

The Correlation of Junior High School Students' Self-Confidence and Mathematical Problem-Solving Ability

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Abstrak

Kemampuan pemecahan masalah matematis merupakan salah satu kompetensi penting yang harus dimiliki oleh siswa, dan kepercayaan diri diyakini memiliki kontribusi signifikan terhadap pencapaiannya. Penelitian ini bertujuan untuk mengetahui hubungan antara kepercayaan diri (self-confidence) dan kemampuan pemecahan masalah matematis siswa SMP. Penelitian ini menggunakan metode kuantitatif dengan desain korelasional. Subjek penelitian adalah 87 siswa kelas VIII di SMP Negeri 12 Jember pada semester genap tahun ajaran 2023/2024. Data dikumpulkan melalui angket kepercayaan diri dan tes kemampuan pemecahan masalah matematis. Berdasarkan analisis deskriptif, nilai rata-rata kepercayaan diri siswa adalah 96,08 dengan kategori dominan berada pada tingkat sedang (74,71%). Hasil analisis korelasi menunjukkan terdapat hubungan yang positif antara kepercayaan diri dan kemampuan pemecahan masalah matematis. Kesimpulan dari penelitian ini adalah semakin tinggi tingkat kepercayaan diri siswa, maka semakin baik kemampuan mereka dalam menyelesaikan soal-soal matematika secara problematis. Implikasi dari temuan ini menunjukkan pentingnya strategi pembelajaran yang tidak hanya fokus pada aspek kognitif, tetapi juga afektif siswa, seperti penguatan rasa percaya diri guna mendukung keberhasilan akademik, khususnya dalam pembelajaran matematika.

Kata Kunci: kepercayaan diri; korelasi; pemecahan masalah matematis

Abstract

Mathematical problem-solving ability is one of the essential competencies students must possess, and self-confidence is believed to significantly contribute to its achievement. This study aims to determine the correlation between self-confidence and junior high school students' mathematical problem-solving ability. The research employed a quantitative method with a correlational design. The subjects were 87 eighth-grade students at SMP Negeri 12 Jember during the even semester of the 2023/2024 academic year. Data were collected through a self-confidence questionnaire and a mathematical problem-solving test. Based on descriptive analysis, the average self-confidence score was 96.08, with the majority (74.71%) falling into the average category. The results of the correlation analysis showed a positive relationship between self-confidence and mathematical problem-solving ability. The conclusion of this study indicates that the higher the level of students' self-confidence, the better their ability to solve mathematical problems. The implications of these findings highlight the importance of learning strategies that focus not only on cognitive aspects but also on students' affective domains, such as enhancing self-confidence to support academic success, particularly in mathematics learning.

Keywords: self-confidence; correlation; mathematical problem-solving

I. INTRODUCTION

Self-confidence is a psychological construct that has long attracted the attention of researchers, educators, and psychologists due to its central role in shaping human behavior, performance, and development (Fatur Rahman, Iswara, & Gozali, 2022). Broadly defined, self-confidence refers to an individual's belief in their own ability to succeed in specific situations or accomplish a task (Dalilan & Sofyan, 2022). It is deeply rooted in the social-cognitive theory, which emphasizes that human behavior is influenced by cognitive processes such as self-perception, judgment, and expectations. Self-confidence serves as a motivational resource that helps individuals persevere in the face of challenges, maintain positive attitudes, and approach difficult tasks with determination (Ulfa & Sundayana, 2022). It is not merely about self-esteem or general feelings of self-worth but is more task-specific and situation-dependent.

It is aligned with Hendriana et al. (2017) Within the educational context, self-confidence becomes particularly vital as it affects how students approach learning tasks, engage with academic content, and perform in evaluative situations such as tests and classroom participation. Ningsih and Warni (2021) said that in junior high school, a period marked by rapid cognitive, emotional, and social development, self-confidence begins to solidify as students encounter more complex academic challenges and begin to form stable perceptions of their academic abilities.

During this stage, students' self-confidence can fluctuate significantly depending on their experiences with

success or failure, feedback from teachers and peers, and the learning environment they are exposed to (Atiyah & Nuraeni, 2022). It is stated by Yates (2013) and Awalia (2023), for instance, consistent encouragement, constructive feedback, and a supportive classroom atmosphere can enhance a student's self-confidence, whereas repeated failures, negative comparisons, or harsh criticism may hinder it.

