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ANALYSIS OF KNOWLEDGE STUDENTS IN COMPLETING ASSOCIATION OPERATION PROBLEMS

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Abstract

Procedural knowledge is knowledge about the steps that must be taken to solve a problem and can represent mathematical ideas and procedures used to solve a mathematical problem. This study aims to analyze students' procedural knowledge in solving problems on set operation material. This type of research is descriptive qualitative research, namely research that aims to determine students' procedural knowledge in solving set operation questions in class VII Muhammadiyah Melati Middle School, West Seram Regency. The subjects of this study were two students who were known to have criteria for procedural knowledge. The research instrument consisted of test questions on the set material and interview guidelines. Data analysis techniques consist of data reduction, data presentation, and drawing conclusions.

The results showed that the SL subjects in solving questions and interviews could solve the problems posed and meet the three indicators of procedural knowledge. Indicators of procedural knowledge used by researchers in this study are implementing appropriate procedures correctly, communicating algorithmic processes into problem situations, and modifying procedures to deal with factors in problem solving.

Keywords: procedural knowledge; problem solving; set operation**.**

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INTRODUCTION

The development of science and technology allows all parties to obtain information abundantly, quickly and easily from various sources and places in the world. Therefore, mastery of mathematics material for students becomes a necessity that cannot be negotiated in the arrangement of reasoning and decision making in the era of increasingly competitive competition at this time. Students need to have the ability to obtain, select and process information to survive in an ever-changing,

uncertain and competitive situation. This ability requires the ability to think critically, systematically, logically, creatively and the ability to cooperate effectively. This way of thinking can be developed through learning mathematics, because mathematics has a strong and clear structure and linkage between concepts so that it allows students to be skilled in rational thinking (Depdiknas, 2003).

Mathematics is a field of study that everyone should study. Formal mathematics education is given starting from elementary school to college. This is because mathematics plays a very important role in everyday life. In solving math problems, the completion procedure is carried out in stages from the statements in the problem to the completion stage. One of the characteristics of procedural knowledge is that there is a sequence of steps to be taken, i.e. after a step the next step will be followed. Understanding concepts that are not supported by procedural knowledge will result in students having a good intuition about a concept but unable to solve a problem (Azizurrohim, 2015).

Ramalisa, Y and Syafmen, W (2014: 2) state that knowledge is the basis for the learning process of mathematics. Knowledge is a specific and contextual domain. The dimension of knowledge in mathematics consists of four dimensions, namely the dimension of factual knowledge, the dimension of conceptual knowledge, the dimension of procedural knowledge, and the dimension of metacognitive knowledge. Meanwhile, one of the knowledge that students must have in middle-level mathematics learning is procedural knowledge. Hiebert and Levefre stated that procedural knowledge is the knowledge of symbols to represent mathematical ideas and the rules and procedures used to solve mathematical tasks (Van De Walle: 2008) Procedural knowledge can assist students in finding mathematical problem solving steps appropriately and systematically. Therefore, procedural knowledge is needed when carrying out the process of solving mathematical problems.

Research conducted by Nur Fitriatin (2018: Unpublished), shows that research subjects who have high mathematical abilities in solving mathematical

problems, apply appropriate procedures to understand problems through the process of identifying what is known and asked about questions and planning problem solving using a mathematical model. While research subjects with mathematical abilities are solving mathematical problems by applying appropriate procedures and communicating the algorithmic process into problem situations. Then for research subjects with low mathematical abilities solve mathematical problems only by applying appropriate procedures, namely, understanding the problem and planning problem solving using a mathematical model.

In this study, researchers focused on procedural knowledge skills, namely how students apply appropriate procedures correctly, communicate algorithmic processes into problem situations, and modify procedures to deal with factors in problem solving set operations. Based on the background above, the title in this study is "Analysis of Students' Procedural Knowledge in Solving Association Operation Questions at SMP Muhammadiyah Melati Kec. Waesala Kab. Western part of the creepy".

