

THE EFFECT OF EARLY MATHEMATICAL ABLITY AND MATHEMATICAL COMMUNICATION ABILITY ON MATHEMATICAL PROBLEM SOLVING ABILITY

Christanti Fr. A. Paulus^{1*}, Theresia Laurens^{2*}

Program Studi Magister Pendidikan Matematika Pascasarjana

Universitas Pattimura

Email: tantipaulus17@gmail.com

(Received: 13-03-2023; Reviewed: 21-04-2023; Revised: 23-06-2023; Accepted: 25-06-2023; Published: 29-07-2023)



©2023 –Daya matematis: Jurnal inovasi pendidikan matematika. This article open acces licenci by CC BY-NC-4.0 (<https://creativecommons.org/licenses/by-nc/4.0/>)

Abstract

This study aims to look at the relationship between early math skills and mathematical communication skills on students' math problem solving abilities. The population in this study amounted to 151 students and a sample of 110 students was taken using the slovin formula. This research uses quantitative methods. The research data was collected through a research instrument in the form of a written test, then processed and analyzed using path analysis techniques. The results of this study indicate that (1) there is a relationship between early mathematical ability and mathematical problem solving ability; (2) there is a relationship between mathematical communication skills and mathematical problem solving abilities;

Keywords: Initial mathematical ability, mathematical communication skills, mathematical problem solving abilities.

INTRODUCTION

Mathematics is a science that has very broad applications in aspects of life, mathematics plays an important role in helping human life. Because in mathematics lessons a logical, systematic and careful way of thinking can be developed because its characteristics are hierarchical, dynamic, deductive and generative.

In education, students' mathematical abilities are honed through problems, so that students are able to improve the various competencies they have. According to Suciati et al (2022), mathematical ability is the ability or skills possessed by students in facing and solving mathematical problems consisting of reasoning, communication, problem solving, connections, understanding concepts and critical and creative thinking, and so on. In this study, researchers will focus on students' mathematical abilities in solving problems.

Problem solving ability is the ability to make an effort to find a solution to a difficulty and achieve goals that cannot be achieved immediately (Ulya 2016 and Wahyudi 2017). So, problem solving ability is a person's ability to solve problems related to mathematics.

Based on the results of the pre-test of mathematical problem-solving abilities in class IX students of SMP Negeri 7 Ambon, students' mathematical problem-solving abilities were still very low. From the data obtained, as many as 89.81% of students have relatively very poor problem solving skills. This is also due to several factors, one of which is the initial ability of students' mathematics.

Initial mathematics abilities describe students' readiness to accept the lessons given by the teacher. Lestari (2017) stated that students' initial mathematics abilities are the key to successful mathematics learning.

According to Ferryansyah (2020), students who have high initial mathematical abilities will more easily absorb the material provided by the teacher, so that it will be easier to solve and complete problems/problems in mathematics (Razak 2017 and Ferryansyah 2020). For this reason, teachers must pay attention to each student's initial mathematics abilities before starting the learning process. Based on the opinion above, it can be said that initial mathematical abilities are skills possessed by students, both natural and learned, to carry out a particular mathematical task.

Juhrani, et al (2017) also argue that in mathematics learning there are several abilities that influence the results of students' mathematical problem solving abilities, including mathematical communication abilities.

According to Susanto (2013), mathematical communication skills are important in learning activities because: (1) Communication is a tool for exploiting mathematical ideas in various perspectives, helping to sharpen students' abilities in seeing various interrelationships of mathematical material. (2) Communication is used as a tool to "measure" the growth of understanding and reflect students' mathematical understanding. (3) Through communication students can organize and consolidate their mathematical thinking. Based on the opinion above, it can be said that mathematical communication ability is the ability of students to convey mathematical ideas both orally and in writing.

And based on the description above, the author intends to conduct a study entitled "The Relationship of Early Mathematical Ability and Mathematical Communication to the Mathematical Problem Solving Ability of Class IX Students of SMP Negeri 7 Ambon".

