

THE EFFECT OF SELF-CONCEPT AND SELF-CONFIDENCE ON STUDENTS' MATHEMATICAL CREATIVE THINKING ABILITIES

Indah Aini Wirdia¹, Asrul²

^{1,2}Universitas Islam Negeri Sumatera Utara, Medan, Indonesia
e-mail: indah0305211018@uinsu.ac.id

Abstract

This study aims to determine the influence of self-concept and self-confidence on students' mathematical creative thinking ability at MTs Negeri Serdang Bedagai. This quantitative research used a correlational design with a sample of 32 students selected through cluster sampling. Data were collected using questionnaires for self-concept and self-confidence, and a test for creative mathematical thinking skills. The results showed that self-concept had a positive and significant effect on creative mathematical thinking (Sig. = 0.016 < 0.05), self-confidence also had a positive and significant effect (Sig. = 0.003 < 0.05), and simultaneously both variables significantly influenced students' creative mathematical thinking ability (Sig. = 0.010 < 0.05) with a determination coefficient (R^2) of 0.289. These findings indicate that self-concept and self-confidence play an important role in improving students' mathematical creative thinking ability.

Keywords: *self-concept, self-confidence, creative thinking, mathematics*

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh konsep diri dan kepercayaan diri terhadap kemampuan berpikir kreatif matematis siswa MTs Negeri Serdang Bedagai. Penelitian ini menggunakan metode kuantitatif dengan desain korelasional dan melibatkan 32 siswa yang dipilih melalui teknik cluster sampling. Data dikumpulkan melalui angket konsep diri dan kepercayaan diri serta tes kemampuan berpikir kreatif matematis. Hasil penelitian menunjukkan bahwa konsep diri berpengaruh positif dan signifikan terhadap kemampuan berpikir kreatif matematis (Sig. = 0,016 < 0,05), kepercayaan diri juga berpengaruh positif dan signifikan (Sig. = 0,003 < 0,05), serta secara simultan kedua variabel tersebut berpengaruh signifikan terhadap kemampuan berpikir kreatif matematis siswa (Sig. = 0,010 < 0,05) dengan nilai determinasi (R^2) sebesar 0,289. Temuan ini menunjukkan bahwa konsep diri dan kepercayaan diri berperan penting dalam meningkatkan kemampuan berpikir kreatif matematis siswa.

Kata kunci: konsep diri, kepercayaan diri, berpikir kreatif, matematika.

INTRODUCTION

Mathematics is a compulsory subject for all students from elementary school to higher education levels. This is so that students can think logically, analytically, systematically, and critically. Mathematics is generally viewed by students as a difficult subject (Suhendar & Yanto, 2023) . With the rapid development of science and technology, every individual is required to be able to master science and technology because both play a very important role in the field of education (Prawidya, et.al, 2023) . Mathematics, as a basic science, has a major contribution in developing a person's mindset so that they are able to improve their mastery of science and technology, which continues to evolve (Sarawina, et.al, 2023) . Mathematics also plays an important role in developing students' logical, analytical, systematic, critical, and

creative thinking skills (A. P. Lubis & Maysarah, 2025) , as well as being the foundation for the development of various other disciplines and technologies (Siregar & Asrul, 2024) .

Creative thinking is defined as the ability to generate new, varied, and meaningful ideas or solutions to solve a problem. The OECD, through the PISA 2022 Creative Thinking framework, emphasizes that creative thinking includes fluency, flexibility, originality, and elaboration in developing solutions (OECD, 2023) .

Mathematical creative thinking skills are an important component in the mathematics learning process because they involve students' ability to generate various possible solutions to a problem, combine concepts, and see new relationships between existing ideas. With these skills, students are expected to understand concepts more deeply and flexibly. However, in reality, many students still struggle to think creatively when solving mathematical problems that require high-level reasoning. They tend to rely on examples or patterns of solutions taught by teachers and are reluctant to try new approaches.

Creative thinking is the ability to generate various possible ideas and diverse ways of solving a problem (Sitorus, et.al, 2023) . In the context of mathematics learning, creative thinking skills enable students to find more than one solution strategy, so that they are not fixated on a single standard procedure in answering questions.

This phenomenon indicates that there are other factors that influence students' mathematical creative thinking abilities. Not only cognitive factors, but also affective and psychological factors such as self-concept and self-confidence (Beghetto & Kaufman, 2022) . Self-concept describes how a person assesses and views themselves, in terms of their abilities, potential, and limitations. Meanwhile, self-confidence is a person's belief in their ability to face various challenges in learning and daily life (Chong & Ismail, 2020) . These two factors are closely related to students' motivation, curiosity, and readiness to solve mathematical problems.