METHOD

This type of research is descriptive qualitative research, namely research that aims to determine students' procedural knowledge in solving set operation questions in class VII Muhammadiyah Melati Middle School, West Seram Regency. The subjects in this study were seventh grade students of SMP Muhammadiyah Melati, involving several students as representatives. The subjects in this study were seventh grade students of SMP Muh. Melati, by involving several students as representatives. From the results of tests and interviews with several students, two subjects who were known to have procedural knowledge were used for further analysis.

From the results of tests and interviews with several students, one subjects who were known to have procedural knowledge were used for further analysis. The data analysis technique used in this study uses qualitative data analysis, including:

data reduction, data presentation, conclusion drawing and data verification.

RESULTS AND DISCUSSION

The SL subject when reading the questions posed when asked to solve the questions, SL immediately understands the meaning of the problem so that SL can solve it to completion. Based on the results of tests and interviews with SL subjects, the researcher made an analysis that the criteria for procedural knowledge had been met. At the problem solving stage, the process carried out by SL in completing the Set Operation, it appears that the subject has met the indicators of procedural knowledge, which are as follows:

Correctly implement the appropriate procedures

Implementing the appropriate procedure correctly, namely a process of students being able to find ideas to compile a problem solving algorithm according to the content of the problem, including students being able to identify things that are known and asked about the problem and can make plans or strategies that are in accordance with the content of the problem, both in form of mathematical models and others until the problem solving stage. From the results of the SL test, the researcher briefly observed that before SL completed the questions, SL first determined what was known and asked about the questions.

Then SL continues the process of solving by making a mathematical model through the process of calculating to find a formula from the combination of two sets to determine how many students like swimming or basketball and how many students are not fond of both. As can be observed in Figure 4.1. below this !

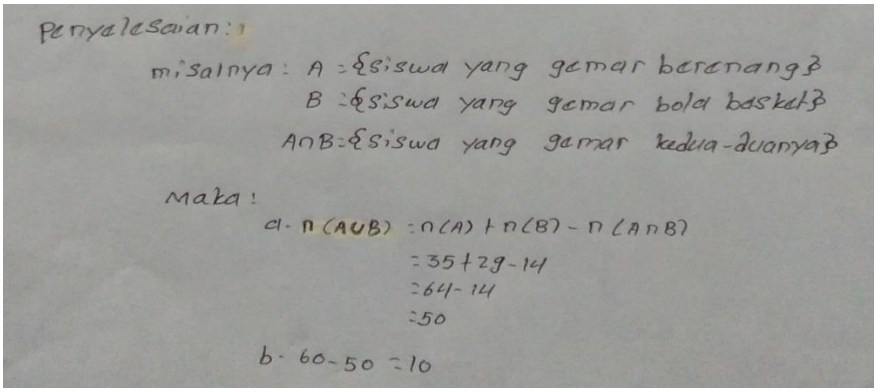

Figure 4.1. SL Results in the Completion Process on the First Indicator

Results Based on the work of SL as shown in Figure 4.1. and 4.2, it can be said that the SL subject fulfills the first indicator of procedural knowledge, namely applying appropriate procedures by identifying things that are known and arriving at the completion process of the set operation. This can be seen from the results of SL's work by writing down what is known in advance, namely it is known that 35 students like swimming, 29 students like basketball, and 14 students like both, then what is developed from this question is how many students like swimming or soccer and How many students do not like both? After that, SL continues the process of solving it by creating or using appropriate strategies for solving problems, both in the form of mathematical models and others by assuming that set A is the set of students who swim, set B is the set of students who like soccer and set AB is the set of students who don't love both. Then proceed with the answers to points (a) and points (b) with the first formula, namely $n(A \cup B) = n(A) + n(B) – n(A \cap B)$, then SL continues by looking for the point (a) first, that is by entering the values that are already known into the predetermined formula, which is in accordance with the example above that,

$n(A) = 35$, $n(B) = 29$ and $n(A \cup B) = 14$, then :

$n(A \cup B) = n(A) + n(B) – n(A \cap B)$

$= 35 + 29 – 14$

$= 64 – 14$

$= 50$

Then to find the answer to point (b), SL reduces the total number of students by the number of students who like swimming and basketball, namely, 60 – 50 = 10. So that students who do not like both are 10 and students who like swimming or basketball are 50 people. This is reinforced by the statement of SL when interviewed as follows:

Q : How did you do the problem?