METHOD

This research uses quantitative methods. The variables in this research are two independent variables and one dependent variable. Where initial mathematical abilities and mathematical communication are the independent variables and students' mathematical problem solving abilities are the dependent variables. This research was carried out in the even semester of the 2022/2023 academic year. The research subjects were class IX students of SMP Negeri 7 Ambon for the 2022/2023 academic year who were selected based on several considerations: (1) class IX students had studied curved sided geometric figures, (2) the samples were not chosen randomly, but were chosen using the Slovin formula. The sampling technique in this research is purposive sampling. Researchers provided initial mathematical ability test questions, mathematical communication ability test questions and mathematical problem solving ability test questions.

The data obtained during the test is analyzed to obtain valid data. This valid data is used to describe the relationship between initial mathematical abilities and mathematical communication abilities on mathematical problem solving abilities.

RESULT AND DISCUSSION

Result

Data retrieval starts from giving initial math ability tests, mathematical communication ability tests and math problem solving ability tests. The results of the test are then analyzed to see the relationship.

Based on the results of data processing, the following are obtained:

Table 1 Anova of Initial Mathematics Ability

Anova				
Model			F	Sig
2	Regression		1794,193	0,000
	Residual			
	Total			
Coefficients				
Model		Standardized Coefficients Beta	T	Sig
2	Early Mathematical Ability	0,301	5,193	0,000
	Mathematical Communication Skills	0,214	3,334	0,001

Discussion

The following is a discussion of the relationship between initial mathematical abilities and mathematical communication abilities on students' mathematical problem solving abilities.

1. The Relationship of Early Mathematical Ability to Students' Mathematical Problem Solving Ability

Based on the research results presented previously, it shows that initial mathematics abilities have a significant relationship with mathematical problem solving abilities. This research is in line with research conducted by Utami et al (2017) which states that initial abilities have a significant relationship with mathematical problem solving abilities so that the more initial abilities a student has, the better the students' mathematical problem solving abilities.

This is also in line with research conducted by Razak (2017) which states that there is a relationship between initial mathematics abilities and students' mathematical problem solving abilities. Research conducted by Safitri (2023) also showed that initial abilities were significantly related to mathematical problem solving abilities.

Based on the research results presented previously, it shows that initial mathematics abilities have a significant relationship with mathematical problem solving abilities. This research is in line with research conducted by Utami et al (2017) which states that initial abilities have a significant relationship with mathematical problem solving abilities so that the more initial abilities a student has, the better the students' mathematical problem solving abilities.

This is also in line with research conducted by Razak (2017) which states that there is a relationship between initial mathematics abilities and students' mathematical problem solving abilities. Research conducted by Safitri (2023) also showed that initial abilities were significantly related to mathematical problem solving abilities.

2. The Relationship between Mathematical Communication Skills and Mathematical Problem Solving Ability

Based on the research results presented previously, it shows that mathematical communication skills have a significant relationship with mathematical problem solving abilities. This is in line with research conducted by Pratama et al (2017) which states that mathematical communication skills and problem solving abilities have a significant relationship. Research conducted by Selvia et al (2017) also resulted in a correlation between mathematical communication skills and students' mathematical problem solving abilities.

Mathematical communication skills have a very important role (Susanto, 2013). According to Novitasari (2021), mathematical communication skills are the ability to explain a problem solution using good and correct language, students' ability to construct and explain problem studies in the form of pictures, diagrams, graphs, words or sentences, table equations.

As expressed by the National Council of Theachers of Mathematics (Sundayana, 2021), that mathematical communication skills are a way for students to share mathematical ideas that have been learned and clarified in understanding. The low ability of students' mathematical communication on their ability to solve mathematical problems makes students think that mathematics is a difficult subject. This happens because of the low ability of students' mathematical communication which results in a breakdown of communication between teachers and students, then makes students unwilling or even afraid when dealing with mathematics lessons.

CONCLUSIONS AND SUGGESTIONS

Based on the research results and discussion, the conclusions in this research are as follows:

- 1) There is a significant relationship between initial mathematics abilities and students' mathematical problem solving abilities with a path coefficient of 0.301;
- 2) There is a significant relationship between mathematical communication skills and students' mathematical problem solving abilities with a path coefficient value of 0.214.

