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Analysis of the Mathematical Connection Ability of Development Economics Students in Solving Row and Series Problems

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Abstract

Mathematics plays a crucial role in developing students' logical, analytical, and systematic thinking skills, including in the discipline of Development Economics. One important aspect of mathematics is mathematical connections, namely the ability to connect mathematical concepts across topics, with other disciplines, and with real-world contexts. As one of the abilities in mathematics, connection skills must be cultivated in students. Therefore, it is necessary to conduct a study entitled Analysis of Mathematical Connection Skills of Development Economics Students in Solving Sequence and Series Problems. The research was conducted in the Development Economics study program, Faculty of Economics and Business, Al-Azhar Islamic University. The objects of this study were 32 second-semester students. The type of research used was qualitative research. The results of this study obtained an average percentage of mathematical connection skills of 77.2%, which means that almost all students in the Development Economics study program have moderate mathematical connection skills.

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1. INTRODUCTION

The importance of studying mathematics in the world of education is that mathematics is often encountered in all areas of everyday life. According to James and James (in Eman Suherman 2003) in their mathematical dictionary, mathematics is the science of logic regarding forms, structures, quantities, and concepts that are related to each other in large numbers, which are divided into three areas, namely algebra, analysis, and geometry. Given the importance of studying mathematics, it is appropriate for every student in every study program to master mathematics lessons.

With numerous mathematical concepts to learn, students often encounter difficulties in learning. One example is difficulty understanding concepts, and many students struggle to understand the interrelationships between concepts, both within mathematics itself and outside of mathematics. Research by Laili & Puspasari (2018) found that students tend to struggle to connect mathematics to other subjects. This is because students don't deepen their understanding of previously learned concepts or reuse their knowledge when studying other materials, causing them to easily forget previously learned concepts and procedures. Students assume that the material they have learned has no connection to what they will learn next. This is supported by the results of a study by Lembke and Reys (Bergeson, 2000: 37), which showed that only a few students were able to explain why a concept was used in problem-solving. Furthermore, many students viewed mathematics as unrelated to everyday life.

Mathematics plays a crucial role in developing students' logical, analytical, and systematic thinking skills, including in the discipline of Development Economics (Hendriana et al., 2017; NCTM, 2000). One important aspect of mathematics is mathematical **connection**, namely the ability

to connect mathematical concepts between topics, with other disciplines, and with real-world contexts. As one of the abilities in mathematics, the ability to connect must be cultivated in students. This is because this ability can help students in learning mathematics more systematically. Lappan et al. (2002) stated that mathematical connection is a learning activity in which students and teachers can develop knowledge, understanding, skills, and awareness in connecting mathematical concepts and mathematical concepts with other sciences. The ability to connect mathematics helps mastery of meaningful conceptual understanding and helps complete problem-solving tasks through the connection between mathematical concepts and between mathematical concepts with contexts outside of mathematics (Hendriana and Seomarmo, 2014: 27). According to NCTM (2000), without mathematical connections, students must learn and remember too many separate mathematical concepts and procedures. Therefore, the ability to connect is necessary for students. If students can connect mathematical ideas, their mathematical understanding will be deeper and more lasting because they can see the connection between topics in mathematics, with contexts outside of mathematics or everyday life experiences. Research by Hidayati et al. (2022) has shown that many economics students tend to have low mathematical connection skills. This low mathematical connection ability is one of the reasons why students have difficulty connecting mathematical concepts, resulting in difficulties in solving math problems, especially those related to real-world contexts in economics and business.

The topic of rows and series frequently appears in various economic applications, such as compound interest, investment analysis, and economic growth projections. This concept requires students not only to understand the theory but also to be able to relate it to concrete economic contexts. Through mathematical connection skills, students can understand that rows and series are not simply sequences of numbers, but rather meaningful economic modeling tools. High mathematical abilities can directly support students in understanding mathematical concepts well. Therefore, students, including economics students, must possess this mathematical connection skill, specifically those taking economic mathematics courses, specifically rows and series. Rows and series are among the topics that require in-depth mathematical concepts. This is especially true when solving problems related to economics, such as business development, compound interest, and population growth. Therefore, students must be able to grasp basic mathematical concepts comprehensively.

