

Basic Science Process Skills in Senior High School for Solve Wetlands Problems

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ABSTRACT

Science process skills are scientific processes that lead to finding knowledge. SPS describe as problems in scientific investigations, and find new knowledge in learning activities. Basic skills consist of observing. Classifying, measuring, inferring, predicting, and communicating. This research aims to determine Basic Level Science Process Skills (SPS) in senior high school. This research is a descriptive study by taking data of all class X MIA students at SMA Negeri 9 Banjarmasin for one semester. The results showed that the highest level of basic science process skills was in the classification ability category, namely 100% and the lowest was in the inferring ability category by 64%.

Keywords: *Science process skill, basic skill, senior high school.*

1. INTRODUCTION

Biology learning is related to science process skills. Based on previous research, it is known that basic science process skills are unsatisfactory for first-year students [1]. Several studies prove that improve skill process skills by specific socio cultural strategies and problem solving [2][3]. Biology learning contributes to the development of science process skills through the application of scientific methods. In addition, practical activities for students contribute to improving science skills. This is evidenced from research that problem solving-based laboratory activities can improve science process skills [4].

Knowledge is built on the learning experience by students. Generally, science assessments focus on scientific products but ignore the mastery of the science process skill [5]. Strengthening science through scientific processes has actually been carried out during classroom but it has not been done optimally. In general, misconceptions happen in biology learning such cellular metabolism, circulatory system reproduction and variation [6]. Misconceptions can be reduced by carrying out scientific processes during learning.

Science process skills are divided into 2 categories, namely basic skills and integrated skills. Basic skills consist of observing. Classifying, measuring, inferring, predicting (predicting) and communicating. Then integrated skills consist of identifying variables, constructing hypotheses, analyzing investigations, tabulating and graphical data, defining variables, designing investigations and experiments [7]. Science Process Skills (SPS) has been optimally it was trained to the students in the learning activity [8].

Another research about science process skill in senior high school have been showed that aspects of students' science process skills appeared with varying percentages. Aspects

that appear appropriate are investigative aspects, observation aspects, classification aspects, predictive aspects, and communication aspects [9]. Then Item which development refers to the formulation of the learning continuum concerning both basic skills, processing skills, and investigative skills [10]. SPS are skills used by scientists to describe problems in scientific investigations, and find new knowledge in learning activities. In addition, with this scientific method students can acquire and develop knowledge independently.

The Department of Mathematics and Natural Sciences (MIA) is one of the departments in SMA Negeri 9 Banjarmasin which has various student backgrounds such as school of origin, academic ability and socio-economic background. This difference in background causes students to have different learning outcomes from one another. Based on those statements, it is necessary to investigate how the mastery of science process skills in high school students and if it is related to biology subjects. Then this research aims to determine Basic Level Science Process Skills (SPS) in class X MIA SMA Negeri 9 Banjarmasin.

2. METHOD

This research was descriptive research. Data in the form of descriptions from Basic Level Science Process Skills (SPS) in class X MIA SMA Negeri 9 Banjarmasin. The approach used is a quantitative approach. The research was conducted in class X MIA students of SMA Negeri 9 Banjarmasin. The research time lasted for a semester.

The subjects of this study were students of class X MIA in the 2017/2018 school year. The process undertaken is to provide cognitive test items with open descriptions. The questions are developed based on predetermined criteria and are limited to basic science process skills for solve wetland problems.

Table 1 The indicator for Science Process Skill (SPS)

No	SPS	Indicator
1	Observing	Using the senses gather / use relevant facts by means of identifying Biological objects in wetland area.
2	Measuring	Choose and use tools carefully according to biological phenomena in wetland area
3	Classifying	Grouping data based on similarities and differences carefully according to the concept.
4	Predicting	1) Presenting simple predictions of biological phenomena clearly in wetland 2) Applying the prediction process in situations that will occur in Biological objects in wetland area
5	Communicating	Interpreting experimental data obtained using graphs, tables in a clear and informative.
6	Generating Hypotheses	Making hypotheses based on established cases on phenomena related to Biology, especially in wetland areas.
7	Infering	1) Use all appropriate information in making inferences 2) Appropriately separate nonessential information
8	Evaluating	evaluate the mistakes made in a clear and detailed practicum in Biology, especially in wetland areas.

All those indicators related to theme of Biology in X class such as diversity of living things in biomes. For analyzing data includes of: (1). Scoring of each test item; (2). Group scores into three categories; (3). Make the frequency of each category percentage by the formula:

$$p = \frac{f}{N} \times 100\%$$

F is the frequency as a percentage, N is the total number of frequencies, P is the percentage number; (4). Analyze the data obtained and assign categories based on those that have been determined.

Table 2 Criteria for SPS defined standards

No	Average	Category
1	$90\% \leq x$	Very high
2	$75\% \leq x < 90\%$	high
3	$60\% \leq x < 75\%$	Moderate
4	$40\% \leq x < 60\%$	low
5	$x < 40\%$	Very low

3. RESULT AND DISCUSSION

The results of these measurements on students' basic science process skills are summarized in Table 1.

