

Analysis of the Difficulties Students of Class V in Solving Mathematics Higher-Order Thinking Skills Problems

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ABSTRACT

One of the difficulties experienced students is solving Higher-Order Thinking Skills (HOTS) problems. This study was conducted to identify, students' difficulties in working HOTS problems on speed and discharge material. The research was conducted at SDN Pakisaji 1 using a qualitative descriptive approach and a phenomenological. The subjects are 6 students from class V A and V B. The research data were collected using interview, questionnaires, and tests. The result of the analysis shows that: (1) the high category difficulties in creating because not able to make possibility of distance and time at speed as well as length and width on discharge questions; (2) the medium category in evaluating and creating because not able to re-examine; (3) low category difficulties in analyzing, evaluating, and creating because not able of thinking that is known and compiled, not make conclusions, and cannot make possibilities.

Keywords: *Students Difficulties, Speed and Discharge, HOTS.*

1. INTRODUCTION

The development of science and technology demands a change in the world of education. As a means in the development of science and technology, the world of education continues to develop and the process of adapting to the times. Educational output and outcome standards also continue to increase. One of the current issues in the world of modern education is the formation of Higher Order Thinking Skills (HOTS) for students (Rapih & Sutaryadi, 2018). HOTS, according to Rahayu, et al. (2020) is a complex and gradual thought process to find a solution in problem solving. Meanwhile, according to Annuuru, et al. (2017), HOTS is the ability to combine facts and ideas in the process of analyzing, evaluating, and creating in the form of providing an assessment of a learned fact.

The urgency of HOTS became even stronger when The Partnership 21st century skills formulated a 21st century learning framework. Within this framework, academic content is in the form of 3rs (writing, reading and arithmetic) and 4Cs (critical thinking, problem solving, collaboration and creativity and innovation). is very important in learning activities in the 21st century.

If you refer to this framework, then HOTS is the answer to the challenges of learning in the 21st century (Rapih & Sutaryadi, 2018).

One of the efforts to face the demands of the 21st century is to develop one's literacy skills that can be used to face challenges in today's life. Literacy is an ability in aspects of reading, mathematics and science. In learning mathematics, it is expected that students' abilities are not only calculated, but are expected to be able to use mathematics in solving problems in everyday life (Dinni, 2018).

Mathematics is a scientific discipline that is unique compared to other disciplines because mathematics is related to abstract concepts that are arranged hierarchically and the reasoning is deductive. This will certainly affect the process of learning mathematics. Mathematics learning is the process of providing learning experiences to students through a series of activities that have been planned so that students gain knowledge, are intelligent, skilled, able to understand well the material being taught (Amir, 2014). In this regard, HOTS is considered important to develop students' thinking skills, especially in learning mathematics. By using HOTS, students will gain a deep understanding of mathematical

concepts and can apply them in everyday life (Musrikah, 2018).

Based on research conducted by Nurjanah (2015), the difficulty in learning mathematics in terms of distance, time, and speed averages 80.06%. The factors that cause difficulties are the error factor in doing the test questions. In this regard, according to Hayatullah (2020), students' ability to solve problems is still classified as low-thinking category that is from 35 students, only 2 students are included in the category of high-level thinking.

Based on the results of interviews conducted with the homeroom teacher of class V A at SDN Pakisaji 1 on October 26, 2020, problems were found, namely students felt confused when working on speed and discharge story questions, students also found it difficult to work on higher order thinking questions. Meanwhile, interviews conducted with the homeroom teacher of class V B at SDN Pakisaji 1 found a problem, namely that students still had difficulty when faced with multiplication questions. In addition, an interview was also conducted with one of the students from class V B and a problem was found, namely students were still confused when asked questions about speed and discharge.

Speed and discharge are important mathematical material and are related to everyday life. Jannah in Pitaloka, et al. (2019) mentions that one of the math materials in grade 5 odd semesters is distance and speed. This material is one of the materials that is considered difficult by students because there are still many who have difficulty working on distance, time, and speed problems. Moreover, if the questions have been modified, the students have more difficulty in understanding the meaning of the questions. In addition, materials that are considered difficult in learning mathematics include discharge, because the material includes solving problems regarding measurements which are summarized in story problems (Lestari, et al., 2020).

