

ANALYSIS OF SCIENCE PROCESS SKILLS OF STUDENTS IN GRADE V SD MUHAMMADIYAH KUTOARJO

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Abstract: The type of research used in this research is descriptive qualitative research. The research subjects were fifth-grade students of Muhammadiyah Kutoarjo Elementary School in the 2023/2024 academic year with a total of 6 students based on high, medium, and low cognitive abilities. Data collection techniques in this study used observation, interviews, questionnaires, and documentation. The results of this study are: Science process skills of grade V students of SD Muhammadiyah Kutoarjo are proficient, which include, 1) Observing science process skills are feasible and proficient, with a total of 4 students who have reached the indicator. 2) The science process skills of predicting indicators are newly developed, feasible, and newly developed, with a total of 2 students who have reached the indicator. 3) The science process skills of the classifying indicator are newly developed, feasible, and, proficient, with a total of 4 students who have reached the indicator. 4) The science process skills of the interpreting indicator are newly developed, feasible, proficient, and advanced, with a total of 2 students who have reached the indicator. 5) The science process skill of inferring indicator is newly developed, feasible, proficient, and advanced, with a total of 4 students who have reached the indicator. 6) The science process skills of the communicating indicator are newly developed, feasible, and proficient, with 2 students who have reached the indicator. The results of this study can be used as a reference to determine the science process skills possessed by students in learning.

INTRODUCTION

Kurikulum Merdeka is an effort to change the education system for the better and emphasizes a learning process that meets the needs of students by providing independence to continue developing students' potential, interests, and talents (Zahir & Nasser, et al., 2022: 56). The launch of the Kurikulum Merdeka is the government's effort to fix problems in the education system so that learning can give a pleasant impression and be able to improve students' intellectual, social skills and science skills. The quality of education in Indonesia depends on qualified human resources, starting from primary, secondary, and tertiary education (Pangestika R.R & Ratnaningsih A., 2018: 32).

Science learning is an important part of education because it is a vehicle for students to learn broad science contextually and apply it in everyday life (Irsan, 2021: 5632). Natural science is the study of an observation of phenomena or behavior that occurs in the universe and then develops and studies so that a scientific concept is produced (Yulistiana, 2020: 591). Elementary school education level, students' understanding of science learning can be done by making observations or experiments (Puspaningrum, et al., 2023: 875). Science learning provides direct learning experiences for students to understand the surrounding natural conditions through systematic steps. The purpose of learning itself is that students can understand the subject matter taught by the teacher through the learning objectives set (Ngazizah N. et al., 2018: 31).

Science learning has several aspects, namely aspects of attitude, process, and product. Objects or things that are the focus of observation can be abstract and concrete. Abstract objects are objects that are difficult to see in everyday life so a scientific concept is needed that can explain it in real terms. Concrete objects are objects that can be seen directly through the senses (Ismiyanti, n.d., 2020: 51). Based on (Setyawan, 2020: 591), science learning has the aim that students have knowledge and skills about the concepts of the surrounding nature obtained at school that link theory with practice so that students can communicate ideas about learning activities. One of the objectives of science learning is the cultivation of science process skills in students.

Meanwhile (Jannah et al., 2018: 346-347) state that three aspects are studied related to the application of science process skills in science learning, namely teachers, students, and schools. Teachers must provide learning innovations by using observation or experiment activities that can improve students' science process skills. Students should have the self-awareness to continue practicing applying science process skills through questions that can spur each of the skills that are indicators of science process skills. Schools should provide and improve infrastructure that can be used by students in applying science process skills.

According to the explanation from the teacher, the ability of each student is different, so the diversity of science process skills possessed by each student is a natural thing. The teacher explained that there are students who are fast in processing information and commands to act, some have understood and then ask the teacher to confirm the information that students understand, and some have not understood but remain silent or do not ask. This prompted the researcher to analyze the science process skills of grade V students at SD Muhammadiyah Kutoarjo.

