THE EFFECT OF HABITS OF MIND ON JUNIOR HIGH SCHOOL STUDENTS' MATHEMATICS COMMUNICATION ABILITY

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ARTICLE INFO	ABSTRACT

This research aims to determine the effect of habits of mind on junior high school students' mathematical communication skills on triangles and quadrilaterals. *Habits of Mind* is defined as a habit of thinking that is carried out as an intelligent behavior pattern when faced with a problem whose solution isn't easily known so that productive action occurs. The problem in this research is motivated by its importance habits of mind in learning mathematics and improving students' mathematical abilities. The method used in this research is method *ex post facto*. The population in this study were all class VIII students in one of Junior High Schools in Karawang Regency. The sample in this study was 42 students using the technique *purposive sampling*. The instrument used in this research is a test, namely mathematical communication skills which consists of 5 (five) description questions. Apart from that, it also uses non-test instruments in the form of questionnaires habits of mind which consists of 30 statements. Data analysis was carried out using simple linear regression techniques. The research results obtained a linear regression equation $Y = -25.065 + 1.345X$. The magnitude of the correlation coefficient $r^2 = 0.848$ and coefficient of determination = 84.8%. This shows that there is habits *of mind* had an influence on students' mathematical communication skills of 84.8%, while 15.6% was influenced by other factors not measured in this research.

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INTRODUCTION

Mathematics is a science that is studied and taught at every level of education from elementary school to college as an effort to equip students with abilities to face the future. Apart from that, mathematics has a very important role in answering problems in everyday life. The role of mathematics was also expressed by Sugianto et. al (Mirna et al., 2023), namely that mathematical skills must be possessed in various ways by all humans to be able to face challenges and competition in the era of globalization. One of them is geometry material which includes triangles and quadrilaterals. This material has an important role

because learning geometry aims to develop logical thinking skills, impart knowledge that supports other materials, and be able to read and interpret mathematical ideas (Hidayah & Fitriani, 2021). Therefore, to achieve the objectives of this material, mathematical abilities are needed, one of which is mathematical communication skills.

Developing mathematical communication skills is one of the focuses of learning in the 21st century (Nahdi, 2019). According to Baroody (Hendriana & Kadarisma, 2019) states that communication has an important role in studying mathematics in the 21st century because mathematical communication is capital in solving, exploring and investigating mathematics as well as a means of social activity in exchanging thoughts, opinions and sharpening ideas in convince others. According to Sumarmo (Deswita & Kusumah, 2018) states that mathematical communication skills are an important component in learning mathematics because they are a tool for exchanging ideas and clarifying mathematical understanding.

Based on the research results of Deswita & Kusumah (2018), it was revealed that the low mathematical communication skills were because students were not able to provide arguments based on mathematical principles and concepts. Then in Munawaroh's research (Hikmawati et al., 2019) stated that students' mathematical communication skills both verbally and in writing are currently still relatively low because students' mathematical ideas have not been conveyed well when faced with mathematical problems. Apart from that, based on the results of observations at one of the State Middle Schools in Karawang Regency, it was found that students were not able to communicate mathematical ideas well. This is because teachers have not developed the affective aspects of students. Therefore, learning mathematics is not only to develop mathematical cognitive abilities but also affective aspects such ashabits of mind (habit of thinking).

In the context of mathematics, habits of mind (thinking habits) relates to how students solve problems, whether they have self-confidence, perseverance, interest, and flexible thinking to explore various alternative problem solutions when problems are not immediately discovered. According to Suryani et al., (2023) Mathematical habits of mind are the habit of acting based on the impulses of the day, listening with empathy, solving problems effectively, being able to combine knowledge that has been learned in new situations, communicating and thinking clearly. Furthermore, Masni's (2017) research stated thathabits of mind is a strength in training students' abilities in determining solutions to a problem. Therefore, the student learning process should be directed by forming good habits, starting to behave productively to discipline and train student intelligence.

According to Costa and Kallick (Fendrik, 2015) state that human intelligence is not only seen from the knowledge they have but is seen from how an individual acts. Besides, it's importanthabits of mind This was also expressed by Driscoll (Malasari, 2019) who stated in his research that success in solving mathematical problems is supported by intelligent thinking habits (habits of mind).

The effect of affective aspects on mathematical abilities has been studied by several researchers, including research which states thathabits of mind has a positive impact on mathematical generalization abilities, namely 42.5% (Dwirahayu et al., 2018); then effect researchhabits of mind towards problem solving abilities which are in the good category (Masni, 2017) as well as towards good concept understanding abilities (Qadarsih, 2017). Based on the background of this problem, researchers are interested in conducting research related to communication skills andhabits of mind student mathematics. The goal is to determine the effecthabits of mind on communication skills mathematical junior high school students.