Marsh and Craven explain that academic self-concept is an individual's perception of their competence in a particular academic field. This self-concept functions as a mediator between learning experiences and students' academic behavior (Suharsono, 2022) . This means that learning experiences do not directly influence student behavior but are first processed through students' perceptions of themselves. Students who have a positive academic self-concept tend to view tasks as challenges that can be overcome, rather than as

threats. Schunk and Zimmerman also explain that self-confidence functions as a mechanism that drives learning behavior, because individuals who are confident will be more willing to take cognitive risks, try new strategies, and persevere when encountering difficulties. In the context of mathematics learning, this cognitive risk is very important because problem solving does not always have a single procedure. Conversely, students who have low self-concept and self-confidence often doubt their own abilities and tend to avoid questions that are considered difficult. This can hinder the development of their creative thinking skills.

Based on the views of these experts, it can be concluded that psychological aspects of students such as self-concept, self-confidence, motivation, and self-efficacy are essential elements in education. Psychological aspects not only play a supporting role but also become the main foundation that enables the learning process to take place effectively and meaningfully.

The development of mathematics, which continues to keep pace with the demands of the times, requires students to be creative in developing and applying mathematical concepts as a basic science in education (N. A. Lubis & Rahmadhani, 2023). In addition, education in Indonesia is currently undergoing various innovations in response to developments in the 21st century, which are marked by rapid technological advances (Selian, et.al, 2023). This condition emphasizes the importance of mathematics learning that is not only results-oriented but also focused on developing students' creative thinking skills.

Previous studies support the importance of psychological factors in successful mathematics learning. Several studies have found that self-concept has a positive effect on students' mathematical creative thinking abilities and academic achievement, with students with higher self-concept demonstrating better creative thinking performance and mathematics learning outcomes (Rati, et.al, 2025). In addition, other studies show that students with high self-confidence tend to be better at formulating creative and flexible answers to mathematical problems, which is a characteristic of mathematical creative thinking (Kharisudin, 2022). However, most of these studies focus more on general academic achievement or broad thinking skills, and there are still very few that specifically examine the relationship between self-concept, self-confidence, and mathematical creative thinking abilities in Madrasah Tsanawiyah (MTs) students.

Thus, there is still a research gap regarding how these two psychological factors influence creative thinking abilities in the context of mathematics learning at the MTs level. Some previous studies only highlight the influence of self-concept on learning achievement without considering the role of self-confidence as a supporting variable. Conversely, there are also studies that examine the influence of self-confidence on learning outcomes, but have not looked at it in relation to mathematical thinking creativity. Therefore, this study attempts to fill this gap by comprehensively examining the influence of self-concept and self-confidence on the mathematical creative thinking abilities of students at MTs Negeri Serdang Bedagai.

In addition to academic needs, this study was also driven by empirical realities in the field. Based on initial observations, many students still experience difficulties in solving non-routine mathematical problems that require creative reasoning. Some of them feel unsure of their abilities, while others are reluctant to try different solution strategies for fear of making mistakes. This condition reinforces the assumption that psychological aspects such as self-concept and self-confidence have a significant influence on how students use their creative thinking skills in the context of mathematics learning.

This study is expected to contribute both theoretically and practically. Theoretically, this study enriches the study of the relationship between affective aspects and cognitive abilities in mathematics learning, particularly creative thinking skills. Practically, the results of this study can be used as a reference for mathematics teachers in designing learning strategies that not only emphasize mastery of concepts but also pay attention to the development of students' self-concept and self-confidence. Thus, students are expected to be able to develop more optimal creative thinking skills, dare to take the initiative in solving problems, and have a positive attitude towards mathematics.

The importance of education is also emphasized in Law Number 20 of 2003, which states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students are able to develop their potential, including becoming creative, independent, and responsible individuals (M. S. Lubis, 2022) .

Based on this description, this study aims to analyze the influence of self-concept and self-confidence on students' mathematical creative thinking abilities at MTs Negeri Serdang Bedagai. The results of this study are expected to provide new insights for the world of

education, especially in efforts to improve the quality of mathematics learning through a more holistic approach centered on developing students' full potential.