METHOD

The research method used in the research is descriptive qualitative. According to Sugiyono (2019: 246), descriptive qualitative is a research method used to research by observing the conditions of natural objects, which are then presented in the form of a description narrative. The sampling technique used purposive sampling technique, while data collection techniques with interviews, observations, questionnaires, and documentation. Data analysis techniques are inductive or qualitative. The research design used in the research is historical research. According to (Aslichati L, et al., 2013: 4.12) historical research design or historical research depends on primary data and secondary data.

Pre-research activities as the first step of research, namely by conducting observations and interviews with fifth-grade teachers of SD Muhammadiyah Kutoarjo. As for the sampling technique, the researcher used a purposive sampling technique. The sample was determined based on the criteria of the student's skill level, which consisted of high skills, medium skills, and low skills. The scoring guidelines used by researchers in assessing student test results are as follows:

$$final\ score = \frac{score\ gain}{ideal\ maximum\ score} \times 100$$

Then the predicate criteria for scoring the results of the student science process skills test are obtained, namely:

Table 1. Subject Codes

Score	Predicate
84 – 100	High
83 – 74	Medium
< 73	Low

RESULTS

1. Description of Research Results

Data collection was carried out by analyzing the results of science process skills tests on experiments to make magnets which were then classified into three categories, namely high, medium, and low using previously prepared scoring guidelines. The results of the classification of students' science process skills tests are used as guidelines to proceed to the data reduction stage, namely by taking several student samples which are then analyzed in depth on each indicator of science process skills. The samples that have been determined then fill out the science process skills questionnaire and interview specifically related to the science process skills possessed by the student. The samples that will be described are 6 subjects based on the category of process skills test results, namely subjects with 2 high categories, 2 medium categories, and 2 low categories. The subject codes in this study that will be described are AAL, GBA, HRR, ALA, FAM, and FDK.

Table 1. Subject Codes

Categories	Subject Codes
High	AAL
	GBA
Medium	HRR
	ALA
Low	FAM
	FDK

The results of the subject's science process skills were then analyzed based on six indicators according to (Dewi P.Y.A., et.al. 2021: 56) namely observing, predicting, classifying, interpreting, concluding, and communicating skills. The analysis of the science process skills of grade V students of SD Muhammadiyah Kutoarjo can be described in the discussion below based on the data in the research that has been previously described.

2. Description of Indicators of Science Process Skills Possessed by Each

Subject

a. Observation Skills

- 1) Subjects with High Ability. Subjects with high ability have proficient observation skills because they can observe by seeing, doing or touching, and listening.
- 2) Subjects with Medium Ability. Subjects with moderate ability have proficient observation skills because one subject is less able to optimize his observation of objects.
- 3) Subjects with Low Ability. Subjects with low ability have decent observation skills because they have not actively practiced and are less precise in answering the test.

b. Prediction Skills

- 1) Subjects with High Ability. Subjects with high ability have decent and proficient science process skills, one subject has been able to predict correctly but the other subject has not predicted only guessed.
- 2) Subjects with Medium Ability. Subjects with moderate ability have decent prediction skills because they are less able to determine predictions correctly in writing, subjects are only incomplete in expressing their predictions.
- 3) Subjects with Low Ability. Subjects with low ability have newly developed prediction skills because they have not been able to process data and determine predictions independently with accuracy in writing, the subject is still fixated on group decisions.

c. Classifying Skills

- 1) Subjects with High Ability. Subjects with high ability have proficient classification skills because they can sort out the observation data, determine the basis for grouping categories, and make grouping tables.
- 2) Subjects with Medium Ability. Subjects with high ability have proficient classification skills because they can sort out the observation data, determine the basis for grouping categories, and make grouping tables.
- 3) Subjects with Low Ability. Subjects with low ability have decent and newly developing classification skills because the have not been able to determine the basis of the grouping category and put objects according to their category.