The increasing demands of the curriculum, especially in subjects like mathematics, often test the students' self-belief, thereby either strengthening or undermining their confidence (Lestari, Supratman, & Komara, 2023). Sumartini (2018) said that mathematics often regarded as one of the most challenging subjects in school, plays a critical role in students' academic trajectories and career aspirations. However, it is also a subject that many students approach with anxiety, fear, or self-doubt. The importance of this ability is acknowledged by Nurhayati et al., (2016), Tamba and Bermuli (2023), Santoso and Ariyanti (2023), and Ratna and Yahya, (2022).

Mathematical problem-solving refers to the process through which students identify, analyze, and resolve mathematical challenges using appropriate strategies, logical reasoning, and conceptual understanding (Minggu, Arwadi, & Bakri, 2022; Ulfa, Roza, & Maimunah, 2022). It involves several interconnected stages such as understanding the problem, devising a plan, carrying out the plan, and reflecting on the solution. This is in line with the data obtained by Sani (2016), In other words, problem-solving is a higher-order thinking

skill that demands active engagement, flexible thinking, and a resilient attitude attributes that are fostered by strong self-confidence.

Putri et al., (2022) The correlation between self-confidence and mathematical problem-solving ability can be explained through several psychological and educational theories. One of the most prominent is Bandura's theory of self-efficacy, which posits that individuals who believe in their capability to succeed are more likely to engage with difficult tasks, exert effort, and persist despite obstacles. In the context of mathematics education, students with high self-confidence are more likely to believe they can handle complex problems, which in turn motivates them to try harder, take intellectual risks, and use strategic thinking all of which enhance problem-solving ability.

Conversely, students with low confidence may avoid challenging tasks, experience heightened anxiety, and give up quickly, thereby limiting their opportunity to develop and demonstrate problem-solving skills (Malik, 2018). Empirical studies have consistently shown a positive correlation between self-confidence and mathematical achievement, particularly in problem-solving. For example, research has found that students who perceive themselves as competent in math are more likely to engage in meaningful problem-solving activities and perform better in assessments. Nugraha & Basuki (2021) This is because self-confidence influences both cognitive and affective domains it enhances concentration, reduces anxiety, and fosters a positive attitude towards learning.

Moreover, confident students are more willing to seek help, collaborate with peers, and learn from mistakes, which are essential behaviors for developing mathematical problem-solving skills.

II. METHOD

This study employed a quantitative approach with a correlational research design aimed at identifying the relationship between self-confidence and students' mathematical problem-solving ability. The subjects of this study were 87 eighth-grade students at SMP Negeri 12 Jember during the even semester of the 2023/2024 academic year. Data were collected using two instruments: a self-confidence questionnaire and a mathematical problem-solving test. The self-confidence questionnaire was developed based on relevant psychological indicators, while the problem-solving test consisted of mathematics questions that assessed analytical and problem-solving skills. The collected data were analyzed descriptively to determine score distribution and categorize students' levels of self-confidence, and inferentially using correlation analysis to examine the relationship between the two variables.

III. RESULT AND DISCUSSION

A. Data Description of Self-Confidence

The description is obtained from the score of the self-confidence questionnaire. The calculation from the data is presented in Table 1 as follows:

Table 1.
Data Description of Self-Confidence

| SELF CONFIDENCE | |
|-----------------|--------|
| N Valid | 87 |
| Missing | 0 |
| Mean | 96.08 |
| Median | 95.00 |
| Mode | 93 |
| Std. Deviation | 10.019 |
| Variance | 100.38 |
| Range | 54 |
| Minimum | 67 |
| Maximum | 121 |
| Sum | 8359 |

The data on self-confidence shows a sample size of 87 valid responses, with no missing data. The mean self-confidence score is 96.08, indicating that the average self-confidence level in the sample is relatively high. The median and mode are 95.00 and 93, respectively, suggesting that the central tendency of the data is consistent with the mean. The standard deviation is 10.019, and the variance is 100.38, indicating moderate variability in self-confidence scores. The range, which spans from a minimum of 67 to a maximum of 121, further confirms the diversity in the self-confidence levels across the sample. The total sum of self-confidence scores is 8359.

