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RELATIONSHIP BETWEEN STUDENTS' MATHEMATICAL REPRESENTATION ABILITY AND SELF-CONFIDENCE

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ABSTRACT
This research is motivated by the students' self-assurance in the acquisition of mathematics and their limited mathematical representation ability. The objective of this study is to examine the relationship between self-assurance and mathematical representation skill with the goal of utilising it as a model to improve mathematical representation ability. The research investigated the capacity for mathematical representation in terms of verbal and visual representation. Correlational quantitative research is implemented in this investigation. A self-confident questionnaire and a written exam of mathematical representation ability were implemented as the data collection methodology. The subjects they studied were those of the ninth-grade students at SMP Muhammadiyah 4 Pekanbaru. Self-confident questionnaires were disseminated to gather data, and the mathematical representation ability test was administered in the form of description questions. The impact of self-confidence on learning outcomes is 91.6%, as indicated by the results of simple linear regression and simple correlation analysis. The learning outcomes of mathematical representation are influenced by 8.4% of other variables and are not specific to this case.
Keywords : mathematical representation ability, self-confidence, learning outcomes.

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PRELIMINARY

Students' capacity to describe mathematical ideas is a talent that is currently demanded in mathematics education and is crucial to their reasoning skill development (Rista et al., 2019). One of the objectives of advanced mathematics subjects formulated by BSKAP in 2022 is the significance of mathematical representation skills. Ability to depict a problem or scenario using mathematical symbols or models, as well as the capacity to convey concepts through graphs, charts, or other media, characterise this competence.

Students are expected to meet five standards set by the National Council of Teacher maths (NCTM) as part of their maths learning process: First, the capacity to find solutions to problems; second, the capacity to reason and prove; third, the skill to communicate mathematically; fourth, the ability to make mathematical connections; and fifth, the skill to give presentations based on mathematical concepts (Lindquist & Gates, 2020).

Mathematical representation ability is a characteristic that is consistently observed during the study of mathematics at all levels of education. Consequently, it is regarded as a component that warrants consideration. Therefore, it is imperative to emphasize and elevate mathematical representation during the instruction of elementary mathematics (Goldin, 2020).

Students are expected to meet five standards set by the National Council of Teacher maths (NCTM) as part of their maths learning process: First, the capacity to find solutions to problems; second, the capacity to reason and prove; third, the skill to communicate mathematically; fourth, the ability to make mathematical connections; and fifth, the skill to give presentations based on mathematical concepts. Based Lette & Manoy (2019) students require mathematical representation skills to develop a method of reasoning that facilitates the communication of abstract and concrete mathematical concepts, thereby simplifying the process of solving mathematical problems.

Indicators of mathematical representation ability according to Mudzakkir are as follows: (1) verbal representation ability, students can restate a problem in words in writing according to their speaking style, and can connect with image representations and or symbolic representations. (2) visual representation ability, learners can restate a problem by creating or modifying a direct image representation of the problem, and can connect with verbal representations and or symbolic representations. (3) symbolic representation ability, students can restate a problem by formulating a symbolic expression of a problem, and can connect with verbal representations and or image representations. Two markers of mathematical representation ability-verbal and visual-are the only ones covered in this study.

Mathematical representation abilities are essential for students to understand the content and find solutions to difficulties. Lacking these skills results in a lack of comprehension of the material, which makes it challenging for students to comprehend and work on the problems. Nevertheless, the actual level of mathematical representation abilities in Indonesia remains minimal. Students' incorrect utilization of representation forms in mathematical problem-solving is indicative of this.

Another reason why some students struggle with mathematical representation is because their teachers don't help them use their talents to accomplish learning goals. The capacity to articulate mathematical ideas that teachers sometimes struggle with is an essential skill for today's students (Delfita et al., 2020). In the pursuit of mathematics, it is

imperative that all individuals acquire the capacity to articulate and visualize mathematical concepts that can assist in the resolution of commonplace issues (Rahayu et al., 2021).

Prior studies' findings corroborate the poor mathematical representation skills from Mulyaningsih et al (2020) according to which pupils are still struggling with challenges involving their mathematical representation skills.according to the findings resulting from the examinations carried out Indriyani et al (2020) the average test result of representation ability, as determined by its three indicators, was 33.24%. Taking into account a psychological component that aids in the completion of tasks is crucial, considering the minimal level of mathematical representation skill in Indonesia. Self-assurance is one of these psychological components.

Inayah & Nurhasanah (2019) indicating that the students' mathematical representation and self-awareness have a high degree of correlation. Ulfa & Sundayana (2022) stated that self-confidence is an aspect that is quite influential on the success of students in performing tasks and representing good, precise and effective solutions.

According Çiftçi & Yıldız, (2019) being confident means having faith in one's mathematical abilities. Possessing self-confidence is believing in one's own ability to remain composed while attempting to resolve and overcome challenges. One facet of attitude that also necessitates learning is self-confidence. Students are able to reach their full potential when they have self-confidence (Inayah & Nurhasanah, 2021).

