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Analysis of Mathematical Connection Ability on the Probability Material for XI Grade SMK

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ABSTRACT

The purpose of this study was to analyze the mathematical connection ability of class XI students of SMK Negeri 1 Wonoasri. This type of research is descriptive qualitative. The subjects of the study were students of class X SMK 1 Wonoasri Academic Year 2019/2020. The instruments of this study were observation and interview sheets as well as mathematics connection ability tests. The results showed that learning in schools is learning discussed by teachers, with conventional methods that minimally involve students who are active in learning. Connection test results show the percentage of mathematical connection ability on the first indicator is 54,37%, the second indicator is 18,75%.

Keywords: Connection ability, mathematic, probability

INTRODUCTION

Mathematics is a science that has an important role in human life [1], [2]. Various problems and activities carried out by humans cannot be separated from Mathematics [3]. Learning mathematics in schools has an important role because mathematics is a discipline that relies on thought processes. NCTM (2000) states that five basic mathematical skills that become standard in learning mathematics, namely problem solving, reasoning, communication, connections, and representation [3]. The five basic skills that students must possess to achieve maximum learning outcomes. Considering that, the mathematical connection becomes one of the basic skills that play an important role in the process of solving mathematical problems. This is because in understanding students are required to be able to understand more than one concept and relate it [4], [5].

Mathematical connection ability is the ability of students to look for relationships of representations of concepts and procedures, understanding between mathematical topics, and the ability of students to apply mathematical concepts in other fields of everyday life. NCTM [3] also states that a mathematical connection is a link between mathematical topics with other disciplines and the relationship of mathematics with the real world or everyday life. Through connection skills students can understand that mathematics is a broad science, not only used in the scope of mathematics itself but also the other sciences and everyday life.

Thus, the ability to be able to connect mathematics can be used as an important measure to see success in learning mathematics, the ability to connect mathematics with various other sciences is called mathematical connection ability. [6] states that the ability of mathematical connections is the ability to connect between concepts in mathematics and connect mathematical concepts and non-mathematical concepts. That is, mathematics is not partitioned apart on various topics, but is a unity that is interconnected between concepts.

To create this kind of learning orientation, a supportive learning atmosphere is needed, but based on the results of researchers' observations in the field, learning done in schools has not been oriented that way. Learning in schools is learning that is dominated by teachers, with conventional methods that minimally involve students actively in learning. So it is difficult for students to develop their ideas and knowledge. [7] also states that learning mathematics in Indonesia is still too monotonous and less stimulating for students and makes students forced to learn in ways they don't like.

Therefore, learning mathematics must be able to see that ideas in mathematics are interrelated. Mathematical connections need to be applied in learning mathematics related to connections with

everyday life to build students' knowledge and skills [8]. Thus students will better understand the usefulness of mathematics if learning is also associated with daily student experiences..

The connection is derived from the word connection which means relationship or connection, while the connection associated with mathematics is called a mathematical connection. Mathematical connection ability is the ability of students to connect or associate various problems with mathematical concepts, the relationship is included in the context of mathematics or outside mathematics [9].

Mathematical connections become more important because they support students to understand concepts substantially and help them to improve their understanding of other disciplines through the mutual relationship between mathematical concepts and conceptions of other disciplines. Besides, mathematical connections help students provide mathematical models that illustrate the relationship between concepts, data, and situations. People who have understood a rule can understand several concepts. Connection, in other words, can be interpreted as a linkage, in this case, mathematical connections can be interpreted as a link between internal mathematical concepts that is related to mathematics itself or external linkages, namely mathematics with other fields both other fields of study and with everyday life day. Therefore, for students to be more successful in learning mathematics, many opportunities must be given to see the connections.

Mathematical concepts must be learned in a structured manner by paying attention to a certain order of matter. In mathematics, there are topics or prerequisite concepts to understand the next topic. Not only are these concepts interconnected with each other, but mathematical concepts in everyday life are also interrelated. This connection is called a mathematical connection.

Mathematical connections are divided into 3 aspects of connection groups that will be indicators of students 'mathematical connection abilities, namely: 1) aspects of connections between mathematical topics, 2) aspects of connections with other sciences, 3) aspects of connections with students' real-world / connections with daily life - day [3].

There is an activity phase in mathematical connections, According to [3], these activities include: a) recognizing and using relationships between mathematical concepts; b) understand how mathematical ideas are interconnected and constructive to produce something intact; c) understand and apply mathematics in other fields (outside mathematics).

Whereas [10] stated that the activities involved in the mathematical connection task are as follows: a) understanding the representation of a mathematical concept, process, or procedure; b) looking for relationships between various mathematical concepts, processes, or procedures; c) understanding the mathematical relationships between mathematics; d) applying mathematics in other fields of in everyday life; e) looking for the relationship of one procedure with other procedures in equivalent representation; f) apply the relationship between mathematical topics with mathematical topics, or with other scientific disciplines.