SL : Write down what you know first!

Q : Apart from that, what do you know about this question?

SL : What is known from this question is that 35 students like swimming, 29 students like basketball, and 14 students like both!

Q : What next step do you use?

SL : The next step is to enter the settlement process!

P : Try to continue the process of solving it

SL: Suppose A is a student who likes swimming, B is a student who likes basketball, and A∩B is a student who likes both. Then n(A∪B) = n(A) + n(B) – n(A∩B) = 35 + 29 – 14 = 50, and we continue by subtracting the total number of students with the result of n(AB), namely 60-50 = 10.

Based on the results of the SL work as shown in Figures above, it can be concluded that the SL subject has met the first indicator of procedural knowledge, namely applying the appropriate procedures correctly.

Communicating algorithmic processes into problem situations

That is a process of students being able to apply algorithms / problem solving procedures that have been found into the problem solving process by solving problems according to the plans prepared or in accordance with the mathematical models that have been made. This is evidenced by the results of SL's work in Figure 4.2 below:

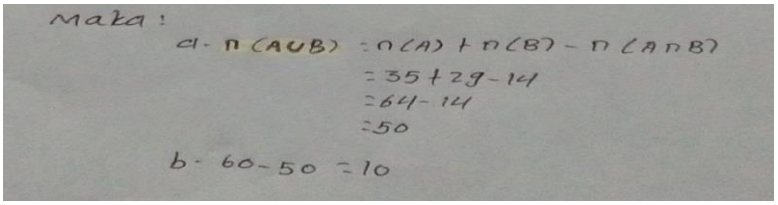

Figure: 4.2. The Results of SL in the Process of Communicating the Algorithm Process into the Problem Situation

Based on the results of SL's work as shown in Figure 4.2 above, SL solved the problem after going through the first stage, namely applying the appropriate procedures correctly based on the mathematical model that had been made on the first indicator of procedural knowledge, based on this it can be concluded that the SL subject has met the indicators. the second is procedural knowledge, namely communicating the algorithm process into problem situations by solving problems according to a prepared plan or according to a mathematical model that has been made. This can be seen from the results of SL's work in solving problems according to the plan or mathematical model that has been carried out, namely by making an example and proceeding with looking for a formula to answer questions from point (a) and point (b) by writing the formula first, namely n (A∪B) = n(A) + n(B) – n(A∩B), then SL continues the solution by finding point (a) first, that is, by entering the known values into the formula that has been it is determined that, according to the above example that n(A) = 35, n(B) = 29 and n(A∪B) = 14, then:

n(A∪B) = n(A) + n(B) – n(A∩B)

= 35 + 29 – 14

= 64 – 14

= 50

Then to find the answer to point (b), SL reduces the total number of students by the number of students who like swimming and basketball, namely, 60 – 50 = 10. So that students who do not like both are 10 and students who like swimming or basketball are 50 people.

Based on the results of SL's work as shown in Figure 4.3. above, it can be concluded that the SL subject has met the second indicator of procedural

knowledge, namely communicating the algorithm process into the problem situation

Modify procedures for dealing with factors in problem solving

Modifying the procedure for dealing with the factors in problem solving, namely a process of students being able to check each problem solving step and make improvements to the algorithms that have been made if errors are found in the checking process, such as by re-checking the results of work, namely how students check again every troubleshooting step he has done.

Based on the results of the SL work, it can be concluded that the SL subject has met the third indicator (3) of procedural knowledge, namely modifying the procedure for dealing with the factors in problem solving by checking back every problem solving steps he has done. This can be seen from the results of SL's work, where SL is very confident about the completion steps of the answer, and when interviewed to check the answer, it turns out that SL stated that the worker's results If the plan is correct, SL is no longer making improvements to the results of its work. Based on the results of tests and interviews with SL subjects that have been described above, it can be concluded that SL is a student who has procedural knowledge, because SL can meet the indicators of procedural knowledge. The procedural knowledge indicators referred to in this study are applying appropriate procedures correctly, communicating algorithmic processes into problem situations and modifying procedures to deal with factors in problem solving.