d. Interpreting Skills

- 1) Subjects with High Ability. Subjects with high ability have proficient and proficient interpreting skills because the subject has been able to explain from predetermined predictions.
- 2) Subjects with Medium Ability. Subjects with moderate ability have decent interpretation skills, because they only relate the experimental results to predictions, so the interpretation is still not correct.
- 3) Subjects with Low Ability. Subjects with low ability have newly developed interpretation skills, because they only associate the results of the experiment with predictions, so their interpretations are still inaccurate.

e. Summarizing Skills

- 1) Subjects with High Ability. Subjects with high ability have proficient inference skills because they have been able to make comparisons of the two experimental results well and clearly and conclude the information obtained related to the experimental object.
- 2) Subjects with Medium Ability. Subjects with moderate ability have decent and proficient inferring skills because they are slightly able to compare the two experimental results and conclude the information obtained related to the experimental object, the subject is less specific in concluding the experimental results.
- 3) Subjects with Low Ability. Subjects with low ability have proficient and newly developed inferential skills because one subject has been able to conclude the results of the experiment but the other subject has not been able to make experimental conclusions.

f. Communicating Skills

- 1) Subjects with High Ability. Subjects with high ability have decent communication skills, because they have not been able to present the results of the experiment in front of the class, but have been able to express opinions, discuss, and ask questions.
- 2) Subjects with Medium Ability. Subjects with high ability have decent communication skills, because they have not been able to present the results of the experiment in front of the class, but have been able to express opinions, discuss, and ask questions.
- 3) Subjects with Low Ability. Subjects with high ability have decent communication skills because they have not been able to present the results of the experiment in front of the class.

DISCUSSION

The research data that has been analyzed is then examined more deeply again through the following discussion. This discussion contains the skills possessed in each subject:

1. Observation Skills

Observing skills are the earliest skills and as material in developing further skills. According to (Kusumawati, 2022: 9), the indicators in observing skills are using as many senses as possible and collecting relevant facts. The science process skills of observing indicators owned by grade V students of SD Muhammadiyah Kutoarjo are proficient and feasible. Observing skills in the proficient category amounted to 4 students, said to be proficient because they were able to use the sensory organs optimally, namely seeing, hearing, touching, and practicing well. The results of the observation are also written in the student activity sheet. As for the decent category, there are 2 students, said to be decent because they can use the sensory organs both seeing, feeling, and doing. Students are still not able to record the results of observations on the activity sheet, so the test work results are not optimal.

2. Prediction Skills

Predicting is predicting the possibility that will occur based on observed data. The indicator contained in the skill of predicting is stating the possibility that will occur by using patterns of observation (Kusumawati N., 2018: 12). Through this research, students predict what objects can and cannot be attracted by artificial magnets and the effect of the number of turns on objects. The science process skills of predicting indicators owned by fifth-grade students of SD Muhammadiyah Kutoarjo are proficient, feasible, and newly developed. The prediction skills of proficient students amounted to 2 students, said to be proficient because they were able to determine the initial prediction of the experiment based on data from observations of objects accurately. In the feasible category there are 2 students, said to be feasible because students are slightly able to determine predictions based on observational data, but the predictions are still not strong. As for the newly developing category, there are 2 students, in determining predictions, both students still depend on group decisions so there is no self-initiation in determining predictions. Both students have not been able to determine predictions correctly based on the observation data.

3. Classifying Skills

Classifying skills can be done when you have obtained observation data. According to (Hisbullah & Selvi Nurhayati. 2018: 6) the indicator in applying science process skills is the activity of recording and presenting data in the form of a grouping table according to the special properties possessed by the object of observation. As in this study, students classify by making a grouping table in the category of objects that can be attracted and cannot be attracted by artificial magnets.

The science process skills of classifying indicators owned by fifth-grade students of SD Muhammadiyah Kutoarjo are proficient, feasible, and newly developed. Classifying skills with the advanced category amounted to 4 students, said to be advanced because students can sort out the data from observations of objects that can be attracted and cannot be attracted by magnets, and determine the basis for grouping categories. Students are also able to make a table of grouping objects that can be attracted and cannot be attracted by magnets in answering questions on the skills test. In the decent category, there is 1 student, in determining the grouping category is correct but the objects written in the classification table are not by the objects that are the objects of the experiment. The new developing category amounted to 1 student, said to be developing because the student has not been able to make a grouping category table by order, and has not been able to sort out which objects are included in the magnetic and non-magnetic categories.

