

Observation and Classification on Science Process Skills in Biology Subject at Jakarta Public High School, Indonesia

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Abstract

Process skills have several indicators that can be used to measure student competence. One indicator of science process skills is observation and classification skills that can be obtained by students using all their senses. This study presents the observation and classification science process skills of high school students and the factors that influence them. The method used is descriptive quantitative method. The results of the study obtained that the results of the study can be concluded that 1) State Senior High School students in Jakarta have observation and classification science process skills in the good category with an average value of observation science process skills of 72 and classification skills of 87; 2) the high value of students' science process skills is influenced by factors are learning methods, learning media, practicum activities, and methods of assessment or evaluation. Factors that can influence infrastructure facilities are the completeness of laboratory equipment, the state of the laboratory room, and the completeness of books in the library.

Key Words: Biology, Classification, Science Process Skills, Observation, High school student

Introduction

Biology is one of the science subject groups which consists of products and processes. Biology learning is expected to be a vehicle for students to learn about themselves and the natural world around them. The biology learning process should be done hands-on and in problem-solving activities to obtain the planned concepts. Through learning biology, students are able to produce output with character (Supriatno, 2018). Students are expected to master the concepts in biology and gain interrelationships between these concepts.

Process skills are fundamental skills that can lead to the physical, mental and social development of learners as a driver of higher abilities (Agustina, 2018). Science process skills can be categorized into basic process skills and integrated process skills (Niagati et al., 2020). Basic process skills consist of six skills, namely observing, classifying, predicting, measuring, predicting, concluding, and communicating (Kartikawati, 2019). Meanwhile, integration process skills can be in the form of identifying variables, identifying variables operationally, tabulating and presenting data, creating a description of the relationship between research variables, compiling hypotheses, collecting data, processing data, analyzing, planning and carrying out experiments (Novita et al., 2017) .

Process skills have several indicators that can be used to measure student competence. One indicator of science process skills (KPS) is observation skills that students can acquire by using their senses of sight, hearing, smell, taste, and touch and using relevant and adequate facts from observations. Classification skills are obtained through grouping activities by comparing, contrasting characteristics, looking for differences, looking for similarities, and looking for classification bases (Rustaman, N. Y and Rustaman, 2003). In this study, the science process skills of observation and classification of high school students and the factors that influence them are presented

Method

The method used in this research is descriptive quantitative. Quantitative descriptive research is used to describe events or events that occur in the form of meaningful numbers. The research sample was obtained using the Cluster Random Sampling technique. The sample of this research is class XI students of SMA Negeri in Jakarta. The research instrument used tests or questions given to measure the ability of science process skills in observation and classification of class XI MIPA students at SMA Negeri in Jakarta. The test is given a total of 20 questions in the form of multiple choice with 5 options covering 13 questions of observation science process skills and 7 questions of classification science process skills. Another instrument used is a closed questionnaire to collect data on the factors that influence students' science process skills.

Results and Discussion

The results of the research and discussion are categorized into two, namely the results of the analysis of the science process skills of observation and classification of students, and the factors that influence these science process skills in students.

Science Process Skills Observation and Classification

Through data analysis of students' answers, we found that the average ability of science process skills with observation and classification was 81, which was in the good or high category. The average value of 81 obtained is the cumulative result of the total scores of all students tested. The results of the students' mastery of the science process observation and classification skills are shown in the following figure 1.

Observation and classification science process skills in biological material have a good category with an average per indicator, namely the highest average is owned by the classification science process skill ability, namely 87 and the observation indicator is 72. This is consistent with the results of the study (Solihati, et al. , 2016), (Nurhadiyani, et al., 2020), (Khairunnisa, et al., 2019), (Kartimi et al., 2013) which states that the students' science process skills in the classifying section as well as observation skills are in the good category. However, at the tertiary level the results of this study were quite different from (Shofia, 2019) which informed that students' science process skills in the observing section were classified as moderate, while the skills in classifying were in the very lacking category. According to (Suryaningsih, 2017) classification science process skills are about understanding a large number of events, all objects in life so that it is easier when grouped into various types of groups. Classification activities can be in the form of determining groups by grouping objects based on suitability for various purposes through observing similarities and differences. Observation activities are carried out using all the senses to see, hear, taste, smell, and feel.