METHODS

This study used a quantitative approach with a correlational design. This design was chosen because it was in line with the research objectives, namely to determine the relationship and influence of self-concept and self-confidence on students' mathematical creative thinking abilities. This approach allowed the researcher to measure the strength of the relationship between variables objectively through statistical analysis. The research was conducted at MTs Negeri Serdang Bedagai, located at Jl. Negara Sarang Ginting, Dolok Masihul District, Serdang Bedagai Regency. This location was chosen because no research had ever been conducted at this school regarding the influence of self-concept and self-confidence on mathematical creative thinking abilities. The research was conducted in the odd semester of the 2025/2026 academic year, specifically in August 2025.

The determination of the population in this study refers to the definition of population as a generalization area consisting of objects or subjects that have certain characteristics to be studied and then conclusions are drawn (Harahap, et.al, 2022) . The population of this study is all eighth-grade students at MTs Negeri Serdang Bedagai. Sampling was conducted using the cluster sampling technique, which is sampling based on class groups. Sample members were selected randomly to give equal opportunities to each student. The research data was obtained through three main instruments, namely a self-concept questionnaire, a self-confidence questionnaire, and a mathematical creative thinking ability test. A questionnaire is a data collection tool in the form of a set of written questions that are managed by the respondents themselves, and although it does not involve direct interaction, a questionnaire can be an effective instrument for obtaining research data systematically (Ritonga & Asrul, 2023) . The self-concept questionnaire was compiled based on indicators covering physical, process, social, and self-image aspects.

Table 1. *Self-Concept Indicators*

NO	Self-Concept Indicators	Description	Item No.	Number
1	Academic self-concept	Students' perceptions of their abilities in learning activities, academic grades,	1,2,3	3

		task completion abilities, and school achievements.		
2	Social self-concept	Students' views on their ability to form social relationships, such as interacting, cooperating, being accepted, and being liked by friends and the environment.	4,5,6	3
3	Emotional self-concept	Students' perceptions of their ability to manage emotions, cope with stress, and control their feelings in learning and social situations.	7,8,9	3
4	Physical self-concept	Students' perceptions of their physical appearance, physical fitness, and attitudes toward their physical condition.	10,11,12	3
5	Moral/ethical self-concept	Students' perceptions of attitudes, values, and good and bad behaviors that they consider to reflect themselves.	13, 14, 15	3
Number				15

The self-confidence questionnaire was compiled based on indicators that include self-confidence, courage in decision-making, responsibility, optimism, and the ability to work together.

Table 2. *Self-Confidence Indicators*

NO	Self-Confidence Indicators	Description	Item No.	Number
1	Confidence in oneself (optimistic)	Self-confidence in the ability to complete mathematical tasks	1,2,3	3
2	Daring to make decisions	Ability to make decisions and stick to them in the learning process	4,5	2
3	Enjoying new experiences and challenges	Interest in new problems, challenges, and exploring ideas in mathematics	6,7	2
4	Responsible	Consistency in completing tasks, acknowledging mistakes, and independent learning	8,9	2

5	Possesses a sense of tolerance (cooperation)	Willingness to cooperate and respect opinions in mathematical discussions	10,11,12	3
6	Always cheerful and happy	Enjoyment and enthusiasm in participating in mathematics lessons	13,14	2
Total				14

A test of mathematical creative thinking in the form of an essay that measures four aspects of creativity, namely fluency, flexibility, originality, and detail in solving mathematical problems.

Table 3. *Creative Thinking Ability Indicators*

Aspects	Question Indicators	Question No.
<i>Fluency</i>	Determine the difference and the next three terms of a number pattern in the question	2
	Creating patterns that match several things requested in the question	5
<i>Flexibility</i>	Finding other patterns that are different from the patterns in the problem	1
<i>Elaboration</i>	Determining the formula for the nth term of a number pattern diagram	3
<i>Authenticity</i>	Providing a different solution method from the usual one	4
Total Score		20

Before use, the instruments were tested for validity and reliability. The validity test results showed that all items were valid and suitable for use. The reliability test was conducted using Cronbach's Alpha coefficient, with results of 0.808 for the self-concept variable, 0.894 for self-confidence, and 0.715 for mathematical creative thinking ability. These results indicate that all instruments have a good level of reliability. The research procedure began with the preparation and validation of instruments, followed by data collection through the distribution of questionnaires and the implementation of mathematical creative thinking ability tests. The collected data were then analyzed statistically using multiple linear regression analysis with the help of SPSS version 23 software. Before the analysis was carried out, the data was first tested through normality, linearity, and multicollinearity tests to ensure

that the data met the statistical assumptions. Regression analysis was used to determine the partial and simultaneous effects of self-concept and self-confidence on students' mathematical creative thinking abilities.