Mathematics is a science that is studied and taught at every level of education from elementary school to college as an effort to equip students with abilities to face the future. Apart from that, mathematics has a very important role in answering problems in everyday life. One of them is geometry material which includes triangles and quadrilaterals. This material has an important role because learning geometry aims to develop logical thinking skills, impart knowledge that supports other materials, and be able to read and interpret mathematical ideas (Hidayah & Fitriani, 2021). Therefore, to achieve the objectives of this material, mathematical abilities are needed, one of which is mathematical communication skills.

METHOD

The research method used in this research is ex-post facto with a quantitative approach. According to Sugiyono (Asyrifah Zaini Wahdah & Putri Nur Malasari, 2022) ex-post facto research is research that is used to examine the factors or causes of the event being studied where the incident or incident has been experienced by the respondent. The research population was all students in class VIII at one of the SMPN in Karawang Regency, totaling 160 students. The data obtained was analyzed using statistical tests with the help ofsoftware SPSS 25, software STAT97 andMicrosoft Office Excel 2010.

Sample selection uses techniques purposive sampling as many as 42 students. Data collection uses test and non-test instruments. The test instrument used in this research is in the form of questions describing mathematical communication skills consisting of 5 (five) questions adapted to indicators of mathematical communication abilities according to Sumarmo (Noviana et al., 2018), namely:

- Expressing real objects, situations and everyday events in the form of mathematical models (pictures, tables, diagrams, graphs, expressions, algebra)

- Explains mathematical ideas and models (pictures, tables, diagrams, graphs, expressions, algebra) into ordinary language.

- Explain and make mathematical statements studied

- Listen, discuss and write about mathematics

- Read with understanding a written presentation

- Making conjectures, organizing arguments, formulating definitions and generalizations.

Apart from that, a non-test instrument was also used in this research, namely a questionnairehabits of mind adjusted to the indicators habits of mind that is(a) diligent; (b) resolve problems carefully; (c) listen to other people's opinions with empathy; (d) flexible thinking; (e) metacognition; (f) thorough; (g) ask and respond actively; (h) utilizing old experiences to form new experiences; (i) think and communicate clearly and precisely; (j) enthusiastic in responding; (k) dare to take responsibility and face risks; (l) interdependent thinking; (m) continuous learning; (n) humorous; and (o) think flexibly and confidently (Sugandi & Maya, 2019).

The questionnaire statement consists of 30 questions. Making habits of mind questionnaire statements based on the grid is in Table 1 below:

Table 1.Habits of Mind Questionnaire Grid

Indicator	Statement Number	
	Positive	**Negative**
The sea	1, 2	3
Be careful in solving problems	-	4
Listen to other people's opinions with empathy	5	6
Think flexible	7	8
Metacognition	9	-
Carefully	11	10, 12
Ask and respond actively	-	13, 14
Leverage old experiences to form new ones	15	16
Think and communicate clearly and precisely	17	-
Be enthusiastic in responding	18	19, 20
Dare to take responsibility and face risks	21	22
Interdependent thinking	23	24
Continuous learning	25, 27	26
Humorous	29	28
Think flexibly and confidently	30	-

Based on Table 1, the habits of mind questionnaire consists of 15 positive items and 15 negative items. There are 4 answer choices for the habits of mind questionnaire based on a Likert scale, namely strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). The scoring of the questionnaire is adopted from Arikunto (2010), namely if the answer to a statement is positive when the answer is SS, the value is 4, S is 3, TS is 2 and STS is 1. Meanwhile, for negative statements, SS is 1, S is 2, TS is 3. and the STS value is 4. This questionnaire was validated first before use by involving expert validators and was tested on 50 students.

There are 5 (five) stages in this research, namely (1) preparation stage; (2) implementation stage, where researchers collect data; (3) data processing stage, where researchers carry out data processing by analyzing prerequisite test results; (4) the stage of drawing conclusions on the research results using the SPSS version 25 application. Decision making is based on a significance level of 5% or 0.05; and (5) the report preparation stage, where the researcher compiles the research results.

RESULTS AND DISCUSSION

Results

Based on the results of data processing from mathematical communication ability tests and questionnaireshabits of mind students obtained the results of descriptive statistical calculations as follows:

Table 2. Results of Descriptive Statistical Data Analysis
Mathematical Communication and*Habits of Mind* Student

	Pretest			
	Mean	**SD**	**Min**	**Max**
Communication Skills	57.34	18.59	20	90
Habits Of Mind	68.84	12.71	46.62	91.26

Apart from carrying out descriptive statistical calculations, data from the research results were also processed using SPSS 25, the following is a table of research results on the effect of thinking habits (Habits of Mind) on mathematical communication skills.

Table 3. Correlation Table*Habits of Mind* On Communication Ability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Say.
		B	Std. Error			
1	(Constant)	-25.065	5.624		-4.457	.000
	Habits Of Mind	1.345	.090	.921	14.957	.000

The following is the effect test hypothesishabits of mind towards mathematical communication skills:

H0 = There is no effect betweenhabits of mind towards mathematical communication skills

H1 = There is a significant effect betweenhabits of mind towards mathematical communication skills

The test criteria are if Sig. > 0,05 eye H_0 accepted. Based on the results of the simple linear regression test in table 2, the values obtained are Sig 0.000, thus indicating that the value Sig.< 0.05 eye H_0 rejected so it can be concluded that there is a significant effecthabits of mind towards mathematical communication.