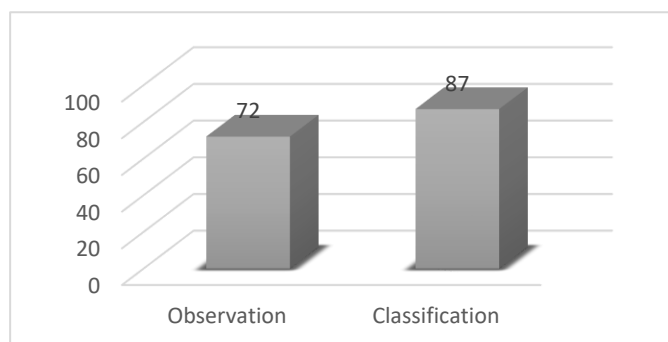


Figure 1. Student Observation and Classification Science Process Skills

Factors Influencing KPS Observation and Classification

Some of the factors that influence KPS observation and student classification in this study are factors related to teachers and the learning process in the classroom, and factors related to supporting infrastructure in schools. Several factors related to the teacher and the learning process include learning methods, learning media, and how to evaluate learning. In addition, the discussion of factors in the form of facilities and infrastructure available at school in the form of equipment and convenience of the laboratory, the availability of textbooks in the school library.

Factors Associated with the Teacher and the Learning Process

Factors that influence the results of science process skills for senior high school students in the observation and classification sections originating from educators/teachers

include the use of learning methods, use of instructional media, practicum activities and/or observation, and learning outcome evaluation techniques. Whereas in the section on facilities and infrastructure that affect students' science process skills, it is explained in the form of the completeness of the tools and convenience of the biology laboratory. The learning method is one of the factors that can influence students' observational science process skills and classification. Based on the results of the questionnaire search regarding the learning methods used by the teacher, we obtained the following data.

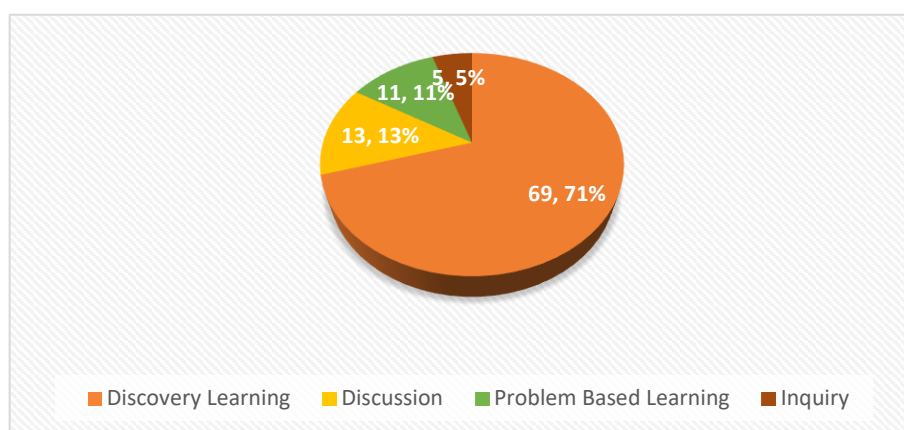


Figure 2. Method Learning Used by Teachers

The research data shows that in the learning process in the classroom the teacher is more dominant using the discovery learning method with a total percentage of 71%, the discussion method is used by the teacher with a percentage of 13%, in the next section the method used by the teacher is problem based learning with a percentage of 11%. , while the inquiry method is the least used by teachers in the science learning process with a percentage of 5%. Mastery of student material belonging to the good category cannot be separated from the learning methods used by the teacher in the learning process. In the sample schools, the teachers used the Discovery method more dominantly. According to (Rahayu, Hardini, 2019) discovery learning is a model for developing the ability to investigate through the process of self-discovery, so that the learning outcomes obtained become meaningful. Through discovery learning students can also learn to think analytically so they can solve their own problems. Therefore this learning method is very suitable for measuring observation and classification science process skills, because these two indicators refer to students' own observations and data searches. In addition to discovery learning, there is an environment-based learning model that can improve high school students' processing skills (Cholvistaria, 2012).

Learning media is a tool used by teachers in conveying their learning, learning media also includes external factors that can affect the ability of observation and classification science process skills. The results of the learning media research questionnaire used by the teacher in the learning process are presented in the following figure.

