***

On the skills to make a graph shows that students are classified as not good with a percentage of 37.5%. The indicator of the ability to make graphs can be seen when students make a graph of the temperature of the time in heating and cooling (Lumbantoruan et al., 2019). In this study, most students could not make a graph correctly about the temperature graph with time. This is caused by students having difficulty connecting conceptual abilities and spatial abilities well. Teachers' efforts to develop graphic skills by providing opportunities for students to present their diverse representations.

### ***Data Acquisition and Processing Skills***

The skills of obtaining and processing data show that students are classified as not good with a percentage of 30.2%. The indicators of skills in obtaining and processing data can be seen when students create experimental data tables, write the measurement results of data on the tables, and display data in the form of experimental data graphs (Lumbantoruan et al., 2019). In this study, most students were unable to display data in the form of data on the results of the experiment. Efforts that must be made are by changing learning patterns that are familiar with giving formulas and examples of workmanship, into learning that can actively involve students, namely learning that provides opportunities for students to represent an understanding of their concepts (Kusuma et al., 2015). Assignments to be given to students must be selected, assignments must require students to think and reason about ideas and concepts of temperature and heat material, give reasons (justifications), make conjectures, interpret, and correlate ideas important ideas of temperature and heat (Wibowo & Farnisa, 2018). The accuracy of the methods chosen and done by the teacher can present student representations in physics learning.

### ***Skills Describe the Relationship between Variables***

In the skill to describe the relationship between variables, the students are classified as not good with a percentage of 55.2%. On the indicator of skills describing the relationship between variables can be seen when students make a line matching the relationship of time to temperature when heating and time to temperature when cooling, discussing the relationship of variables in the relationship graph temperature when heating and when cooling to time (Lumbantoruan et al., 2019). In this study, students could not describe the relationship between variables so students between groups could not discuss the relationship of variables in the graph of the relationship of temperature during heating and when cooling against time. This is due to the low level of students in defining variables when conducting experiments. Teachers' efforts to improve the skills to describe the relationship between variables need to be applied to learning with learning models that are by students' abilities (Wijayanti, 2016).

### ***The Skill of Identifying Variables Operationally***

The skills to identify variables operationally indicate that students are in the bad category with a percentage of 36.5%. On the indicator of skills identifying operational variables can be seen when students measure the temperature of wax powder during heating and cooling by using a thermometer, students calculate the time during the heating process and cooling with a stopwatch (Lumbantoruan et al., 2019). In this study, some students were unable to measure the temperature of the wax powder with a thermometer and were unable to calculate time correctly with a stopwatch during the heating process and cooling. To be able to identify operationally, students must know how to measure many variables to be tested and the number of other variables that are allegedly involved (Sujarwanto & Putra, 2018). Students who have difficulty identifying operationally also mean difficulty in one or more of the skills to measure, observe, or make guesses.

### ***Hypothesis Skills***

The ability to make a hypothesis shows that students are in a good category with a percentage of 44.8%. The indicator of the ability to make hypotheses can be seen when students make hypotheses about the transformation of the form (Lumbantoruan et al., 2019). In this study, most students can make hypotheses about the relationship of temperature to the time when the candle is warmed and cooled. This is due to the material temperature and heat often encountered in everyday life. This research is in line with research conducted by Salsiah (2015), a person's knowledge related to experience can construct knowledge.

### ***Experimental Analysis Skills***

The experimental analysis skills show that students are in the bad category with a percentage of 52.1%. The indicator of the ability to analyze experiments can be seen when students adjust the design of the experiment with the hypothesis, deciding that the experimental design is under the hypothesis made (Lumbantoruan et al., 2019). Thus, in this study, students cannot decide that the experimental design is under the hypothesis. This is due to students not being able to understand and associate relationships between variables (Putri et al., 2017). Students must find the value of a variable first which is related to other variables in solving a given problem.

