Science Process Skills of Senior High School Students in Kebumen Regency on the Topic of Environmental Change

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ABSTRACT
This research aims to analyze the results of students science process skills on the topic of environmental change. This research was conducted in public high shools in Kebumen Regency. This research used a quantitative descriptive method by using 5 essay questions. The sample were 150 students of class XI in SMAN Kebumen Regency. Data obtained by using a test technique with google form which contains 5 essay questions on environmental change material. The data analysis technique used descriptive data analysis with a quantitative approach.The results of this research indicate that the science process skills of State Senior High School students in Kebumen Regency for observation indicators have a percentage of 70.12% in the high category, for the classification indicator 56.75% with thw medium category, for the drawing conclusion indicator 66.5% with the high category and for indicators predicting 67.75%.

Keywords: Science process skills, Environmental change

1. INTRODUCTION

In essence, studying biology is the process of finding facts, concepts, and principles that are not just mastery of science. But it is necessary to learn about how to obtain information through scientific skills. Biology as an integral part of science, provides various ways to acquire knowledge through a number of science process skills activities by means of inquiry, observation and experiment. Biology learning must emphasize the process by which students build the knowledge obtained from the learning activities they experience. Biology learning should be designed to provide students with opportunities to discover facts, construct concepts, and discover new value through the process as scientists discover knowledge. Biology learning is an effort to develop thinking skills, attitudes, and processes [1]. Concerning process standards states that learning objectives include the development of the realms of skills, knowledge and attitudes. Process skills are one of the skills students must have in

learning biology. Skills that are tried during science education activities are said to be science process skills [2]. This skill will be the link between developing concepts and developing attitudes and values, so that students will be more skilled at applying concepts in solving problems.

Learning activities that are carried out can make students get a complete understanding of the process skills they have. Science process skills are divided into two, namely basic and integrated. Basic process skills consist of skills to observe, classify, measure, conclude, and predict. Meanwhile,integrated science process skills consist of the ability to recognize and characterize factors, collect and handle information, create tables and charts, describe relationships between factors, describe information, plan materials, retrieve information, hypotheses, plan examinations, and drawing conclusions [3]. Science process skills are utilized to take care of issues and can also do experimental activities. Science process skills are directed at cognitive and psychomotor abilities to carry out scientific investigations, find concepts,

principles, and theories to develop pre-existing concepts [4].

Science process skills in this research are basic science process skills which including the skills of observing, classifying, concluding, and predicting. These basic science process skills are the foundation for learning and mastering integrated science process skills. The importance of science process skills is a hope for the curriculum in Indonesia which is stated in the competency standards of student graduates. In the learning process students are directed to have the ability to observe, ask, try, reason, present, and be creative. But in reality in the field the learning process that trains students' science process skills is not optimal. Based on the results of several studies on science process skills, the results obtained in the aspect of predicting. This is because students only memorize concepts without ever seeing them directly or practicing them [5].

In developing a process of sense of responsibility and increasing the importance of research methods in the learning process students need science process skills that are formed through an independent learning process [6]. Therefore, it is important to be understood by teachers because of the importance of these skills in science learning [7]. Teachers are often more concerned with learning outcomes obtained by students, especially in the cognitive domain, rather than the processes experienced by students. The assumption is that the more students who get high learning outcomes, it is said that they have succeeded and understand the learning material well. However, there are things that need to be realized that the success of learning is not only seen from the results obtained, but in terms of the process as well. In other words, the learning process determines the results obtained by students later.

One of the biology topics that discuss the relationship between humans and the environment is the topic of environmental change [8]. This material aims to make students care about the environment, especially the problem of waste and environmental pollution. This material is often considered easy and boring, so students are reluctant to study it more deeply. Often teachers give independent assignments to students in the hope that students learn on their own and are not shown the object of the problem directly even though to practice science process skills the teacher can use this environmental change material because students can practice with real examples.

Based on the results of interviews conducted at one of the public high schools in Kebumen Regency,

namely senior high school Pejagoan, Kebumen Regency on February 22, 2020, teachers still use the conventional model, namely lectures so that students have not played an active role, tend to be passive. Lack of practicum implementation due to the absence of laboratory assistants makes teachers rarely carry out practicum so that students' science process skills are still considered less honed. According to research [9], indicating that teachers are not aware that developing science process skills is important and that classroom activities do not specifically ensure that students achieve science process skills. In delivering environmental change material which is an applicable material, the teacher uses the home group assignment method to discuss various topics and present them. The practice questions given by the teacher did not use indicators of science process skills. Therefore, these skills must be understood by teachers so that they can be taught to students properly [10].