Table 2.
Frequency Distribution of Self-Confidence

| Score | Interval | F | Percentage | Category |
|--------------------------------------|--------------------------|---|------------|-----------|
| $X \geq Mi + 1,5 SDi$ | $X \geq 126,75$ | 0 | 0% | Very High |
| $Mi + 0,5 SDi \leq X < Mi + 1,5 SDi$ | $107,25 \leq X < 126,75$ | 1 | 11.49% | High |

| Score | Interval | F | Percentage | Category |
|--------------------------------------|-------------------------|---|------------|----------|
| $Mi - 0,5 SDi \leq X < Mi + 0,5 SDi$ | $87,75 \leq X < 107,25$ | 6 | 74.71% | Average |
| $Mi - 1,5 SDi \leq X < Mi - 0,5 SDi$ | $68,25 \leq X < 87,75$ | 1 | 13.79% | Low |
| $X < Mi - 1,5 SDi$ | $X < 68,25$ | 0 | 0 | Very low |
| | | 8 | 100% | |
| | | 7 | | |

Based on Table 2, the self-confidence scores show that most individuals (74.71%) have an “Average” level of self-confidence, with scores between 87.75 and 107.25. A smaller group (13.79%) has “Low” self-confidence, and 11.49% are classified as “High.” No individuals fall into the “Very High” or “Very Low” categories. The total sample size is 87.

B. Data Description of Problem-Solving Ability

The data description of problem-solving ability is obtained from the problem-solving test. The calculation from the data is presented as follows:

Table 3.
Data Description of Problem-Solving Ability

| TEST | |
|----------------|---------|
| N Valid | 87 |
| Missing | 0 |
| Mean | 60.74 |
| Median | 60.00 |
| Mode | 60 |
| Std. Deviation | 15.863 |
| Variance | 251.639 |
| Range | 83 |
| Minimum | 10 |
| Maximum | 93 |
| Sum | 5284 |

Based on Table 3, the descriptive statistics for the problem-solving ability variable show that 87 students took the problem-solving test. The mean score is 60.74, with a median and mode score of 60. The standard deviation is 15.863, the variance is 251.639, the maximum score is 93, and the minimum score is 10. The analysis of self-confidence derived from the self-confidence questionnaire scores is as follows:

Table 4.
Frequency Distribution of Problem-Solving Ability

| Score | Interval | F | Percent | Category |
|-------|----------|----|---------|-----------|
| | | 18 | 20,69% | Excellent |
| | | 30 | 34,48% | Good |
| | | 33 | 37,93% | Moderate |
| | | 4 | 4,60% | Bad |
| | | 2 | 2,30% | Poor |
| | | 87 | 100% | |

Based on the data in Table 4, it is evident that the problem-solving ability of students are categorized as follows: 2 students, or 2.30%, are in the bad category; 4 students, or 4.60%, are in the moderate category; 33 students, or 37.93%, are in the moderate category; 30 students, or 34.48%, are in the good category; and 18 students, or 20.69%, are in the excellent category. Thus, it can be concluded that the problem-solving ability of 8th-grade

students at SMP Negeri 12 Jember is in the moderate category.

C. Preliminary Test

Before testing the hypothesis regarding the relationship between self-confidence and problem-solving ability, it is necessary to conduct preliminary tests. The preliminary tests for this study include tests for normality and linearity. The data to be tested consist of scores from the problem-solving test and self-confidence questionnaire.

Table 5.
Normality Test

| One-Sample Kolmogorov-Smirnov Test | | | |
|------------------------------------|--------------------------|-------------------|---------------------|
| | | TES | SELF CONFIDENCE |
| N | | 87 | 87 |
| Normal Parameters ^{a,b} | Mean | 60.74 | 96.08 |
| | Std. Deviation | 15.863 | 10.02 |
| | Most Extreme Differences | | |
| | Absolute | 0.9 | 0.7 |
| | Positive | 0.9 | 0.7 |
| | Negative | -0.8 | -0.7 |
| Test Statistic | | 0.089 | 0.065 |
| Asymp. Sig. (2-tailed) | | .083 ^c | .200 ^{c,d} |

From Table 5, it can be observed that the significance value for self-confidence is 0.200, and the significance value for the mathematics problem-solving test is 0.083. Both variables show sig > 0.05, indicating that the data for self-confidence and students' mathematics problem-solving ability are normally distributed.