REFERENCE

- Ferryansyah, & Anwar, A. (2020). Hubungan Kemampuan Awal Matematika Dengan Kemampuan Pemahaman Konsep Matematika Siswa Kelas Viii Smp 12 Tarakan. *Mathematic Education Andaplication*, 2(1), 8–14
- Juhrani, Suyitno, H., & Khumaedi. (2017). Analisis Kemampuan Komunikasi Matematis Berdasarkan *Self-Efficacy* Siswa Pada Model Pembelajaran Mea. *Unnes Journal Of Mathematics Education Research*, 6(2), 251–258. <https://Journal.Unnes.Ac.Id/Sju/Index.Php/Ujmer/Article/View/20604>
- Lestari, K.E Dan Yudhanegara, M.R. (2017). Penelitian Pendidikan Matematika (Panduan Praktis Menyusun Skripsi, Tesis, Dan Laporan Penelitian Dengan Pendekatan Kuantitatif, Kualitatif, Dan Kombinasi Disertai Dengan Model Pembelajaran Dan Kemampuan Matematis). Bandung
- Pratama, T. C., Hendra Kartika, Dan Indrie Noor Aini. (2017). Hubungan Kemampuan Pemecahan Masalah Dengan Kemampuan Komunikasi Matematis. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika (Sesiomadika) 2017* | Isbn: 978-602-60550-1-9 Pembelajaran, Hal. 668-679
- Razak, F. (2017). Hubungan Kemampuan Awal Terhadap Kemampuan Berpikir Kritis Matematika Pada Siswa Kelas Vii Smp Pesantren Immim Putri Minasatene. *Jurnal "Mosharafa"*, Volume 6, Nomor 1, Januari 2017.
- Safitri. (2023). Hubungan Motivasi Belajar Dan Kemampuan Awal Matematika Terhadap Kemampuan Pemecahan Masalah Matematika Siswa (Studi Pada Kelas X Sman 14 Bandar Lampung Semester Genap Tahun Pelajaran 2021/2022). Fakultas Keguruan Dan Ilmu Pendidikan, Universitas Lampung
- Selvia, M. D., Satya Santika Dan Ipah Muzdalipah. (2017). Korelasi Kemampuan Komunikasi Matematik Dengan Kemampuan Pemecahan Masalah Matematik Terhadap Peserta Didik Melalui Model Pembelajaran Logan Avenue Problem Solving (Laps)-Heuristic. *Jurnal Penelitian Pendidikan Dan Pengajaran Matematika*. Vol. 3 No. 2, Pp. 145–150, September 2017
- Suciati, I., Mailili, W. H., Dan Hajerina. (2022). Implementasi Geogebra Terhadap Kemampuan Matematika Peserta Didik Dalam Pembelajaran: A Systematic Literature Review. *Teorema: Teori Dan Riset Matematika*, 7(1), 27-42, Maret 2022. P-Issn 2541-0660, E-Issn 2597-7237 © 2022.
- Susanto, Hadi. (2013a). Peran Komunikasi Dalam Pembelajaran Matematika.[Online]. Diakses Dari: <https://Begawanabiyasa.Wordpress.Com/2013/05/20/Peran-Komunikasidalam-Pembelajaran-Matematika/>
- Ulya, H. (2016). Profil Kemampuan Pemecahan Masalah Siswa Bermotivasi Belajar Tinggi Berdasarkan *Ideal Problem Solving*. *Jurnal Konseling Gusjigang* Vol. 2 No. 1 (Januari-Juni 2016).

- Utami, R. W., & Wutsqa, D. U. (2017). Analisis Kemampuan Pemecahan Masalah Matematika Dan *Self-Efficacy* Siswa Smp Negeri Di Kabupaten Ciamis. *Jurnal Riset Pendidikan Matematika* 4(2), 2017, 166-175
- Wahyuni, Fina Tri, Arnetta Thalia Arthamevia, Dan Danang Haryo. (2018). Berpikir Reflektif Dalam Pemecahan Masalah Pecahan Ditinjau Dari Kemampuan Awal Tinggi Dan Gender. *Jurnal Pendidikan Matematika* 1 (1): 31