This study aims to identify: (1) students' difficulties in working on HOTS nuanced speed questions; (2) students' difficulties in working on HOTS nuanced discharge questions. The reason the researchers chose to analyze the difficulties of students in working on speed and discharge questions with HOTS nuances is because during the current covid-19 pandemic, the level of students understanding of speed and discharge is not known with certainty. This is indicated by students' midterm exams scores that are not pure or not from their work.

2. METHOD

The approach used is a qualitative descriptive approach. This research was conducted based on phenomena, events, or social issues presented by describing research data in narrative form. Qualitative

research is carried out on objects that are natural and develop as they are. Qualitative research views the object as something dynamic, the result of thought construction and interpretation of the observed phenomena, and is comprehensive because every aspect of the object has an inseparable unity (Sugiyono, 2019:20).

This study seeks to determine the level of difficulty of students in working on speed and discharge questions with HOTS nuances in fifth grade elementary school. The type of research used in this study is phenomenology. Phenomenology is a type of research that aims to describe the meaning of life experiences experienced by several individuals about certain concepts or phenomena by exploring the structure of human consciousness. So, the research wanted to know the meaning of the difficulties experienced by students of class V A and class V B in working on speed and discharge questions with HOTS. The descriptive approach and the type of research were chosen because the research conducted is related to the events that are currently happening. The research was conducted at SDN Pakisaji 1 which is located on Jl. Raya Pakisaji No 41 Rt 13 Rw 3 Pakisaji District, Malang Regency, East Java. The time of the research was carried out from 27 April to 15 May 2021.

This study uses data analysis techniques Miles and Huberman models. The reason the researcher uses the Miles and Huberman model is because it is in accordance with the title and research needs. Based on the Miles and Huberman model, the researcher took several stages, namely the first to collect data from interviews with homeroom teachers, giving tests and questionnaires to students, and conducting interviews with students and parents. In the second stage, the researcher conducted data reduction by focusing on the work of class V A and V B students, filling out questionnaires, and selecting subjects for interviews. In the third stage, the researcher presented data on student work analysis in the form of tables, filled out questionnaires in graphic form, and interviewed the research subjects using interview transcripts or dialogues. The fourth stage, the researchers compared the results of student work and the results of interviews.

The population selected by the researcher was all students of grades V A and V B even semesters at SDN Pakisaji 1 for the 2020/2021 academic year with a total of 74 students from class V A totaling 38 students and V B totaling 36 students. The technique used by researchers in determining this sample is based on purposive sampling technique. Thus, this study used a sample of 3 students from class V A and 3 students from class V B as representatives of the class V population of SDN Pakisaji 1, where the subjects taken by the researcher were students with high, medium, and low categories.

Sampling of research subjects is seen from the value obtained from the value of the test questions. The value is taken based on the intake aspect, namely the higher the

student's initial ability, the higher the value (Pangastuti & Munfa'ati, 2018). Table 1 show scores or values of research subjects from high, medium, and low categories which will be presented after the researchers get the scores from the results of the speed and discharge tests.

Table 1. Student Grade Category

Number	Grade	Category
1	80-100	High
2	65-79	Medium
3	< 65	Low

3. RESULT AND DISCUSSION

Based on research conducted at SDN Pakisaji 1 for students in class VA and class VB in the even semester of the 2020/2021 academic year with speed and discharge material in the odd semester, data shows that there are still some difficulties faced by students in working on speed and discharge questions with HOTS. There are 38 students in class V A and 36 in class V B. The first step in this study was to conduct interviews with homeroom teachers to obtain information about students' midterm exam results in odd semesters and obtain information about students' difficulties in learning mathematics, especially speed and discharge material.



Figure 1. Test for Class VA and VB

Next, is to validate the questions to material experts and practitioners. After the questions are validated, it is continued by giving test questions. Test questions in the form of descriptions are given to students twice. The first test is done at school because it coincides with face-to-face learning trials, while the second test is done at home. After students take the test, then fill out the Google Form to find out the level of difficulty of students after working on the speed and discharge test questions. The Figure 1 is an illustration when students work on speed and

discharge questions at school by implementing health protocols.

