Analysis of high school students’ science process skills

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Abstract. This research aims to describe the Science Process Skills of high school students on elasticity material. This research used descriptive methods. The respondents involved in this research were 25 students from XI IPA 2 SMA N 4 Madiun. The instruments used were 10 multiple choice tests and questionnaires for Science Process Skills. Science Process Skills in this research are basic Science Process Skills consisting of 5 aspects of indicators. The indicator aspects of the Science Process Skills in question are observing, concluding, identifying and manipulating variables, predicting and interpreting data. The indicator aspect of Science Process Skills that has the lowest percentage of 30% is the conclude aspect, while the highest skill is the Science Process Skills in the indicators aspect of identifying and manipulating variables, and interpreting aspects of data where each indicator has an equal percentage of 50%, for observing indicators have a percentage of 40% and indicators predict by 34%. The results of this study indicate students in SMA Negeri 4 Madiun on material elasticity material have Science Process Skills with an average value of 40.8% which is included in the low category.

1. Introduction
Curriculum 2013 facilitates and motivates teachers and students to obtain the expected graduation competency standards. In the curriculum 2013 each teacher is required to apply learning using the scientific approach. This approach is suitable for all subjects, especially for physics learning. The scientific approach will train students to be able to have science process skills. Science process skills (SPS) is the ability of students that can be transferred and can be applied to many sciences and which reflect the behavior of scientists [1]. SPS plays an important role for each student as a basis for using scientific methods in the development of science and students are expected to develop the knowledge they have or acquire new knowledge. SPS is one approach that must be used as a reference for teachers in implementing the learning process.

Science Process Skills (SPS) is defined as transferable skills and can be applied to many sciences and that reflects the behavior of scientists [2]. SPS is a skill that facilitates learning in physics, encourage students to have a sense of responsibility, increases learning activeness, and facilitates students to obtain research methods and methods, namely ensuring ways of thinking and behaving like scientists.

Science process skills are important possessed by every individual as basic capital for someone so that in their daily lives they can solve their life problems. KPS consists of intellectual, manual, and social skills that are used to build understanding of a concept or knowledge and to convince or perfect an understanding that has been formed [3]. Physics with its characteristics is one of the fields of science that is good enough to recognize each student's SPS. In the learning process to determine the ability of SPS required by students required appropriate methods and in accordance with the subject matter that
has been learned. To be able to appreciate SPS, a learning process is needed that provides support for students to do aspects of SPS.

Activities that describe process skills are Observing, Clarifying, Communicating, Measuring, Predicting and Concluding [4]. Science process skills can be categorized into 2 levels, namely basic and integration. Integration science process skills are composed of 5 skills, namely: (a) Identification and control of variables, (b) Operational definitions, (c) Hypothesis formulation, (d) Experimenting and being able to design and test their own hypotheses utilizing existing producers to obtain reliable data, (e) Interpreting data and being able to conclude [5].

Science process skills can increase student responsibility for learning, facilitate science learning and student activities in class and teach students methods or scientific research. These skills are relevant to all fields of science, more important by students is how to learn to apply science in actual learning in daily life, apply concepts, harmonize theory and law in learning. This is more needed for students to have habitual science process skills [11].

Science process skills has become an important part of the science curriculum and has also become approaches that provide more effective science education. Consequently, the develop of curricula that focus on science process skills requires the development of relevant and valid instruments that can evaluate the improvement of these skills. Assessment uses Hand-on Procedure to determine the science process skills of students considered the most appropriate. Science schools in Malaysia have implemented it with practical work, known as PEKA to quantify students' science process skills [12].

Science process skills are described as an adaptation of the skills used by scientists to compile a knowledge, think about problems and infer. Science process skills affect science education because it can make it easier for students to develop higher-order thinking skills such as critical thinking and making decisions to overcome problems. In his research to be able to improve students' science process skills, a worksheet sourced on science process skills can be used by teachers to support awareness and knowledge of science process skills. The conclusion of this research is that one worksheet is not enough to develop students' science process skills, so worksheets with a variety of topics deserve to be developed and their effectiveness deserves to be investigated. Part of the worksheet can be changed according to the needs of teachers and students [13].