Because when students have mathematical connection skills, it will influence their success in learning and understanding the material on lines and series. Therefore, it is hoped that mathematical connection skills can help students solve problems in other sciences that require mathematical assistance.

Because of mathematical connections, previously learned mathematical concepts are not simply abandoned, but used as foundational knowledge in learning new concepts. Without mathematical connections, students will have difficulty understanding mathematics. This occurs because mathematics is not a collection of separate topics, but rather interconnected. Therefore, research is needed with the titleAnalysis of the Mathematical Connection Ability of Development Economics Students in Solving Row and Series Problems

2. RESEARCH METHODS

The research was conducted in the Development Economics study program, Faculty of Economics and Business, Al-Azhar Islamic University. The subjects were 32 second-semester students. The research used descriptive qualitative research. According to Nawawi (2012: 67), the descriptive method is a problem-solving procedure that is investigated by describing or depicting the current state of the subject or object of research (a person, institution, society, etc.) based on the facts that appear or are as they are. The data collection uses a written test of 2 questions about arithmetic

and geometric series. The first question with indicators 1 and 2, and the second question with indicators 3 and 4.

The indicators used in this study are indicators according to Prasetia et al. (2020), namely (1) connections between concepts in one mathematical material, (2) connections between topics in mathematics, (3) connections between concepts in mathematics and concepts in other fields of science, and (4) connections between mathematics and everyday life. The data analysis used is descriptive qualitative, by presenting data in tabular form. The data analysis of this study refers to the data analysis of Miles and Huberman (Sugiyono, 2018). Data analysis is carried out in three steps, namely data reduction or grouping, where the data will be presented in tabular form, after then concluding. Data analysis in this study uses the following percentage formula: percentage = (total score obtained) / (total score) × 100% (Hikmah, 2019). The categories are in the table below.

Table 1. Percentage of Written Test Ability

No	Percentage	Score	Category
1	10% - 44%	1	very low
2	45% - 59%	2	Low
3	60% - 79%	3	Currently
4	80% - 100%	4	High

(Wisdom, 2019)

3. RESEARCH RESULTS AND DISCUSSION

3.1.Research result

The results of this study are presented in a table showing the results of a written test evaluating students' ability to solve row and series problems. Two evaluation questions were used to assess students' mathematical abilities in solving row and series problems. Twenty-seven students took the written test. The evaluation results can be seen in the table below.

Table 2. Percentage of Student Scores on Each Question Item

Question Items	Category	Percentage
1	Currently	72%
2	High	82,4%

From table 2, it is known that the percentage of students' mathematical connection ability on question item no. 1 is 72%, meaning that almost most of the students have been able to develop their ability in connecting between concepts and topics in one mathematical material to solve economic problems related to sequence and series material. Then, on question item number 2, the percentage is 82.4%, it is also known that almost most of the students have been able to solve row and series problems by connecting economic problems by connecting between mathematical topics. If calculated as a whole, the average percentage of mathematical connection ability is 77.2%, which means that almost most of the students of the Development Economics study program have moderate mathematical connection ability.