4. Interpreting Skills

Interpreting skills are interpreting data which includes indicators of finding the relationship between observations and statements in the form of explanations of characteristics, and causal relationships in the form of statements (Hisbullah & Selvi Nurhayati. 2018: 6). The science process skills of interpreting indicators owned by fifth-grade students of SD Muhammadiyah Kutoarjo are proficient, proficient, feasible, and newly developing. Interpreting skills with the advanced category amounted to 1 student, said to be proficient because students have been able to express their interpretations in the form of explanations that are per observational data, predictions, and existing theories. The explanation described provides an overview of the results of the experiment from his group so that others can understand what things are obtained from the experiment to make a magnet. In the proficient category, there was 1 student because they were able to express interpretations that were linked to predictions and existing theories.

In the feasible category, there are 2 students, said to be feasible because students stating interpretations are only associated with their predictions, while the predictions previously determined are still weak. As for the newly developing category, there are 2 students, said to be newly developing because students have not been able to state explanatory interpretations of the experimental results independently, students still depend on group decisions.

5. Summarizing Skills

Concluding skills are skills in deciding on the results of observations on objects based on relevant theories in the form of sentences that include all observations on the object (Hisbullah & Selvi Nurhayati. 2018: 8). The science process skills of inferring indicators possessed by fifth-grade students of SD Muhammadiyah Kutoarjo are proficient, proficient, feasible, and newly developing. The skills to conclude with the advanced category amounted to 1 student, said to be proficient

because they were able to compare the two experimental results by writing the number of objects raised by each experimental result and writing the reasons. The student is also able to conclude information related to magnetic and non-magnetic objects correctly.

The proficient category with a total of 3 students, is said to be proficient because students can make comparisons of experimental results briefly and conclude experimental results related to magnetic and non-magnetic objects appropriately. The decent category amounted to 1 student, said to be decent because students have not been able to compare the two experimental results, but have been able to conclude related to magnetic and non-magnetic objects. In the developing category, there is 1 student, because the student has not been able to compare the two results of the experiment and conclude information about magnetic and non-magnetic objects.

6. Communicating Skills

Communicating skills are expressing opinions that contain the results of experiments orally (Kusumawati N., 2018: 11). Oral delivery must use language that is easy to understand, a clear voice, and confidence. In this study, communicating activities are presenting the results of experiments to make magnets in front of the class, either in groups or independently. In reality in the field, the subject shows communication skills through non-presentation activities, namely through group discussion activities, asking questions, and expressing opinions.

The science process skills of communicating indicators possessed by grade V students of SD Muhammadiyah Kutoarjo are proficient, feasible, and newly developed. In this study, it was found that communication skills were not fully realized in presentation activities in front of the class, but in discussion activities, asking questions, and having opinions. In the proficient category, there were 2 students, said to be proficient because students dared to ask questions on behalf of the group when experiencing difficulties when carrying out experimental steps. The decent category amounted to 3 students, said to be decent because students have not been able to make presentations in front of the class, but can be active in expressing opinions and discussing activities. In the developing category, there is 1 student, said to be developing because students have not been able to present in front of the class and discuss and express opinions.

CONCLUSIONS

The science process skills of grade V students of SD Muhammadiyah Kutoarjo can be said to be proficient based on rubric assessment and data analysis. The rubric assessment used states that students are said to meet the indicators if they reach at least the proficient stage. This presents the classification of new developing criteria with a total of 7 students, feasible with a total of 11 students, proficient with a total of 12 students, and advanced with a total of 6 students. Through the number of 12 proficient students and 6 advanced students, it can be concluded that the fifth-grade students of SD Muhammadiyah Kutoarjo have proficient science process skills.

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