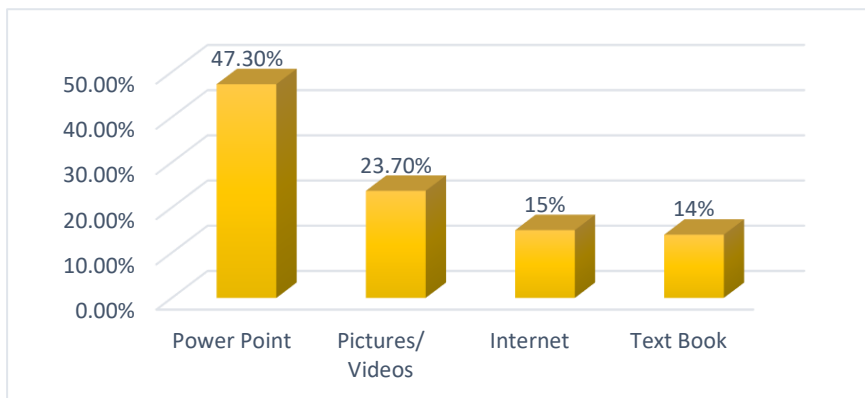
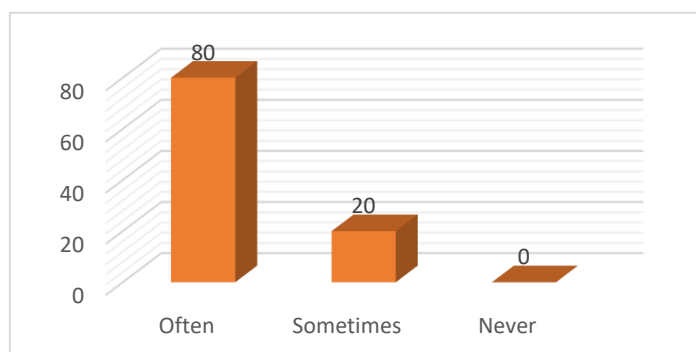


Figure 3. Use of Learning Media in Class

The results of the study stated that the learning media most often used by teachers was power point media with an average of 47.3%, then followed by image/video media as much as 23.7%, then internet media which was 15% and the media used to train students. the lowest science process skills, namely textbooks with an average of 14%. According to research (Muthoharoh, 2019) teaching with power point can be used as an interesting learning medium for students. Through interesting media, teachers can communicate well the material presented. In addition, through the media of images/videos it turns out that it can help students' skill abilities, because by displaying pictures students tend to be more interested in learning. Biology subjects are closely related to scientific concept discovery activities by students. In addition to supporting learning methods and media, these discovery activities are generally carried out through a process of practical activities in the laboratory or in nature. The following is data on practicum activities, observation activities, or experiments in learning carried out by students.



Based on information from the results of the questionnaire students tend to make observations or practicum more often. This is supported by data, namely as many as 80% of students say that they often carry out practicum activities and or observations. While students who answered sometimes did practicum as much as 19%. As many as 0% of students who filled out the questionnaire in the statement had never carried out practical activities or observations. This is in line with the results of research (Maesaroh et al., 2020) which states that the ability of prospective biology teacher students in carrying out experiments is in a very good category. In addition to the completeness of the equipment and the condition of the

room, the time in doing the practicum can also affect the ability of science process skills. Biology learning is not only learning in class, but also learning outside the classroom, namely the laboratory. According to (Nomleni & Manu, 2018) biology learning activities are processes that require hands-on activities, which are supported by practical tools and observation tools. According to (Lepiyanto, 2014) in his research, one of the science process skills that can appear in practical activities is observing/observation skills. The results of other studies inform that students have a high potential for integrating KPS in practical worksheets (Pranata, S., et al, 2014).

The method of assessing or evaluating learning outcomes that exist in students is carried out by the teacher according to the types of learning objectives. Teachers should be able to provide evaluation tools, carry out evaluations, process data and at the same time make decisions and policies based on the results of the evaluations carried out. Learning evaluation can be carried out in the form of an evaluation to improve the learning process as well as to determine student success. How to evaluate learning outcomes can affect the character of the process and student learning outcomes. Information about how the teacher evaluates or evaluates student competence is presented in the following figure 5.