Table 3 The Percentage of Students Basic Science Process Skills

No	SPS	Percentage	Category
1	Observing	79	high
2	Classifying	100	Very high
3	Predicting	97	Very high
4	Communicating	74	Moderate
5	Generating Hypotheses	82	high
6	Infering	64	Moderate
7	Evaluating	92	Very high
8	Measuring	95	Very high
Average		85.38	high

Based on Table 2, show that Mastery of science process skill in SMAN 9 Banjarmasin overall get 85.38% which on category high. It showed that student mastery their SPS in Biology aspect, This aspect consists of observing, measuring, classifying, predicting, communicating, making hypotheses, inferring, and evaluating.

Based on table 2. Observing aspect on Biological phenomena on is 79%. In this indicator Students able to

observing objects and natural phenomena using their senses. one of which is overcoming environmental problems in wetlands. These observations are made to collect data and information about problems and solutions for environmental. It include sight, hearing, taste, touch and smell. Observing is response to various natural objects using the five senses and it is most basic skill in knowledge [11].

Measuring skill related to be able instruments correctly and apply the calculation method using measuring tools. The first step of the measuring process emphasizes the consideration and selection of the right measuring instrument to use and determining the estimate of a particular object before taking measurements with a measuring instrument to get the right size. This activity provides the active participation of learners. Observing related to measuring, because it is early stages for students make observations using the senses then to observe more deeply according to data and facts, students use tools that are in accordance with the objectives of the observation. Most of the students had highest score for the ability to measure. Basic science process skills are interdependent, implying more than one of these skills in any single activity [12]. Based on these indicator, measurement using quantitative data such height and depth [1].

Classifying aspect are 100% mastery by student, classifying skills the ability to classify an object by observing the similarities and differences of the observed features. Apart from similarities and differences. Objects that have the same characteristics are grouped. If an object that has many differences is found, it can be grouped again. The result of previous research having difference thing on most difficult aspect. In this subject classifying is easiest aspect for reaching by student in SMA 9. But on previous research found that classifying the most difficult aspects on SPS [1]. Predicting on this aspect are 97%. Predicting skill is an ability to predict all things that are likely to happen in the future, based on predicted patterns or trends. On predicting aspect student must have better on observing skill first [13]. The ability to predict is in the very high category. This means that students are able to use the observed patterns to answer questions. Besides, the ability to predict is closely related to students' reasoning abilities. The highest percentage of 100% is in the classification category. This shows that the classification category of students' science process skills is very good.

This is finding related on data show that observing aspect were on very high category. The relationship between facts, concepts, and principles in science. Biology learning requires an active role of learners based on scientific processes and ways of thinking based on facts. According to the assumption from learners, Biology is the science of rote and unbeneficial for their life [14].

Generating hypotheses aspect are 82% which categorized high. Student ability to generate hypotheses and select the feasible research questions among these [15]. Hypothesis will be produced based on prediction. Then better ability to predicting will be relevant for better generating hypotheses. High order questions with rich questions are needed to improve logical reasoning and thinking students, especially in problem solving in wetland problems. Students will use the knowledge, understanding, skills they possess, and they will connect the problems they have with the new situation that arises in wetland [14].

Communication skill show on 74% in the table 3. It skills are the ability to convey facts and concepts and principles of science in audio, visual, or audio visual form. The delivery of this information can be presented in the form of

graphs, charts, maps, symbols, diagrams, mathematical equations, and visual demonstrations [5]. Most student using graphics to present information from data. Students become trained to think about things related to the material being studied. This condition will have a positive impact on students' critical thinking skills with different backgrounds [16].

Inferring are skill to decide the state of an object or event based on known facts, concepts and principles. Some of student mistake on inferring aspect were not finding fact and available information. It related on procedure; don't know how to draw conclusions. Inferring are skill to decide the state of an object or event based on known facts, concepts and principles. Some of student mistake on inferring aspect were not finding fact and available information. The reason student misunderstanding about draw inferring and it related in procedural [17]. Evaluating aspect is an ability for students to criticize the steps, methods, and retest some processes. Learning content (relevance) that is being studied must be related to students' knowledge, so students can adapt science to their lives [16]. SPS can be trained, so makes sure that student be active [18]. Many factors support the mastery of science process skills, namely the active activity of practicum-based activities during biology learning so that students are accustomed to using various laboratory tools. In addition, teachers often use various learning models such as inquiry and discovery learning during biology learning.

Then for improving their own science process skills, it must be (a) Giving Opportunity to Use SPS in Handling First Hand Material and Phenomena. (b) Discussing both in small or large groups. (c) Listening to the ideas / thoughts that were learned about SPS. (d) Supporting Critical Reviews. (e) Prepare flexible techniques for SPS [5].

Based on the research, it suggested to implement learning some models which innovative during teaching on class, then measure integrated SPS. So it imply to explain student ability. Students are activated when individuals encounter unfamiliar problems, uncertainties, questions, or dilemmas. Successful applications of the skills result in explanations, decisions, performances, and products that are valid in the contexts of knowledge and experience [14].

4. CONCLUSION

The results show that basic science process skills are well mastered by students of SMAN 9 Banjarmasin, the aspects measured include the ability to observe as much as 79%, classify by 100%, measure 95%, predict 97%, communicate 89%, Making a Hypothesis of 82%, Inferring by 64%, and Evaluating (Evaluating) by 92%.

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