Profile of Students' Science Process Skills on Substance Pressure Material

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ABSTRACT
Science education essentially involves students in a systematic scientific investigation. SPS can be developed in science-based learning so that students can use it as a basic skill to master science. 100 students of class VIII of Junior High school in the first year were the samples used in this research. Purposive sampling was used to determine the sample in this research. The SPS test kit (SPSTI) is used to determine the SPS profile of junior high school students on the substance pressure material. Indicators in the SPSTI consist of 8 types. The instruments in this research have been declared valid and reliable by experts consisting of 3 experts. The implementation of this research describes the SPS profile of junior high school students, especially in the matter of substance pressure, in general, is still at a very low level. The results of this research can be evidence for future research of SPS subjects for substance pressure materials in junior.high.school.students' that need to be improved.

Keywords: *Science process skills, SPS, Substance pressure material.*

1. INTRODUCTION

Orientation in science education should involve students in a structured scientific research process. Scientific investigation is the way scientists work to solve the same problem by applying regular and systematic steps. Scientists of science for centuries have always applied the scientific method to provide a systematic description so that the findings in the field of science can be proven true, and objectively so that they can increase knowledge and can be developed in the future. The scientific method can also improve science process skills (SPS). Skills in discovering and developing science using the scientific method are the meaning of SPS [16,27,31-33].

Thus, students who study science are not enough just to remember and understand existing science concepts, but they can behave like a scientist in developing [15,16,27], as well as discovering new concepts in science. SPS can be developed in science-based learning so that students can use it as a basic skill to master science [17,19,29]. Based on the explanation that has been mentioned, it gives the reason that SPS is very much needed in science learning.

SPS is needed by students in supporting the mastery of science. Science learning must involve students in obtaining scientific information, the role of science and technology in forming procedural knowledge [7,8], scientific work, forming deep understanding by investigating phenomena, correcting, and acquiring new knowledge by combining previous knowledge [6,24,27,29].

Based on the background above, if the initial SPS is low [11,13,17,27], it will have an impact on the science learning process. SPS is very important for students. So there is a need for research to see how the SPS profile of junior high school students, especially on the material pressure of substances. The findings in this research can be used as empirical evidence later, for the development of further research, in the field of education, especially SPS, as well as being an evaluation material for educational activists to pay more attention to students' SPS.

2. METHODS

2.1. General background of research

This research uses a pre-experimental research design. This research aims to analyze the SPS profile of junior high school students on the substance pressure material.

2.2. Sampling of research

This research.was conducted at SMP Negeri 1 Pulau Laut Selatan, in the odd semester of September 2021. The population in this research were junior high school students class VIII (four classes) VIIIA, VIIIB, VIIIC, and VIIID, totaling 100 students. Purposive sampling was used to determine the sample of this research.

2.3. Procedure

The research procedure consisted of seven stages, namely: (1) researchers conducted interviews with junior high school science teachers; (2) researchers determine SPS indicators in the field of science, (3) The researcher prepares the design of the Science Process Implementation Skills Instrument (SPSTI) (4) the researcher validated the SPSTI to three experts; (5) Carry out inspections according to the revisions of the three appointed expert validators; (6) researchers measured 100 students using SPSTI; (7) Conduct a series of analyzes and conclude capabilities according to the results of SPSTI.

2.4. Instrument

The profile of the SPS on the substance pressure material in junior high school students in a study carried out using SPSTI. The indicators used in the SPSTI are determining the formulation of the problem, formulating hypotheses, identifying the experimental variables studied, determining the operationalization of variables in the experiment, making graphs; Data analysis; Formulate conclusions. The three appointed experts have stated that this research instrument is valid and reliable. SPSTI validation results are in Table 1.

Table 1. Short cut keys for the template

Item of SPSTI	Validation Score	Validity	Reliability
Item 1	4.00	Very valid	Reliable
Item 2	4.00	Very valid	Reliable
Item 3	4.00	Very valid	Reliable
Item 4	4.00	Very valid	Reliable
Item 5	4.00	Very valid	Reliable
Item 6	4.00	Very valid	Reliable
Item 7	4.00	Very valid	Reliable
Item 8	4.00	Very valid	Reliable

In table 1, it is stated that 3 experts have concluded that it is valid and reliable for the existence of the SPSTI test instrument to identify the SPS profile on the substance pressure material of junior high school students.

2.5. Data analysis

Profile of junior high school students' SPS on the substance pressure material was analyzed by quantitative descriptive by calculating and explaining the percentage of SPS achievement on the substance pressure material. The following is the interpretation of the score data from the SPS percentage shown in Table 2 [29].