3.2. Discussion

3.2.1 Indicator 1.

Based on the research results, data on students' mathematical connection abilities were obtained for each question item. In question number 1, with indicators of connections between concepts and between topics in one mathematical material, it was found that most students were able to solve questions related to connections between concepts and between topics using the concept of mathematical sequences and series. The following is

a bar chart showing the results of categorizing students' mathematical connection abilities according to indicator 1 in question number 1, namely

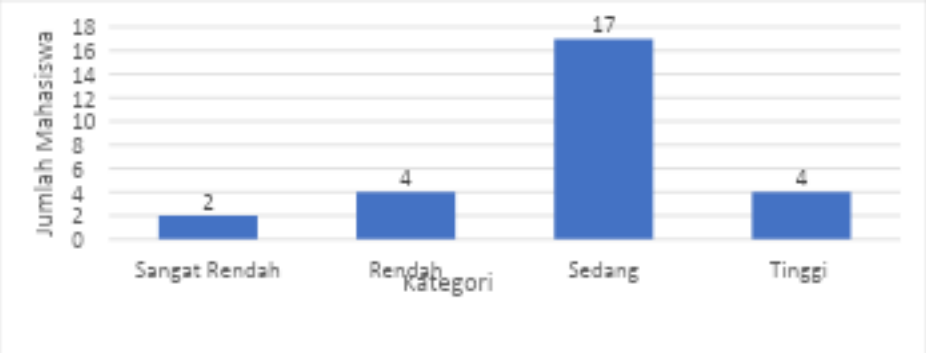

Diagram 1. Category of connection capabilities between concepts and intertopic in one mathematics material

Based on diagram 1, it can be seen that the connection ability of connections between concepts and between topics in one mathematics material is in the very low category for 2 students or 7.4% of 27 students, in the low category for 4 students or 14.8% of 27 students, in the medium category for 17 students or 62.96% of 27 students, in the high category for 4 students or 14.8% of 27 students.

3.2.2 Indicator 2

In question number 2, with the indicator of being able to solve row and series problems by connecting economic problems by connecting between mathematical topics, most students have been able to achieve indicator 2. The following is a bar chart showing the results of categorizing students' mathematical connection abilities according to indicator 2 in question number 2, namely:

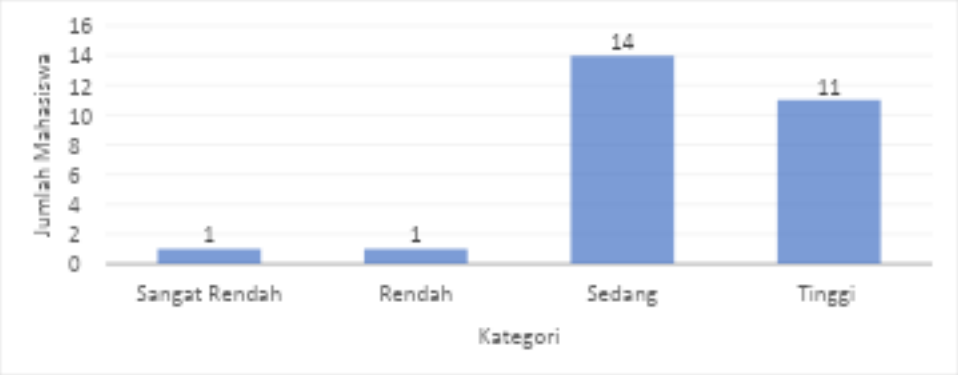

Diagram 2. Ability to connect with economic problems by connecting mathematical topics

Based on diagram 2, with the indicator of the ability to connect in economic problems by connecting between mathematical topics, which is in the very low and low category as many as 1 student or 3.7% of 27 students, in the medium category as many as 14 students or 51.58% of 27 students, in the high category as many as 11 students or 40.74% of 27 students.

4. CONCLUSION

Based on the results and discussion, it can be concluded that students' mathematical connection skills are in the moderate category. However, this still needs to be improved, because we know that there are still a small number of students who experience difficulties when working on the problems given in both indicators 1 and 2. This occurs due to several factors, including lack of concentration, lack of mastery of concepts, and lack of understanding of what is instructed in the problem, so that when working, they use the wrong formula. Therefore, learning evaluation is needed to improve students' mathematical connection skills so that they can be applied to economic problems.

5. ACKNOWLEDGEMENT

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