Based on the above theoretical study, in general, there are three aspects or indicators of mathematical connection ability, namely:

1. Through problems in everyday life, students can write mathematical modeling. At this stage, students are expected to be able to connect between existing forms of problems with mathematical concepts.
2. Write down the mathematical concepts that underlie the answers. In this aspect, students are expected to have answers that are by the mathematical concepts used.
3. Connecting between mathematical objects and concepts. In this aspect, students are expected to be able to connect between mathematical objects and concepts used in answering problems, as well as completing mathematical operations that have been written previously based on knowledge or concepts that have been obtained.

The three indicators can be seen briefly in Table 1. below:

Table 1. Indicators of Mathematical Connection Capabilities

No	Activity
1.	Able to write mathematical modeling
2.	Write down the mathematical concepts that underlie the answers
3.	Connecting between mathematical objects and concepts

From some of the indicators above, it can be concluded that the indicators of a mathematical connection are as follows:
1. The relationship between mathematical concepts and everyday life
2. Relationships between mathematical concepts
3. Relationship of mathematical concepts with other disciplines.

In this study only used the method to analyze the ability of mathematical connections in the material opportunity class XI at SMK 1 Wonoasri. There are three indicators of mathematical connection analyzed, namely, the relationship between mathematics and everyday life, and the relationship between objects and mathematical concepts, and Relationship of mathematical concepts with other disciplines. However, this study is limited by two indicators, namely: the relationship between mathematics and daily life and the relationship between objects with mathematical concepts.

RESEARCH METHOD

The research method used is qualitative descriptive, this research was conducted at SMK NEGERI 1 Wonoasri with the subject of this study were 32 students of class XI. The material used is the class xi probability material. This study uses a mathematical connection ability test instrument. The ability test instrument consists of one problem with two questions. the assessment techniques used in this study use the following guidelines in **Table 2** to mathematical ability capability grid and T**able 3 to t**est scoring guidelines mathematical connection ability:

Table 2. Mathematical Ability Capability Grid

Number	Indicators of Mathematical Connection Ability	Indicators of Probability
1.	The relationship between mathematics and daily life	Students can apply the concept of probability in daily life problems
2.	The relationship between objects with mathematical concepts	Students can state the concept used and its relationship to the problem

Table 3. Test Scoring Guidelines Mathematical Connection Ability

Rated Aspect	Reaction to the problem	Score
The relationship between mathematics and daily life	No Answer	0
	The answer is almost inconsistent with questions or problems	1
	Some answers according to the question or with the problem but the connection is not clear	2
	Some answers according to questions or with problems and connections clear but not complete	3
	The answer according to questions or with problems but not complete	4
	The answer according to questions or with problems and complete	5
The relationship between objects with mathematical concepts	No Answer	0
	The answer is almost inconsistent with questions or problems	1
	Some answers according to the question or with the problem but the connection is not clear	2
	Some answers according to questions or with problems and connections clear but not complete	3
	The answer according to questions or with problems but not complete	4
	The answer according to questions or with problems and complete	5

$$\text{Score(N)} = \frac{\text{obtained score}}{10}\ x\ 100$$

With references like the following:

Percentage	Category
$85 \leq N \leq 100$	Very good
$70 \leq N < 85$	Well
$55 \leq N < 70$	Good Enough
$40 \leq N < 55$	Less
$0 \leq N < 40$	Very Less

RESULTS AND DISCUSSION

In this study, used questions to measure the mathematical connection ability of students as follows: Anis, Bela, and Citra take pictures together in different positions. If they want to print all the photos with each different position. Determine:
1. The costs they incur if the price of each photo is Rp 10,000?
2. Write down the concepts used and connect with problems!

The results showed the ability of mathematical connections for class XI students of SMK 1 Wonoasri was still very low. The results of Percentage of mathematical connection capabilities can showed at **Table 4**. Most students do not understand the relationship between objects and mathematical concepts to meet the indicators of mathematical connection ability. The ability of mathematical connections can be obtained by considered the ability to associate basic concepts or knowledge acquired with new concepts or knowledge gained.

Table 4. Percentage of Mathematical Connection Capabilities

Indicators	Score	Total Score	Percentage	Category
The relationship between mathematics and daily life	87	160	54,37%	Less
The relationship between objects with mathematical concepts	30	160	18,75%	Very Less

The research that is relevant to this research is a study conducted by Siregar & Surya (2017) which shows that the results of the study show that the percentage of students' mathematical connection ability in the first indicator is 51.11%, the second indicator is 17.78%.

Likewise with the research of Kenedi, et al (2019), which showed 6.67% of the sample chose between 60 and 69 in the fair category. As many as 98 students or 81.67% scores between 45 and 59 are included in the category below the average, and 14 students or 11.67% get scores between 0 and 44 that are classified as poor categories. These results prove that the mathematical connection ability of elementary school students in solving mathematical problems is still low.

CONCLUSIONS

From the above description and relevant research, this study has analyzed the ability of mathematical connections with this indicator and the results, the ability of students of class XI of 1 Wonoasri Vocational School is still very low by using the method of Mathematics connection ability indicators.

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