The relationship between teachers and students is the most important component in building students' mathematical self-confidence, students with students, and students with the teaching materials they use. Students will experience an increase in self-assurance when they are presented with enjoyable and challenging circumstances. A person's level of self-confidence is determined by self-confidence indicators, which serve as a reference. Sumarmo, U., Rohaeti & Hendriana (2021) The following are the indicators of self-confidence: (1) awareness of one's own capabilities; (2) lack of autonomy in decision-making; (3) humility and remorse for one's actions; and (4) a willingness to acknowledge one's shortcomings.

It is inevitable that the level of self-confidence of each individual will vary; this is due to two factors that influence it: the family environment and the surrounding environment, which are beyond one's control and have an effect on their self-esteem. The second factor is the internal factor, which is the self-concept that is associated with the individual's level of consciousness. This is characterized by a sense of self-awareness that arises from the senses and the expectation that one will have the ability to understand the

interrelationships between others in the vicinity. Afifah et al., (2019) asserts that an individual's self-assurance grows and changes as he learns from his experiences in relation to his environment. Self-confidence does not appear in him suddenly, but requires a process that starts from personality to the experiences that have been done.

Learners will be unable to solve problems due to a lack of confidence, as they will not comprehend the concept. Consequently, they will rely on guesswork to determine the solution to the given problem (Salamah & Amelia, 2020). In order to attain learning outcomes that are suboptimal for students. Given this, it is evident that students must possess self-confidence in order to optimize their capabilities, foster student enthusiasm and intelligence, and optimize their learning outcomes.

The findings of the study carried out by Yulinawati & Nuraeni (2021) students' mathematical representation abilities are split into three levels: high, medium, and poor. According to the results of this study, pupils' confidence levels have a direct correlation to their mathematical representation skills. Although the findings of research conducted by Ulfa & Sundayana (2022) that proves: (1) Respondents with a high level of self-confidence can accomplish the sub-indicators of creating problem situations using the provided data or representations, making visual representations to help understand the problem and find solutions, and creating mathematical models or equations from other representations. (2) In contrast, the sub-indicator of solving issue situations based on the available facts or representations is the only one that respondents with low self-confidence or moderate self-confidence can tackle.

Researchers are conducting an investigation into the self-confidence of mathematical representation abilities, as indicated by the preceding description. In order to make prior studies more useful as a guide for developing mathematical representation ability, this study aims to investigate the relationship between self-confidence and this skill.

METHODS

The approach utilised in this inquiry is quantitative correlation. The positivist worldview provides the theoretical and methodological basis for quantitative research. Research instruments are used to gather data from specific populations or samples, and statistical analysis is performed on the collected data to evaluate hypotheses (Sugiyono, 2016). Measuring the degree of relationship between two variables is the primary goal of correlational quantitative research. Gathering numerical data and analysing it statistically

to find and assess the link between variables is a common part of this type of study (Arikunto, 2017).

In the context of mathematics education, this study aims to do correlational quantitative research to demonstrate a considerable correlation between students' confidence level and their mathematical representation ability. This study's research tool is an examination of students' abilities in mathematical representation, which includes both verbal and visual aspects. The test includes two indicators: verbal and visual representation. A self-confidence questionnaire is an additional instrument that is employed to assess the level of confidence that students possess in their ability to learn mathematics.

The numerical data collected in this study comes from written test scores and surveys. Two factors, mathematical representation and self-confidence, make up this research variable. In this study, researchers distributed a self- confident quiz as many as 24 statements. (Lestari, 2023) administer research sample students written examinations consisting of five questions describing mathematical representations of random topics.

This study was conducted at SMP Muhammadiyah 4 Pekanbaru in classes XI-6 and XI-8, with a sample size of 41 students. The slovin formula and incidental sampling techniques were employed to determine the sample. Questionnaires and written exams were used to gather data for this research. In this study, we used a basic correlation test and linear regression analysis to examine the data. We also ran a preliminary test to make sure everything was normal and linear. This assessment is conducted with the assistance of IBM SPSS Statistic 22 and Microsoft Excel.

According Priyatno (2016) to find out how closely related, in what direction, and statistically significant two or more variables are to one another, researchers employ simple correlation analysis. Meanwhile, according to Riduwan (2018) when making predictions about the linear relationship between a single dependent variable and an independent one, basic regression analysis is utilised.

RESULT AND DISCUSSION

This investigation examines the impact of mathematical representation on students' self-assurance with respect to chance material. This investigation was conducted at SMP Muhammadiyah 4 Pekanbaru, where a total of 41 students were enrolled in classes XI-6 and X-8. This investigation pertains to chance material that possesses both visual and non-visual mathematical representation capabilities. The objective of this investigation was to

ascertain the correlation between self-assurance and mathematical representation. The students were administered a mathematical representation ability examination in the form of description questions, and subsequently, they were required to respond to statements on the self-confident questionnaire.