The first test in class V A and class V B was carried out for two days starting from May 3, 2021 - May 4, 2021 because students entering school were divided into two sessions. In the first test students work at school with a time of 3 hours starting from 7 to 10 in the morning. After students work on and are collected, then students fill out a questionnaire link about student difficulties after working on test questions in the form of a google form sent via WhatsApp Group.

Students fill in the link when they arrive at their respective homes. While the second test will be held on May 5, 2021 - May 6, 2021, students work on their own at home at different times. Some are 2 hours and some are up to 3 hours. After students work on the test questions, the results are corrected and given a value. Furthermore, 6 students were taken to be research subjects with consideration and approval from students and parents of students. Scores are divided into high, medium, and low categories for each class.

Table 2. Indicators of Students Difficulty in Working on HOTS Questions

Difficulty	Indicator
Difficulty in learning concept	Students have difficulty recognizing, analyzing questions, and not knowing the concepts used to solve problems
Difficulty in learning principles or procedures	Students have difficulty using arithmetic operations
	Students have difficulty using the right formula to solve the problem
Difficulty solving verbal problems	Students have difficulty solving problems using method
	Students have difficulty making steps to problem solving
	Students have difficulty answering questions correctly
	Students cannot make conclusion answers

The research subjects were obtained from the test results given twice. Representatives of the subject were taken for later interviews with the parents of the students. The goal is to be able to identify in depth the difficulties of students in working on speed and discharge questions with HOTS. Students are also given a questionnaire that is filled out via a Google Form to find out students' difficulties. Based on the results of filling out questionnaires from all VA and VB class students, totaling 74 students, many choose strongly agree and agree, meaning that many students still have difficulty working on speed and discharge questions with HOTS.

The difficulty of grade 5 students in working on speed and discharge questions with HOTS nuances studied using test questions, there were several students who got high, medium, and low scores. In class V A, there are 1

student in the high category, 4 students in the medium category, and 33 students in the low category. While in class V B there are 1 student who belongs to the high category, 1 student who belongs to the medium category, and 34 students who fall into the low category. By the number of students, it can be concluded that there are still many students who are still having difficulties in working on speed and discharge questions with HOTS.

The difficulty can be caused by several factors according to Sudjono (Yeni, et al., 2015) these factors include difficulty using concepts, lack of arithmetic operation skills, and difficulty solving story problems. The following is an indicator of student difficulty in working on the modified HOTS questions from Sholehah (2017). At average, fifth grade students still have difficulty in arithmetic operation skills because they cannot multiplication and division and still cannot solve story problems as evidenced by not completing using methods because students still find HOTS questions difficult. HOTS-based questions require students to think about the application of facts or concepts that have been mastered. Meanwhile, questions that are not based on HOTS are simpler and only measure students' ability to remember or understand a concept and do not present contextual problems related to everyday life (Rohim, 2019).

Therefore, HOTS questions require skills to analyze, evaluate, and create. Analyzing is a process of solving problems by separating each part and looking for interrelationships of parts that can cause problems, evaluating related to cognitive processes, providing assessments based on existing criteria and standards, creating a cognitive process that directs students to produce a new product by organizing several elements into a different pattern from the previous one (Majid, 2014:10). The following is a discussion of students' difficulties in working on the HOTS' speed and discharge questions from each category.

3.1. Discussion on the Difficulties of High Category Students

S₃₁, as one of the students on high category, can "evaluate" the speed and discharge questions well because he can do the questions in the right and proper way and criticize the questions well because he writes the correct conclusions. However, there are subjects who are less thorough because some other questions are not given a conclusion. In "analyzing", the subject can complete the steps in sequence although it still needs to be investigated again regarding the calculation results. In "creating", the subject can formulate and plan answers by writing down information on the questions and writing formulas, but at the production stage, the subjects still have difficulty making possible distances and times on speed questions, as well as length and width on discharge questions.

Based on the results of tests and interviews, it can be concluded that S₃₁ and S₃₆ in solving speed and discharge questions have high-level thinking skills to solve problems analyzing and evaluating, on the question of creating subjects they still need more guidance because they have not been able to make possible distance and time as well as length and width. to solve the problem. Subjects S₃₁ and S₃₆ were able to mention the information that was known and asked, the interview results also showed that the two subjects had answered according to the answer sheet. In addition, it is also supported by the results of interviews with the subject's parents, both parents mentioned that the subject is a child who studies diligently and likes mathematics.