The SPS approach means the treatment set in the learning process by using thinking and creations efficiently and effectively to achieve the objectives of the teaching and learning process. Basically, each student has physical and mental skills in the form of potential or abilities that have not been formed clearly, abilities that are still very simple, abilities that still need to be stimulated so that students are able to self-display. The teacher must be able to grow that potential from within students and develop these skills at the level of the development of students' thinking.

2. Methods

This research is a descriptive study using the Purposive Sampling Area method. This research has been carried out at SMA 4 Madiun. The samples in this research were students of class XI IPA 2 who had received elasticity for the 2018/2019 school year as many as 25 students.

The data collection techniques in this study used an instrument in the form of 10 multiple choice questions and questionnaire data on science process skills. From the results of data analysis in this study it will be known how students' Science Process Skills are on elasticity material. The data already collected will be done processed using percentage interpretation data processing techniques. Retrieval of scores obtained are calculated by the formula and converted to a percentage scale (0% -100%). The formula used is as below [6].

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\text{Percentage(\%)} = \frac{\sum \text{Score obtained (x)}}{\sum \text{Maximum score (n)}} \times 100\%
\]

The percentage values were obtained will be matched with the table below.
3. Results and Discussion

This research intention to describe the Science Process Skills (SPS) of high school students in elasticity material. SPS High school students could be saw from the results of the SPS test on elasticity material. SPS in this study are basic SPS consisting of 5 aspects of indicators. The indicator aspects of the SPS in question are observing, concluding, identifying and manipulating variables, predicting and interpreting data. The overall results of the value of the SPS of students in this research are presented in Figure 1.

Sourced on Figure 1 over, it could be explained those the two aspects of the science process skill indicator students have the highest percentage, namely the aspects of identifying and manipulating variables and on aspects of interpreting the data with a value of 50. Then followed by the concluding aspect of 40, followed by the predictive aspect that is equal to 34. Finally, the lowest science process skill ‘value is obtained from the observing aspect of 30.

Sourced the results analysis data of Science Process Skills’ students in the elasticity material could be saw the average number of value students' Science Process Skills is 40.8%. The Science Process Skills Value of the students is based on the score criteria included in the low category. Students who cannot answer tests are included in a large category; this shows the inability of students to provide answers sourced on science process skills. Student don’t have the ability to communicate the results of experiments which is done in writing. The inability of students to show science learning has not been carried out according to the nature of science. SPS is a general implementation for children in developing skills from various types of cognitive, social and emotional development through direct experience. Science process skills could too improve student’s creativity through motor skills and motor activities throughout the project [10].

Overall, the ability of students' science process skills is included in the low category where students agree or disagree on a statement or problem but cannot solve scientifically even experience...
misconceptions. Some of the factors that cause is, among others, students not familiar with completing tests or problems related to science process skills. Besides introducing a form of test that is oriented to science skills, it is necessary to have explicit learning that trains science process skills so students are accustomed to doing things related to activities including: Identifying scientific questions, providing scientific explanations of phenomena and using scientific evidence [7]. Being a teacher is not only able to master the process skills, but in learning science it would be better if the science process skills could be applied in the classroom [9]. The development of students’ science process skills is very important in education, because they can provide student learning abilities and encourage students to think critically. One of the most beneficial strategies for introducing science process skills is the training of teachers and prospective teachers to be able to develop science process skills [8].

4. Conclusions
Based on the data analysis that has been carried out, then the conclusions that can be drawn the science process skills of students in material elasticity material have a score criterion in the low category with an average value of 40.8%. The value of the science process skills of the students based on the science process skills in the aspect of the indicator concludes has the lowest percentage that is equal to 30%, while the highest skill is the science process skill in the aspect of identifying and manipulating variables, and interpreting aspects of data where each indicator has the same percentage is equal to 50%.

Suggestions that can be given by researchers are: (1) For teachers, it is expected that in teaching and learning activities can choose learning methods that can train Science Process Skills students so that skills possessed by students can develop. (2) For schools, it is expected to provide complete learning facilities so that they can support the process of teaching and learning activities. (3) Other researchers are expected to be able to follow up this research to find out how to overcome the science process skills of high school students who are still categorized as fair / low.

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