Table 2. Category of score data SPS

Interval	Criteria
86 – 100%	Very high
76 - 85%	Tall
60 - 75%	Currently
55 - 59%	Low
< 54%	Very low

3. RESULTS AND DISCUSSION

Three experts stated that the SPSTI was valid and reliable and then tested on SMP student class VIIIA, VIIIB, VIIIC, VIIID students, totaling 100 students taking science subjects. The following is the analysis of the results of the SPS for junior high school students on the material pressure of substances, which are presented in Table 3 and Table 4.

According to the data in table 3 and table 4, it is known that the SPS of students on the substance pressure material is in the very low category. In all SPS indicators, all students do not have achievement scores above 60%. There is one indicator whose percentage value is 0%, namely the indicator making a graph. Based on this, it can be concluded that the profile of junior high school students' SPS on the substance pressure material is still very low.

Based on the results of interviews with science teachers, the causes of students' SPS on very low substance pressure materials are (1) teachers do not train SPS specifically for students because each lesson focuses more on mastery of concepts, (2) teachers also admit that they do not understand SPS so it is difficult for teachers to train SPS students, 3) as for the low percentage of the

sixth SPS indicator, namely making graphs with a score of 0% because students are not accustomed to presenting

Table 3. Students' SPS on substance pressure material

I	VIII A		VIII B		VIII C		VIII D	
	S	C	S	C	S	C	S	C
I1	44,60	VL	44,00	VL	45,20	VL	40,40	VL
I2	44,80	VL	48,00	VL	46,00	VL	48,40	VL
I3	45,20	VL	44,80	VL	45,60	VL	47,60	VL
I4	47,20	VL	46,00	VL	46,40	VL	48,40	VL
I5	43,20	VL	39,60	VL	39,20	VL	30,40	VL
I6	0	VL	0	VL	0	VL	0	VL
I7	40,40	VL	46,40	VL	44,40	VL	48,40	VL
I8	44,40	VL	43,60	VL	44,40	VL	46,40	VL
A	**38,60**	**VL**	**39,05**	**VL**	**39,90**	**VL**	**38,80**	**VL**

Note= I: an indicator of SPS; S: Score; C: Criteria; VL: Very low; A: Average

Table 4. Details of indicator SPS score

Indicator of SPS	S	C
1. Formulating the problem	43,30	VL
2. Formulating a hypotheses	46,80	VL
3. Identifying variables	45,80	VL
4. determining the operationalization of variables in the experiment	47,00	VL
5. Designing experimental procedures	38,10	VL
6. Creating graphics	0	VL
7. Data analysis	45,00	VL
8. Formulating conclusions	44,70	VL
Overall Percentage	**38,83**	**VL**

Note= S: Score; C: Criteria; VL: Very Low

data in graphic form, (4) there is no SPS-based worksheet so students are not accustomed to solving problems presented with scientific solutions, (5) the absence of appropriate teaching materials for teachers in SPS training so that students lack enthusiasm in learning science, (6) teachers are not trained to develop innovative teaching materials, especially SPS training, (7) students during practicum activities in the laboratory are less serious so that the steps of scientific work are less impressive for students, (8) tools and materials do not support SPS learning so that practicum activities are often missed and only memorize concepts as an alternative to mastering the material, (9) SPS is not used as an assessment in the national exam so students are less enthusiastic.

The solutions for improving SPS for students by implementing or carrying out developments based on research findings that have been proven effective to improve SPS are: (1) providing appropriate treatment to students, one of which is by applying learning models that can improve SPS (guided inquiry, learning cycle, PjBL) [2-4,13,14,18,19,24,25]; (2) developing learning modules and media using the STEM approach [14,26]; (3) learning using a generative approach [6,9], PhET-based scaffolding approach [5,15], project-based has been shown to improve SPS [1]; (4) developing SPS-based student worksheets learning is proven to be able to improve SPS [1,11,12,20-23,29]; (5) Experimental learning assisted by virtual laboratories can improve SPS [10,34]. Many alternative solutions can be used and adapted by teachers. Teachers still need to make modifications according to the character of students so that learning is more meaningful.

4. CONCLUSION

In this research, the SPS profile of junior high school students on the material pressure of substances, in general, is still very low. The factors that greatly affect students' SPS abilities related to the learning process are very diverse so that there is a need for follow-up for researchers. The findings and results of this research can

be empirical evidence regarding students' SPS on substance pressure material that still needs to be developed and improved. The limitation of this research is that it still uses 100 junior high school students. further research is needed to innovate in improving students' SPS on the material pressure of substances.

AUTHORS' CONTRIBUTIONS

Saidawati designed research, developed instruments, conducted research, analyzed data, and wrote scripts. Zainul A. I. Supardi and Fida Rachmadiarti participated in designing research, validating research instruments, supervising, providing provide constructive corrections and suggestions in the process of drafting the manuscript. Eko Hariyono and Arif Sholahuddin participated in supervising, providing input, criticism, and suggestions on the writing of the manuscript. Binar K. Prahani participated in designing research, validating research instruments, supervising, providing good criticism and suggestions in writing the script.

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