Research Limitations. This study has several limitations that should be considered when interpreting the findings. One of the main limitations of this research is the relatively small sample size ($N = 32$), which may limit the statistical power of the multiple regression analysis. Therefore, the findings of this study are not intended to be generalized broadly to larger populations. The results should be interpreted as indicative of relationships among variables within the specific context and characteristics of the participants involved. In addition, the correlational research design does not allow for direct causal inference. Other variables that may influence students' mathematical creative thinking ability such as learning motivation, self-efficacy, instructional strategies, and learning environment were not examined in this study.

RESULTS AND DISCUSSION

This study aimed to determine the influence of self-concept and self-confidence on the mathematical creative thinking abilities of eighth-grade students at MTs Negeri Serdang Bedagai. Data were obtained from the distribution of self-concept questionnaires, self-confidence questionnaires, and mathematical creative thinking ability tests to 32 students. Data analysis was performed using SPSS version 23 with a series of prerequisite tests before regression analysis.

The validity test results showed that all instruments used were suitable for use as research measurement tools. The self-concept variable consisted of 15 statements, with 13 valid items and 2 invalid items. The self-confidence variable had 14 items, with 13 valid items and 1 invalid item, while the creative thinking variable had 5 items, all of which were valid. The reliability test shows that all variables have a Cronbach's Alpha value above 0.70, which means they are reliable.

Table 4. *Results of Validity and Reliability Tests*

No	Research Variable	Number of Items	Valid Items	Invalid Items	Number of Dropped Items	Cronbach's Alpha	Description
1	Self-Concept	15	13	2	4.13	0.808	Reliable

2	Self-confidence	14	13	1	4	0.894	Reliable
3	Creative Thinking	5	5	0	0	0.715	Reliable

The results of the classical assumption tests indicate that the data met the requirements for multiple regression analysis. The normality test showed that the data were normally distributed (Sig. = 0.200 > 0.05). Linearity tests confirmed linear relationships between self-concept and mathematical creative thinking ability (Sig. = 0.020), as well as between self-confidence and mathematical creative thinking ability (Sig. = 0.006). In addition, the multicollinearity test indicated no multicollinearity between the independent variables, with a tolerance value of 0.557 and a VIF value of 1.796.

Table 5. Results of Classical Assumption Tests

Test Type	Statistical Value	Significance	Description
Normality (K-S)	0.092	0.200	Data is normally distributed
Linearity (Self-concept)	F = 6.282	0.020	Linear relationship
Linearity (Self-confidence)	F = 9.568	0.006	Linear relationship
Multicollinearity	1.796	-	No multicollinearity

Based on the results of the first hypothesis test, a significance value of 0.016 (< 0.05) and a regression coefficient of 0.490 were obtained. These results indicate that self-concept has a positive and significant effect on students' mathematical creative thinking abilities. This means that the higher the students' self-concept, the higher their mathematical creative thinking abilities.

Table 6. Results of Simple Regression Test of Self-Concept on Mathematical Creative Thinking Ability

		Unstandardized		Standardized		
		Coefficients		Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-6.099	7.729		-.789	.437
	Self-Concept	.490	.190	.438	2,577	.016

a. Dependent Variable: Creative_Thinking

$$\hat{Y} = -6,099 + 0,490X_1$$

The results of the simple regression analysis indicate that self-concept (X_1) has a positive and significant effect on students' mathematical creative thinking ability (Y) ($p < 0.05$). This finding suggests that higher self-concept is associated with higher levels of creative thinking. Similarly, self-confidence also shows a positive and significant effect on mathematical creative thinking ability ($p = 0.003 < 0.05$), indicating that students with higher self-confidence tend to demonstrate better creative thinking skills.

Table 7. Results of Simple Regression Test of Self-Confidence on Mathematical Creative Thinking Ability

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	-.869	4.519		-.192	.849
	Self-Confidence	.436	.134	.524	3,255	.003

a. Dependent Variable: Creative_Thinking

$$\hat{Y} = -0,869 + 0,436X_2$$

The results of the simple regression analysis indicate that self-confidence (X_2) has a positive and significant effect on students' mathematical creative thinking ability (Y) ($p < 0.05$). This finding suggests that higher levels of self-confidence are associated with better creative thinking performance.

