

The Measurement of Science Process Skills for First Year Students at Biology Education Departement

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Abstract—*A meaningful science teaching focuses on reconstructing knowledge and experience. One way for reconstructing knowledge is by using science process skill. It is an ability of students to solve problems. This research aimed to measure science process skills of first grade students at Biology Education Department. This research was descriptive research involving all of first grade students in Biology Department in academic year 2016/2017. The results showed that the easiest aspect for basic skill was measuring data and the most difficult aspects were classifying and inferring data. The easiest aspect for integrated skill was making data for investigation and the most difficult aspect were analyze investigation and identifying of variables.*

Keywords—*Biology Education Department, Measurement, Science Process Skill*

I. INTRODUCTION

Science broadly as lesson and translation of the physical aspects in a regular and systematic method, including all aspects produced by the method [1]. The aspects are not limited to facts and concept, but are expanded to the application of knowledge and process to change people's way of thinking. Learners develop an experience to prompt and test hypotheses. Then, learners have to try and communicate the outcome of the experiment orally. Written skill is combination of the process and products and intertwined between each other [2]. Science is built on three main dimensions of scientific products (the content of science, the concept of science and scientific knowledge), the scientific process (the process of doing science), and the scientific attitude (the characteristics of science and the view of science).

Learning Biology ideally should increase capacity as a product of the science, process science and attitude. In fact, in learning Biology implemented in secondary and elementary, students use science as products and it will be meaningless without process of science.

A meaningful cognitive learning focuses on reconstructing knowledge and experience, so it only covers remembering or knowing factual knowledge [3]. It is an ability of learners to be able to solve problems, so it is related to material enrichment as a product. Strengthening natural science needs science process skill as a method of science itself. The event consists of a series of biological questions or tasks that involve the use of one or more process Skills.

Science process skills are the things that scientists do when doing science [4]. It means science process skills refer to what scientists do when they learn and investigate. Science teaches how to understand the phenomena like observing, concluding, measuring and experimenting. It is a reflection of the method used by scientists when generalizing scientific information [2].

Science skill process into 2 categories, namely basic skills and integrated skill. Basic skills consists of observing, classifying, measuring, inferring, predicting, and communicating, While integrated skill consists of variable identification, hypothesis construction, investigation analysis, data tabulation, variable definition, investigation design and experiment [4]. These skills can be accessed by applying them to a series of lab station activities.

Mastery of the learning material is not the main objective, yet the most important thing is changing behavior [5]. Teacher give limited teaching only convey the subject matter to teach as the process of set environment to change of teaching paradigm. Teacher's experience for teaching science is related to the orientation as education experts to change behavior. Thus, science process skill can be taught at the previous level education [2]

Biology education department consists of many backgrounds for students, covering origin areas, education level and habits. Students on the first grade at academic year 2016/2017 consists of 40 females and 7 males. They come from various origins, not only from south Kalimantan but also from other areas. They have different education levels. Most of them come from science class of high schools, and some of others are from vocational high schools. Therefore, the problems in this research was "how are the science process skills of first year students in Biology education department? The purpose of this research, was to measure science process skills of the first year students in Biology education department.

II. METHOD

This research was descriptive research. It can be explained as a statement of affairs as the research present the results without getting any control from the researcher, namely the description mastery of science process skill. The approach used in this was quantitative approach. The research was conducted on the Biology Education Department, Universitas Lambung mangkurat for two months, from January to March in academic year 2016/2017.

The subjects of the research were students from Biology education department. Technique analysis was : (1) scoring of each test item, (2) grouping the score into three categories, and (3) making the frequency of each category suppressed by the following formula .

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

F is frequency being searched for the percentage. N is the total number of frequency. P is percentage points. The research data were analyzed by using the Microsoft Excel.

III. RESULTS AND DISCUSSION

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

TABLE I. THE PERCENTAGE OF STUDENTS' BASIC SCIENCE PROCESS SKILLS

No	SPS	Type	Percentage
1	Observing	Basic	55.68
2	Classifying	Basic	35.23
3	Predicting	Basic	51.14
4	Communicating	Basic	63.64
5	Hypothesizing	Basic	59.09
6	Informing	Basic	28.41
7	Measuring	basic	86.36

Based on Table 1, the highest basic skill is ability to measure. Measuring ability uses standard measures or estimations to describe specific dimensions of an object or event. This information is considered as quantitative data. Thus, most of students had highest score.

The most difficult aspects were the ability for inferring and classifying. When student did inferring, they used formulating assumptions or possible explanations based upon observations. The last is ability to classify, in which the students did grouping or ordering objects or events into categories based upon characteristics or criterion.

The level of observation skill was the lowest skill. Highest skills include classifying and inferring skills [6]. Actually basic skills should have been mastered thoroughly by learners from elementary to senior high school.

The highest skill is the ability for measuring. Measuring aspect uses standard measures or estimations to describe specific dimensions of an object or event. This information was considered quantitative data. Most of the students had highest score for the ability to measure. Basic science process skills are interdependent, implying that investigators may display and apply more than one of these skills in any single activity [7].

The results of the measurements on integrated science process skills are summarized in Table 2.

TABLE II. THE PERCENTAGE OF STUDENTS' INTEGRATED SCIENCE PROCESS SKILLS

No	SPS	Type	Percentage
1	Identifying of Variables	Integrated	19.32
2	Organizing Data in Tables and Graphs	Integrated	88.64
3	Designing investigation	Integrated	50.00
4	Analyzing investigation	Integrated	18.18
5	Defining Variables Operationally	Integrated	21.80

Based on Table II, it is known that this study uses integrated skill covering 5 subskills. Integrated science process skills are immediate skills that are used in problem-solving [2]

The highest score was obtained by the ability to organize data in tables and graphs. The students are able to present and organize the collected data in tables and graphs. Moreover, the lowest score was obtained by the analyzing ability, investigating ability and the ability of identifying variables.

The aspect of analyzing investigation was done by interpreting data statistically, identifying human mistakes and experimental errors, evaluating the hypothesis, formulating conclusions, and recommending. The aspect of identifying variables is done by determining the types of variables. The variable being manipulated is the independent variable, the variable being measured to determine its response is the dependent variable, and all variables that do not change and may be potential independent variables are constants.

Student should be able to master whole science process skill. It is supposed to be learning of adapting science as the process. Science as the process is important for understanding the concept such conducting observations, making classifications, measuring, predicting and hypothesizing and constructing knowledge [8]. Giving training of science process skills can increase the academic achievement of students [9]. Learning activities should be directed at learning experience rather than oriented teaching for passing a test or national examination. it termed as teaching for the test [10].

IV. CONCLUSION

The highest percentage of basic science process skills was 86.36 % for the ability to measure data. The lowest percentages of the skills were 28.42% for the ability to infer and 35.23% for the ability to classify. The highest aspect of integrated process science skills is organizing data in tables and graphs indicated by 88,64 %, while the lowest aspect was analyzing investigation indicated by 19.32 %, followed by identifying variables with 18.18 %

It is suggested to other researchers who are interested in doing the similar research to control earnest characteristic of learners in working on a test instrument. Besides, other researchers can add various factors, such divergent thinking, creative learning, and motivation.

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