After conducting a literature analysis, no research studies were found on the analysis of science process skills of public high school students in Kebumen Regency. Therefore, this research needs to be done because so far there has been no research on the analysis of the science process skills of high school students in Kebumen Regency.

2. RESEARCH METHOD

2.1. Research Design

This research used descriptive quantitative method which aims to analyze the results of students' science process skills. The data analysis technique used descriptive data analysis with a quantitative approach. The population in this study were all high schools in Kebumen Regency. The subjects used were 2 Public Senior High Schools students of class XI in Kebumen Regency which randomly determined the sample. This is because all students in schools are considered to have the same ability because SMAN in Kebumen regency have been accredited A, biology teachers are civil servants, and new student admissions have used zoning system no longer based on the highest score. The total number of respondents was 150 students of class XI IPA from public senior high school (SMAN) 1 Pejagoan and public senior high school (SMAN) 1 Klirong. The research was conducted for two months, namely on 1 August 2020 - 1 October 2020 online using Google Forms with an essay test instrument. The scientific process skills measured are observation, classification, drawing

conclusions, and predictions. Measurement of science process skills using written test instruments.

2.2. Data Collection Techniques and Instruments

The data was collected by means of a test technique in the form of an online essay test via google form. The questions on the essay test given refer to indicators of science process skills. The indicators of scientific process skills that are measured are observation, classification, drawing conclusions, and predictions. Online data collection via google form.

2.3. Research Data Analysis Techniques Research

The data analysis technique used descriptive data analysis with a quantitative approach. The quantitative descriptive data analysis technique is in the form of a percentage, the goal is to determine the percentage of students' mastery of science process skills. The test results were analyzed using Microsoft Office Excel by calculating the score per indicator. The following is a calculation formula to determine the percentage score of science process skills [11].

$$NP = \frac{R}{SM} \ x \ 100\% \tag{1}$$

Information:

R : scores obtained on indicators of science process skills

SM : maximum score of science process skills

NP : percentage value per indicator of science process skills

There are five categories of mastery of science process skills which can be seen in table. The categorization of the level of mastery of science process skills uses the formula as in Table 1[11].

Table 1. Categories of science process skills mastery level

Percentage Average Score (%)	Category
75.05 < X	Very high
58.35 < X ≤ 75.05	High
41.65 < X ≤ 58.35	Moderate
24.95 < X ≤ 41.65	Low
X ≤ 24.95	Very low

3. RESULTS AND DISCUSSION

3.1. Science Process Skills of Public High School Students in Kebumen Regency

Science process skills are one of the important abilities students have in learning biology, because biology is inseparable from scientific processes such as observing, applying, understanding, and developing scientific methods and discovery new knowledge. [12] argues that the process of science skills is indispensable in the learning process because it is to develop a sense of responsibility and master research methods. Science process skills are divided into two, namely basic and integrated. In this study, what is measured is basic science process skills. Where basic process skills are the foundation of science process skills possessed by students which are very important in the scientific process.

The indicators used in science process skills (SPS) only use 4 indicators, namely: observation, classification, drawing conclusions, and prediction. The reason is that it only uses four indicators because in its implementation it uses online via google form. The questions given are problem-based questions on the topic of environmental change. The answer score is then entered into the formula and calculated using Microsoft Office Excel. The results obtained are presented in the form of percentages and categories per indicator of science process skills of public high school students in Kebumen Regency as in Table 2 below.

Based on Table 2, the percentage and category results per indicator of science process skills of public high school students in Kebumen are in the high and medium categories. The results of this study were obtained from the analysis of answers to description questions as many as 5 questions on science process skills given to the research sample via google form.