Furthermore, a correlation coefficient significance test was also carried out. The following is a table of correlation significance test results:

Table 4. Test results
Significance of Correlation Coefficient

Model	R	R Square
1	.921	.848

Based on the results of the correlation significance testhabits of mind and mathematical communication skills shown in table 2, the correlation coefficient (R) value is quite strong, namely 0.921 and has a positive relationship and a strong direct effect on students' mathematical communication. Apart from that, the results of the analysis show that the effecthabits of mind as measured by students' mathematical communication skills was 0.848. Thus, the magnitude of the effect coefficienthabits of mind = 84.8%, while the remaining 15.2% is effectd by other factors not measured in this study.

From the results of the research analysis, a regression equation was also obtained, namely Y = -25,065 + 1,345 habits of mind student.

Discussions

Based on the analysis of the data obtained, the researcher will discuss the results of hypothesis testing based on theory and relevant research results:

First, the results of the correlation test found that the value Sig.= 0.000 < 0.05 point H0 rejected. This shows that habits of mind The effect on students' mathematical communication skills is 50.41%. This is because learning applies indicators habits of mind encourage students to explore contextual problems so as to support the achievement of mathematical communication skills. According to Werdiningsih & Khoerunisa (2021), their research revealed that with habits of mind It is very necessary in every mathematics lesson because mathematics is abstract so it requires habits of mind high, so students will also have high thinking abilities too. Therefore, habits of mind make students more diligent, thorough and careful in solving mathematics problems.

The effect habits of mind Susanto (2020) in his research stated that there was an increase in problem solving abilities and critical thinking abilities that applied learning by paying attention to indicators. mathematic habits of mind. Furthermore, Qadarsih's (2017) research also states that this has an The effect habits of mind on students' ability to master mathematical concepts by 27.67%. Then, also the results of research conducted by Dwirahayu et al. (2018) stated that habits of mind have a positive The effect on students' mathematical generalization abilities, namely 42.5%. This is because habits of mind that students have can help students to find general patterns or generalization results in solving problems.

Thus, according to Cuoco, Goldenberg & Mark (Handayani, 2015) mathematical habits of mind must be developed in students and require the role of teachers in their application in the classroom.

Second, from the results of the research analysis, the regression equation is obtained, namely Y = -25.065 + 1.345 habits of mind students have a score equal to zero. Based on this, it is known that, if students do not have habits of mind at all, his communication skills are still very poor; 2) b = 1.345 is the size of the variable contribution habits of mind which affects mathematical communication skills. The regression coefficient is 1.345 with a positive sign, meaning if the variable habits of mind changes or increases by one unit, the student's mathematical communication ability will also increase by 1.345 and vice versa if it decreases. So, it is concluded that the level of students' mathematical communication skills is directly proportional to habits of mind student; 3) If the value is average habits of mind is 61.27. If included in the regression equation it will increase students' mathematical communication skills by 57.34; and 4) to find out the value habits of mind What students need to have minimum communication skills is 18.64. Based on this equation it is known habits of mind What is needed for students to have minimal communication skills, namely students who are at the stage between being able and unable to have mathematical communication skills, is 18.64.

Based on the explanation above, habits of mind The effects students' mathematical abilities where intrinsic motivation produce positive learning and ultimately will encourage students to act and make better efforts when faced with mathematical tasks and solutions. According to Miliyawati (Yani et al., 2022) states that individual success is largely determined by habits that are carried out continuously, which will become stronger and stay with the individual so that they are difficult to change. So a common thread can be drawn from this research, namely to improve or develop students' mathematical communication skills, one of which can be done by improving students' mathematical habits of mind.

Based on the analysis of the data obtained, the researcher will discuss the results of hypothesis testing based on theory and relevant research results:

First, the results of the correlation test found that the value Sig. = 0.000 < 0.05 point H0 rejected. This shows that habits of mind The effect on students' mathematical communication skills is 50.41%. This is because learning applies indicatorshabits of mind encourage students to explore contextual problems so as to support the achievement of mathematical communication skills. Habits of mind influencing students' mathematical abilities was also revealed by Susanto (2020) who stated that there was an increase in problem solving abilities and critical thinking abilities by applying learning by paying attention to indicators mathematical habits of mind.

Qadarsih (2017) also stated in his research that the effect of habits of mind on students' ability to master mathematical concepts by 27.67%. Apart from that, the results of research conducted by Dwirahayu et al. (2018) stated that habits of mind has a positive The effect on students' mathematical generalization abilities, namely 42.5%. This is because habits of mind

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CONCLUSION
Based on the results of the analysis above, it is concluded that there is a significant The effect exerted by habits of mind on students' mathematical abilities, namely 84.8%. Therefore, mathematics teachers can develop learning strategies by paying attention to indicators habits of mind considering that affectivity has a positive effect on mathematical communication skills.

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