Following the data collection, the prerequisite tests for simple linear regression analysis and simple correlation tests, that are administered using data from the students' mathematical representation ability exam and a self-confidence questionnaire. Two tests that measure this relationship are the normalcy test and the linearity test. The descriptive statistical data results are presented in the subsequent table, as determined by the research conducted:

Table1. Descrptive Statistics

	N	Minimum	Maximum	Means	Standart Deviation
HasilRM	41	1.00	20.00	12.3902	6.37526
Selfconfident	41	1.71	4.08	2.9949	.49942
Valid N (Listwise)	41				

Based on table 1, it can be concluded that the descriptive statistics of mathematical representation learning outcomes with a sample size of 41 students, the mathematical representation learning outcomes variable has a minimum value of 1.00 and a maximum value of 20.00. The average value of mathematical representation learning outcomes is positive, namely 12.3902 with a standard deviation of 6.37526. The average value of mathematical representation learning outcomes is positive, namely 12.3902 with a standard deviation of 6.37526.

Based on table 1, it can also be concluded that the descriptive statistics of self confidence with a sample size of 41 students, the self confidence variable has a minimum value of 1.71 and a maximum value of 4.08. The average value of self confidence is positive, namely 2.9949 with a standard deviation of 0.49942.

Table 2. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Self_Confident	.100	41	.200	.985	41	.868
Representasi_Matematis	.110	41	.200	.942	41	.136

**This is a lower bound of the true significance.*
a. Liliefors Significance Correction

According to Table 2, self-confidence has a significant Shapiro Wilk value of 0.868, which is higher than the 0.05 threshold. The data follows a normal distribution,

therefore. A mathematical representation with a Shapiro-Wilk score of 0.136 would be statistically significant at the 0.05 level. These results also show that the data follows a normal distribution. Once the data has been normally distributed, the linearity test may be executed.

Table 3. ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Hasilbelajar* Self Confident	Between Groups	(Combined)	55.901	30	1.863	1.384	.303
		Linearity	.096	1	.096	.071	.795
		Deviation from Linearity	55.805	29	1.924	1.429	.283
	Within Groups		13.466	10	1.347		
	Total		69.367	40			

According to the findings of Table 3, the sig. value on the Deviation from Linearity line is 0.283, which is greater than the threshold of 0.05. Consequently, it can be inferred that there is a linear relationship between the variables. Once the linear relationship between variables has been established, the correlation test and simple linear regression analysis may be implemented.

Table 4. Correlations

		SelfConfident	Hasilbelajar
SelfConfident	Pearson Correlation	1	-.957**
	Sig.(2-tailed)		.000
	N	41	41
Hasilbelajar	Pearson Correlation	-.957**	1
	Sig.(2-tailed)	.000	
	N	41	41

**. Correlation is significant at the 0.01 level (2-tailed).

The results of Table 4 indicate that the sig value is 0.000, which is less than 0.05. Consequently, it can be inferred that there is a partial significant relationship between self-confidence and mathematical representation. In other words, an increase in self-confidence is partialy correlated with an increase in mathematical representation. This result indicates that the observed relationship is not coincidental, but rather a genuine relationship between the two variables.

Table 5. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957[a]	.916	.914	.08041

a. Predictors : (Constant), Self Confident

Through the examination of the value of R2, it is possible to determine the extent of the influence of self-confidence on mathematical representation in table 5. R2 = 0.916, which translates to 91.6%. Such an interpretation is obtained. According to this value, the impact of self-confidence on learning outcomes is 91.6%, while the influence of other variables on the learning outcomes of mathematical representations outside of this context is 8.4%.

According to the data analysis findings, self-confidence is capable of accounting for 91.6% of the variation observed in mathematical representation. This implies that self-assurance is a highly influential factor in the development of students' mathematical representation skills. Other variables that are not included in this analysis, but which also influence students' mathematical representation learning outcomes, account for the remaining 8.4%.

It is evident from this outcome that a substantial increase in students' self-assurance will be accompanied by an improvement in their mathematical representation skills. Consequently, it is crucial for educational institutions and educators to enhance students' self-confidence as a component of their endeavors to enhance learning outcomes, particularly in mathematics.

The results that have been presented above can be further bolstered by the findings of research conducted by Sarah Inayah & Nurhasanah (2019) which asserts that the correlation coefficient is positive and that mathematical representation ability and self-confidence have a high correlation (excellent). Furthermore, the research findings from Yulinawati & Nuraeni (2021) the level of students' mathematical representation abilities is influenced by their self-confidence. Students with a high level of self-confidence are more likely to possess high mathematical representation skills, while those with a medium level of self-confidence are more likely to possess medium mathematical representation skills. Conversely, students with a low level of self-confidence are more likely to possess low mathematical representation skills.

CONCLUSION

From the results obtained, the ability of mathematical representation has an influence on self-confidence by 91.6% while 8.4% is influenced by other factors not measured in this study. The study of mathematical representation ability and student self-confidence can be used as a reference and basis for teachers in schools, especially for mathematics teachers in directing, which is not measured in this study by 8.4%. There are

several other possible factors that affect students' self-confidence including students' socioeconomic status, physical appearance, talents possessed or other abilities. Seeing that the portion of the influence of mathematical representation ability is greater, it can be said that it is important to pay attention to these abilities in learning in order to get students' self-confidence.

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