Table 6.
Linearity Test

| ANOVA Table | | | | | | | |
|------------------------|----------------|----------------|----------|-------------|----------|-------|-------|
| | | Sum of Squares | df | Mean Square | F | Sig. | |
| TEST * SELF CONFIDENCE | Between Groups | (Com bined) | 8099.789 | 32 | 253.118 | 1.009 | 0.477 |
| | | Linearity | 1237.061 | 1 | 1237.061 | 4.933 | 0.031 |
| | | Deviat | 6862.728 | 31 | 221.378 | 0.883 | 0.640 |

| | | | | |
|--|------------------------------|----------|----|---------|
| | ion from Linear ity | | | |
| | Within Groups | 13541.13 | 54 | 250.762 |
| | | 1 | | |
| | Total | 21640.92 | 86 | |
| | | 0 | | |

Based on Table 6, it is evident that the significance value (sig.) for linearity is $0.031 < 0.05$, indicating a linear relationship between the variables of self-confidence and problem-solving ability. Furthermore, considering the significance value for Deviation for Linearity, it can be concluded that there is a linear relationship between self-confidence and problem-solving ability, as the significance value is $0.640 > 0.05$.

D. Hypothesis Test

Based on the results of the normality tests, which indicate that the data for both students' problem-solving ability and self-confidence are normally distributed, the next step is to conduct a correlation analysis to examine the relationship between mathematical problem-solving ability and self-confidence among students. The hypotheses used are:

H_0 : There is no significant relationship between self-confidence and mathematical problem-solving ability.

H_1 : There is a significant relationship between self-confidence and mathematical problem-solving ability.

Here is the interpretation of the correlation test results in Table 7:

Table 7.
Interpretation of Correlation Test

| Parameter | Value | Interpretation |
|-----------|-------|----------------|
|-----------|-------|----------------|

| Parameter | Value | Interpretation |
|-----------------|--------------|---|
| Correlation (r) | 0,00 – 0,199 | Very weak |
| | 0,20– 0,399 | Weak |
| | 0,40 – 0,599 | Moderate |
| | 0,60 – 0,799 | Strong |
| | 0,80 – 1,000 | Very strong |
| Sig. Value | | H_0 is rejected, H_1 is accepted means that there is a correlation between two variables |
| | | H_0 is accepted, H_1 is rejected means that there is a correlation between two variables |
| Direction | Positive (+) | Same direction, the higher the value of the independent variable (X), the higher the value of the dependent variable (Y) |
| | Negative (-) | Opposite direction, the higher the value of the independent variable (X), the smaller the value of the dependent variable (Y) |

The following is the result of correlation analysis in Table 8:

Table 8.
Pearson Correlation Test

| | | TEST | SELF CONFIDENCE |
|------------------------|---------------------|-------|--------------------|
| TEST | Pearson Correlation | 1 | .239* |
| | Sig. (2-tailed) | | .030 |
| | N | 87 | 87 |
| SELF CONFI DENCE | Pearson Correlation | .239* | 1 |
| | Sig. (2-tailed) | .030 | |
| | N | 87 | 87 |

In Table 8, it is observed that the variables of self-confidence and problem-solving ability obtained a significance value (sig.) of 0.030, indicating that $0.030 < 0.05$. Therefore, the null hypothesis H_0 is rejected, and the alternative hypothesis H_1 is accepted.

The value 0.239 interprets the strength of the correlation between two variables, self-confidence, and problem-solving ability, which is weak correlated because it is in the interval 0.20-0.399. The correlation analysis can then be continued by calculating the coefficient of determination to see how much it influences self-confidence and problem-solving ability. The magnitude of the coefficient of determination is obtained by squaring the coefficient found (Sugiyono 2022). Coefficient of determination. This means that the influence of the self-confidence variable on problem-solving ability is 5.4%, while 94.6% is influenced by other variables not examined in this research.