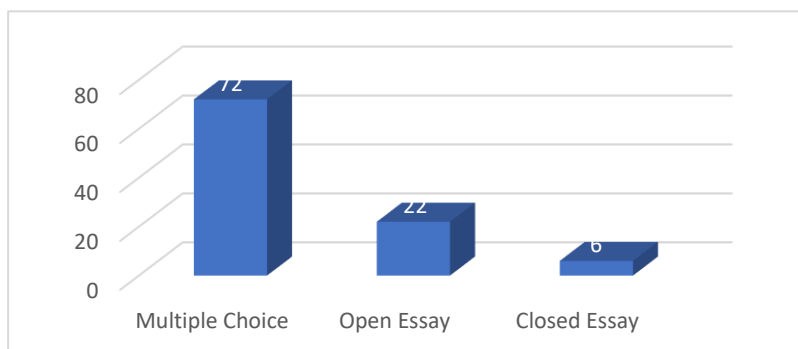


Figure 5. Evaluation of Learning Outcomes

Based on research data, it is known that the most dominant method of assessment used by teachers is multiple choice questions with an average of 72%. The second type of assessment that is often used by teachers is open description with an average of 22%. While the assessment that is rarely used by teachers is closed description with an average of 6%. According to (MUSDANSI & NAHADI, 2019) multiple choice tests can be used to measure learning objectives ranging from the simplest to the most complex. According to research results (RAMADHANI ET AL., 2015) multiple choice questions can be used practically to measure students' science process skills. In another study, it was explained that performance appraisal is an assessment that is very suitable for uncovering students' science process skills (SEPTIANI, 2016). Meanwhile, the results of the study (DIELLA ET AL., 2019) state that observation and classification skills are a type of KPS that are relatively difficult to make an assessment of.

Associated Factors with Means Infrastructure

Facility and infrastructure factors can include the completeness of laboratory equipment and comfort, and the availability of books in the school library. The following is an overview of practical tools that can be used to support biology learning and the convenience of laboratory space based on the results of the questionnaire filled out by students.

Table 1. Completeness Tools and Convenience Laboratory

No.	Indicators	Respondent's Answer
1.	Laboratory Equipment	
	complete	64%
	Quite complete	31%
	Less complete	5%
	incomplete	0%
2.	Laboratory comfort	
	Comfortable	86%
	Less comfortable	13%
	Uncomfortable	0%

The completeness of laboratory equipment in Jakarta public schools is in the sufficient category, as can be seen from the results of the questionnaire with the highest average of 64%, which is quite complete. Then followed by a complete average category with a value of 31%, and incomplete as much as 5%. Facilities and infrastructure greatly affect students' ability to learn. This includes starting from the completeness of the equipment in the laboratory and the condition of the laboratory room.

Not only the completeness of the tools, but the condition of the room also affects the learning process, the comfort of the room can support students to be able to study well. Laboratory conditions at public high schools in Jakarta were included in the comfortable category with an average rating of 86%, while 13% of students stated that the laboratory conditions were uncomfortable. Furthermore, there were no students who stated that the laboratory conditions at school were uncomfortable. Another factor that can affect the science process skills of observation and classification in SMA is the availability of textbooks in the school library. The following is data from a questionnaire about the availability of books in the school library.

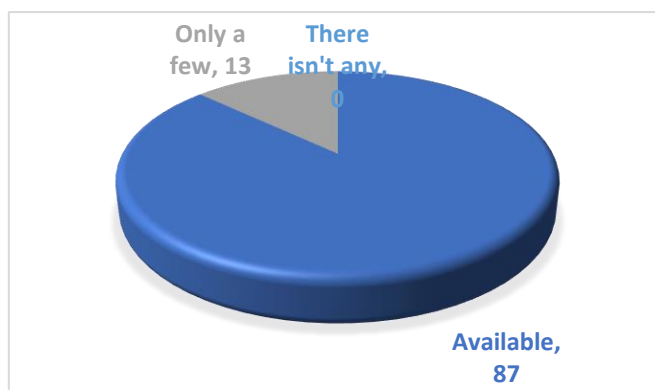


Figure 6. Availability Books in the Library School

According to high school students in the study sample at the Jakarta State School, the availability of books in the school library was in the good category with the percentage of respondents who answered by 87%. On the other hand, there were still students who stated that only a few books were available in the school library or in other words they felt that the availability of these books was inadequate with a student percentage of 13%. The books in the public high school library are readily available, this is one of the factors causing the science process skill abilities of state high school students in Jakarta to be in the good category.

Conclusion

Based on the research data it can be concluded that 1) state high school students in Jakarta have the ability to observe science process skills and classification in the good category with an average value of observation science process skills of 72 and classification skills of 87; 2) the high value of students' science process skills is influenced by learning methods, learning media, practicum activities, and methods of assessment or evaluation. Facility factors that can influence are the completeness of laboratory equipment, the condition of the laboratory room, and the completeness of books in the library.

Suggestion

Further research should be supplemented with direct observation data or observations of the learning process in class and practical implementation in the laboratory or in the field. Furthermore, research can be expanded to the education level or to cover other areas.

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