3.2. Discussion on the Difficulties of Medium Category Students

S₁₂, as one of the students with medium category, can "evaluate" the speed and discharge questions well because they can do the questions in the right way and criticize the questions well for writing the correct conclusions. However, the subject was incomplete in writing methods such as converting seconds to minutes which were suddenly written in minutes. While on the other evaluation questions, the subject was less careful in calculating the division and some did not write conclusions. In "analyzing", the subject does not write down the information that is known and asked in the question, the subject can write down the methods and arithmetic operations even though in other questions there are calculations that are still not correct. In "creating", the subject can plan answers, but at the production stage, the subject still has difficulty making possible distances and times on speed questions, as well as length and width on discharge questions.

Based on the results of tests and interviews, it can be concluded that S₁₂ and S₃₄ in solving speed and discharge questions have high-level thinking skills to solve problems analyzing and evaluating, in the matter of creating subjects they still need more guidance because they have not been able to make long and wide possibilities to solve problems. Subjects S₁₂ and S₃₄ have not been able to mention the information that is known and asked, the interview results show that both subjects have answered according to the answer sheet. In addition, it is also supported by the results of interviews with the subject's parents, both parents said that the subject was a diligent child, often took lessons and was sometimes taught by his father or brother at home. The subject likes mathematics depending on the problem, if it is easy he likes it, if not then the subject asks to be taught first.

3.3. Discussion on the Difficulties of Low Category Students

S₃₄ has not been able to "evaluate" the speed question properly because he only wrote the formula and method without writing the conclusion of the answer. While on the discharge question, the subject did not answer the question because the answer paper only reached number 6. This shows that the subject has difficulty in working on the discharge question. In "analyzing", the subject does not write down what is known and asked in the question and immediately writes down the answer. In "creating", the subject can formulate but cannot plan and produce. This is because the subject only writes down the known distance and time without making possible answers. In other questions, the subject also wrote down the method but it was still not quite right.

Based on the results of tests and interviews, it can be concluded that S₃₄ and S₆ in solving speed and discharge questions do not yet have high-level thinking skills to solve problems, analyze and evaluate, and create. Subjects still need more guidance to better understand the problem. Subjects S₃₄ and S₆ have not been able to mention the information that is known and asked, the results of the interview also show that both subjects have answered according to the answer sheet. In addition, it is also supported by the results of interviews with the subject's parents, both parents mentioned that the subject of children who do not like math lessons, when faced with difficult questions, children often complain.

The level of difficulty of students is certainly different from one another. From the analysis results obtained, students with high categories of difficulty in solving speed and discharge questions in the category of creating, students with moderate categories of difficulty in solving speed and discharge questions in the evaluating and creating categories, and students in the low category with difficulty in solving speed and discharge questions in the analyzing category, evaluate, and create. According to Putri (2018), these difficulties can be overcome by doing more story problems, providing remedial programs, giving rewards to students, and collaborating with parents to guide students in working on the questions given.

4. CONCLUSION

Research on the analysis of student difficulties in working on speed and discharge questions with HOTS nuances at SDN Pakisaji 1 obtained several conclusions. (1) The difficulty of high category students is at the stage of creating. This conclusion is shown from the students' inability to make possible distance and time on speed problems and length and width on discharge questions. (2) The difficulty of students in the medium category is at the stage of evaluating and creating. This conclusion is shown from the inability of students to re-examine the

answers because the results of the calculations are incomplete and less thorough in completing arithmetic operations. (3) The difficulty of low category students is at the stages of analyzing, evaluating, and creating. This conclusion is shown from the inability of students to write down what is known and asked, not making conclusions about answers, some calculations are still wrong, and they have not been able to make possible distance and time on speed questions and length and width on discharge questions. It is expected that the teacher can provide an introduction to HOTS questions to students so that they can find out HOTS math questions, teachers can also provide HOTS nuanced questions to students on a regular basis to train students' higher-order thinking skills. It is hoped that for future research, this research can be used as a reference to conduct other similar studies.

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