### ***Investigation Design Skills***

The investigative design skills show that students are classified as not good with a percentage of 35.4%. The indicator of investigative design skills can be seen when students determine the main tools and materials in the transformed experiment and determine the work steps under the purpose of the experiment (Lumbantoruan et al., 2019). In this study students cannot determine the steps of work under the purpose of the experiment, students tend to wait for orders from researchers in conducting experiments. This is because students do not yet understand the demonstrations presented by the teacher and the experiments they will do (Kurniawan & Muliyani, 2017).

### ***Experimentation Skills***

The ability to conduct experiments shows that students are classified as not good with a percentage of 41.7%. The indicator of the ability to conduct experiments can be seen when students prepare tools appropriately according to the aim of the experiment, measure temperature using a thermometer, measure the time using a stopwatch, hold the thermometer, assemble the tools and materials that have been selected in the planning of changing shape and conduct experiments according to work order (Lumbantoruan et al., 2019). In this study, passive students tend not to know what to do, even though when conducting experiments researchers



have provided practical guidance, but they find it difficult to start doing experiments, even in preparing any tools to be used so that it has an impact when assembling tools and materials as well as experimenting with changes in form. Efforts must be made by the teacher to develop the students' creativity in learning so students can actively develop and perform their abilities (Mahmudah, 2017). Students learn not only to achieve results but also to learn how to learn.

From the results of research on each indicator of the ability of basic and integrated science processes shows students possess low science process skills. The lack of students' science process skills is because students are rarely trained in discussions in learning subject matter or practicum (Bahrudin et al., 2013). The root of the problem is that learning is more dominated by the teacher so students act as learning objects. As a result, it lacks the experience for students to develop process skills (Ningsih et al., 2011). The lack of science process skills due to learning that is still oriented to mastering the material and rarely do experiments, so that the learning process only succeed in competency considering the short term but fails to equip students to solve problems in long term competence (Elnada et al., 2016). The low science process skills of students due to the low science background, lack of laboratory infrastructure (Jack, 2013), the only guide in learning (Djufri & Wilujeng, 2017), the school administration has not initiated contextual learning (Kristiyanto et al., 2019), only emphasizes the mastery of concepts, as well as learning activities that have not yet explored the students' science process skills (Sukarno et al., 2013). Broadly speaking, the factors that influence the low skill of students' science processes occur due to lack of optimization of learning that involves roles. This is related to interviews conducted by researchers.

Interviews were conducted with teachers to see science process skills. Teachers often do practicum activities but not all materials, because laboratory facilities are limited to support practicum activities. When practicum activities take place, some students respond well and can participate in every practicum activity. Thus, the teacher believes that some students are already skilled in using practical tools so that when practicum activities take place, most students only observe it and it is difficult to define the variables used and conclude the material practiced. To support practicum activities, laboratory rooms and equipment must be complete.

Furthermore, interviews were also conducted with students. When practicum activities take place, not all experimental steps are carried out. Some students just observe not doing measurements, defining variables, communicating, and concluding the material in practice. Thus, most students are not yet skilled in practice. Some of the students said that practicum made learning more meaningful because through practicum not only theories and concepts were learned but students could find concepts that already existed. Most students demand that practicums be held regularly to improve students' science process skills by emphasizing a learning process that uses scientific steps that are in the science process skills (Kurniawati et al., 2016). Therefore, the concepts in the subject matter can be formed properly.

## CONCLUSION

Based on the results of research and discussion, it can be concluded that the science process skills of students tend to be in a bad category. Students are good at obtaining and processing data and making hypotheses. Consequently, students are not good at observing, classifying, measuring, predicting, communicating, concluding, identifying variables, compiling data tables, making graphs, describing relationships between variables, identifying operational variables, analyzing experiments, designing investigations, and conducting experiments. Mastery of students' science process skills as a whole is categorized as not good with a percentage of 55.2%, meaning that students have low science process skills. The low level of students' process skills, because learning is more dominated by teachers and the learning process, is still oriented towards mastering the material and rarely do this experiment in line with interviews that researchers have conducted.

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