Furthermore, the multiple regression analysis shows that self-concept and self-confidence simultaneously have a significant effect on mathematical creative thinking ability ($F = 5.480$; $p = 0.010$), explaining 28.9% of the variance, while the remaining variance is influenced by other factors beyond the scope of this study.

Table 8. Multiple Regression Test Results

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.610	2	18,305	5,480	.010 ^b
	Residual	90,190	27	3,340		
	Total	126,800	29			

a. Dependent Variable: Creative_Thinking

b. Predictors: (Constant), Self-Concept, Self-Confidence

$$\hat{Y} = -5,156 + 0,179X_1 + 0,348X_2$$

Based on the multiple regression analysis, self-concept and self-confidence simultaneously have a significant effect on students' mathematical creative thinking ability ($F = 5.480$; $p < 0.05$), explaining 28.9% of the variance ($R^2 = 0.289$).

The results of this study indicate that self-concept and self-confidence play important roles in supporting students' mathematical creative thinking ability. These findings not only confirm the statistical relationships among the variables but also provide deeper insights into how internal psychological factors influence the process of creative thinking in mathematics learning.

From a psychological perspective, students with a positive self-concept tend to perceive themselves as capable of meeting academic demands. This positive self-perception encourages greater persistence in completing tasks, reduces the tendency to give up when facing non-routine problems, and promotes cognitive flexibility in exploring various solution strategies. In the context of mathematical creative thinking, persistence and cognitive flexibility are essential prerequisites for generating diverse and original solutions. These findings strengthen previous research suggesting that self-concept contributes to higher-order cognitive abilities in mathematics learning.

Meanwhile, self-confidence functions as a driving force for students' exploratory behavior in mathematical problem solving. Confident students are more willing to engage in intellectual risk-taking, such as proposing unconventional answers, attempting alternative approaches, and expressing ideas even when they are not fully certain of their correctness. This willingness to take intellectual risks represents one of the key mechanisms supporting the emergence of originality and flexibility in thinking, which lie at the core of mathematical creativity. Thus, self-confidence serves not merely as a supporting factor but also as a catalyst that activates students' creative potential.

Simultaneously, the contribution of self-concept and self-confidence to mathematical creative thinking ability indicates that these two variables complement each other. Self-concept shapes students' fundamental beliefs about their own potential and abilities, while self-confidence strengthens their willingness to actualize those beliefs through concrete

actions during the problem-solving process. The interaction between these factors enables students to engage more actively, experiment with new ideas, and persist when encountering difficulties in mathematics learning. This finding is consistent with the PISA 2022 Creative Thinking framework, which emphasizes the importance of non-cognitive factors in fostering students' creativity.

From a pedagogical perspective, the findings highlight that the development of mathematical creative thinking cannot be achieved solely through the provision of non-routine exercises. Teachers need to design instructional strategies that intentionally support the development of students' self-concept and self-confidence, such as providing constructive, process-oriented feedback, creating a classroom environment that is safe for expression and making mistakes, and implementing group discussions that encourage students to voice their ideas. Through such pedagogical approaches, students are expected to develop mathematical creativity more optimally.

These findings are consistent with previous studies indicating that self-concept influences mathematics learning outcomes (Handayani, 2016). This finding is consistent too with the study by Rati et al. (2025), which shows that self-concept contributes significantly to higher-order cognitive performance in mathematics. and that self-confidence is significantly related to students' academic achievement (Rozaini et al., 2017). This study extends prior research by demonstrating that both psychological factors also play crucial roles in the development of mathematical creative thinking ability, particularly within the context of Madrasah Tsanawiyah students.

CONCLUSION

This study concludes that self-concept and self-confidence are important psychological factors that support students' mathematical creative thinking ability at the Madrasah Tsanawiyah level. Self-concept plays a role in shaping students' positive perceptions of their own abilities, while self-confidence encourages persistence and willingness to take intellectual risks when solving mathematical problems. Together, these findings indicate that affective factors meaningfully support higher-order cognitive skills in mathematics learning.

The main contribution of this study lies in strengthening empirical evidence that mathematical creativity is not determined solely by cognitive competence, but is also influenced by internal psychological factors. In the context of mathematics education, these

results highlight the importance of designing learning environments that not only emphasize conceptual understanding and non-routine problem solving, but also intentionally foster students' self-concept and self-confidence.

Future research is recommended to involve larger sample sizes, apply longitudinal or experimental designs, and include additional psychological or instructional variables in order to enhance generalizability and provide stronger causal inferences regarding the development of students' mathematical creative thinking abilities.

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