Table 2. Result of percentage and categories per indicator of science process skills for public senior high school studentd in kebumen regency on environmental change material

Indicator	Percentage	Category
Observation	70.12%	High
Classification	56.75%	Moderate
Draw a conclusion	66.5%	High
Predict	67.75%	High

The highest indicator is observation with a percentage of 70.12% and the lowest indicator is classification of 56.75%. The greatest result is the observation indicator which is the first indicator of science process skills. In this indicator, students observe an object in the form of an image on the questions that have been provided to find information about the object using their five senses. This indicator is considered to be an easy indicator because it is the most basic indicator. This is in accordance with the research conducted [13] that observation skills are in the high category, because students observe to collect data based on factors related to learning material and what they see. Using relevant and adequate facts from observations also includes observing process skills. This also corresponds to [14] that observing indicators is a fundamental scientific skill that uses all five senses. In learning activities students will be required to interact directly with real objects orevents, so that students find it easier to observe or observe an object. Scientific skills are based on observational skills in the presence of observational evidence that they are essential for scientific discovery and the application of scientific theory [15].

The lowest analysis result is the classification indicator of 56.75% and is categorized as medium which means students who are less able to classify still need to be trained. Classification skills are skills in selecting or grouping something based on the similarities or differences that are owned. According to [16], Science process skills on classification indicators can be obtained when students are able to interpret experiences related to the surrounding environment. In the indicator of classifying questions, students work on questions about the surrounding environment, namely the differences in waste based on its origin which are contained in the images provided in the questions. The factors that can cause the low results can be caused by the lack of carefulness of students in understanding the instructions about the differences in waste. Based on the answers, it was known that the participants did not understand the questions and pictures so that more people answered explaining the meaning of garbage and waste, and giving examples. Therefore, this classification skill is important to have because it can develop the ability to think logically in a flexible manner [17].

When faced with questions about classification, the first step that must be taken by students, namely looking for the differences contained in the picture questions, then looking for the characteristics of each, comparing, and looking for the classification based

on what, such as based on the origin of waste from industry and households. This step can be an easy trick for students to classify. As according to [18] which states that the classification activity, classification is carried out after students recognize their characteristics. So that the process of grouping includes several activities such as looking for contrasting characteristics, looking for similarities, differences, comparing, and finding the basic of classification. This also corresponds to [15] classification is a process skills to determine objects based on their specific characteristics, so that a similar group is obtained about what is meant.

Drawing conclusion skills have a percentage of 66.5% and are categorized as high. In this study students have the ability to draw conclusions based on the discourse with data provided. Practicing science process skills is very important because, if students have mastered process skills, then these students have mastered the skills needed in high-level learning, namely conducting research and solving problems. In measuring the skill indicators to conclude, students are given questions about air pollution problems. From the students' answers to these questions, it can be illustrated that students are quite capable of having skills based on the facts given or real examples. Teachers are required to be able to design, develop and create science learning activities that can develop student's science process skills. The teacher realizes that science process expertise means getting students to master the concept better, but because of time constraints and workload, they find it difficult to practice it in learning [19]. Science process skills serve as effective competencies for studying for examining science and innovation, critical thinking, individual and social turn of events [20].

Predicting skills involve using students' knowledge to decide what will happen if something changes in a situation [14]. Prediction skills are in the high category of 67.75%. The thing that has been unconsciously practicing these skills is when students are asked to predict their daily surroundings by the teacherThe teacher asks the questions only as an introduction to the topic of the day. This skill is implanted in the classroom [19]. The high predictive skill in SMA Negeri Kebumen Regency is due to the implementation of the discussion method in learning activities so that students get used to interacting and practicing mastering concepts. Based on information obtained during an interview with a Biology teacher, when learning material changes in the environment the teacher assigns students to discuss a problem that exists in the discourse provided.

From these discussion activities, students are directed to predict a problem by using the facts found. This is in accordance with the research results [21], that the indicator predicts high because students can predict something that will happen based on an existing trend or pattern to answer questions. Apart from that, according to [22], students can predict well because students have previously gained an understanding of the concept. Furthermore, in predicting skillsused in the process of introducing and implementing a solution to a problem. This can be seen from the examples of problems in the questions [23].

4. CONCLUSION

Based on this research, it can be concluded that the percentage of science process skills mastered by public high schools in Kebumen Regency is observing with a percentage of 70.12%, classification of 56.75%, drawing conclusions as large as 66.5%, and predicting 67.75. %. The highest result was the highest observing indicator with a percentage of 70.12% including the high category and the lowest classification indicator of of 56.75% which was in the medium category.

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