Procedural knowledge is knowledge about how to do something (Suwarto, 2013). Meanwhile, according to Hilbert (1986) procedural knowledge is formed from two different parts composed of symbolic representations about mathematics and algorithms or rules for solving mathematical tasks.

Based on the results of the research analysis of students' procedural knowledge in solving set operation questions at Muhammadiyah Melati Middle School, it is illustrated that the criteria have been met, namely applying appropriate procedures correctly, communicating the algorithm process into problem situations,

or modifying procedures to handle factors in problem solving.

From the results of the SL subject test, it can be seen that before solving the problem the subject looks for a statement that meets the problem of the set operation questions by determining what is known and asked, then proceeds to make an example by using several symbols to get a clear statement so that it can be entered. into the formula to find the result of the combination of two sets and solve it based on the formula that was made previously. This is in accordance with the explanation of the definition in the first indicator, namely applying appropriate procedures correctly, namely students are able to find ideas to develop problem solving algorithms according to the content of the problem, namely by understanding the problem, including how students identify things that are known and asked in the problem. , and Planning solutions, namely how students can make appropriate plans or strategies in solving problems in the form of mathematical models and others and carrying out the completion process based on mathematical models that have been made previously. This is in line with the definition of procedural knowledge according to Van De Walle in (Azizurrohim, 2015) saying that procedural knowledge is knowledge of symbols to represent mathematical ideas as well as rules and procedures used to complete mathematical tasks. This is also in line with the opinion of Hilbert (Khair, 2015) who says that procedural knowledge is formed from two different parts consisting of symbol representations about mathematics and algorithms or rules for solving mathematical tasks.

From these problems they try again to find and find the next step to get the next result, namely by entering several symbols that match the statement or example above that meets the problem in the problem, namely using a formula from a combination of two sets related to the problem and method. the solution according to the form of the separation. And when interviewed, it was stated that in determining how many students like swimming or basketball and how many students don't like both by using the formula from the combination of the two sets in the problem, namely using symbols as a form of example, then the next step is

input. These symbols are in the form of formulas that have been described previously to get a better final result. This is in accordance with the explanation of the definition in the second indicator, namely communicating the algorithm process into problem situations where students are able to apply the algorithms/procedures of problem solving that have been found into the problem solving process, namely by how students can solve problems according to the plans prepared or according to the mathematical model that has been made.

When solving problems, both subjects used the concepts that had been taught, and did so based on procedural knowledge indicators. Students are said to have procedural knowledge, if students can choose and apply procedures correctly and appropriately, carry out examinations or proofs correctly from a procedure using concrete models or symbolic methods, develop or modify procedures to describe the factors that characterize mathematical problems.

Based on this opinion, it can be concluded that students are said to have procedural knowledge in learning mathematics when they can apply appropriate procedures correctly, communicate the algorithm process into problem situations and modify procedures to deal with factors in problem solving in accordance with the steps required in solving problems. solve mathematical problems to achieve a certain goal

As for this research, it contributes to the world of education, namely in learning it is seen that students are able to solve set operations problems correctly, then state them in mathematical models and are able to communicate them in solving problems.

CONCLUSION

Based on the results of research and discussion, it can be concluded that SL (S1) students in solving questions and interviews can solve the problems posed and meet 3 indicators of procedural knowledge. Indicators of procedural knowledge used in research are implementing appropriate procedures correctly, communicating algorithmic processes into problem situations, and modifying

procedures to deal with factors in problem solving. Based on the conclusions made, the following things can be suggested, related to mathematics learning. Thus students are said to have procedural knowledge in learning mathematics when they can apply appropriate procedures correctly, communicate the algorithm process into problem situations and modify procedures to deal with factors in problem solving in accordance with the steps required in solving mathematical problems to achieve a certain purpose.

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