E. Self Confidence

Based on the frequency table of the self-confidence variable in Table 3, it is known that 11.49% of students' self-confidence is categorized as high, meaning that students are confident when solving mathematical problems, 74.71% is in the average category, meaning that students are quite confident when solving a mathematics problem, 13.79% is in the low category, meaning that students are less confident when solving a problem. Students who have average self-confidence are not confident in their abilities in mathematics, therefore they need teacher assistance in improving their ability to understand mathematics material. Moreover, sometimes they feel nervous about making mathematics presentations in class. This is supported by Lauster's (2015) statement that the aspects of self-confidence of each student are different, such as belief in one's abilities, optimism, objectivity, responsibility, and rational and realism.

The results of the research show that students' self-confidence is in the average category. Research by Asari et al. (2022) revealed that students who have average self-confidence are not able to achieve all problem-solving indicators. This means that efforts are required to increase students' self-confidence. According to Annisa & Abadi (2023), one of the factors that causes students' self-confidence levels to be in the low or average category is the lack of facilities that can support students to be brave and confident in doing everything in learning. Students' self-confidence in the mathematics learning process is directly related to the teacher as an educator who

has a role as a motivator and facilitator. Students' self-confidence needs to be instilled by the school and teachers through activities that train students to act independently, socialize, communicate, and speak in public.

F. Problem-Solving Ability

From the results of data analysis, it is revealed that students generally have a moderate ability to solve mathematical problems, but their tendency when solving problems is good. This means that some of the class VIII students at SMP Negeri 12 Jember were able to solve problems solving problems in statistics material.

The factors causing it are students not understanding the questions given, being careless in checking the answers again and reading the questions, lack of skill in planning solutions, students not liking mathematics subjects, being unmotivated, lack of confidence in solving problems, as well as implementing inappropriate learning models during the learning process (Nugraha & Basuki, 2021). The research results of Annizar et al. (2020) stated that average and low subjects made mistakes when designing and implementing strategies because of the mistake they made in the first step of problem-solving, therefore it had a big impact on the next solving step. Difficulties in completing problem-solving questions in statistics material can be reduced by the role of the teacher. The teacher must continue to actively provide practice questions and need to strengthen statistical concepts. Based on research results from Widana (2021), one learning model that can be used as an alternative by

teachers to improve problem-solving ability is the Realistic Mathematics Education (RME) learning model.

G. The Correlation between Self-Confidence and Problem-Solving Ability

The hypothesis test was conducted by using the Pearson Product Moment correlation. The hypothesis test results obtained were r r-count or Pearson correlation of 0.239 and sig. of 0.030. From these data, the rcount (0.239) > rtable (0.208) and the sig value. $0.030 < 0.05$. Thus, an increase in the self-confidence variable was followed by an increase in problem-solving ability. This is what Lauster (2015) stated self-confidence is an attitude or feeling of confidence in one's abilities so that the person concerned is not too anxious about their actions, can feel free to do the things they like, and is responsible for their actions. Furthermore, his actions are warm and polite in interacting with other people, has the drive to achieve, and knows his strengths and weaknesses. Having self-confidence in problem-solving ability will influence success in learning mathematics. This is supported by the findings of Ratnasari et al., (2022) who state that the higher the student's self-confidence score, the higher their mathematical problem-solving ability.

The coefficient of determination obtained was 5.4%, meaning that the influence of the self-confidence variable on problem-solving ability was 5.4%, while 94.6% was influenced by other variables not examined in this research. This is supported by Kudsiyah et al. (2017) who observed the factors that influence

mathematical problem-solving ability. These factors include learning difficulties, attitude (likes/dislikes), mood, motivation, attention, laziness, responses, activeness, and discussion. This occurs under the possibility that other factors influence problem-solving ability besides self-confidence. Therefore, self-confidence has an influence, although it is small, on students' mathematical solving abilities, especially for students in VIII D, VIII E, and VIII F classes at SMP Negeri 12 Jember.

IV. CONCLUSION

The result of r_{count} was $0,239 > 0,208$ with significant value of $0,030 < 0,05$. Self-confidence had an effect of as much as 5,4% on mathematics problem solving, while the rest of 94,6% was influenced by other factors. Based on the research that has been done, there are several suggestions, namely, students are expected to try to increase self-confidence by diligently practicing solving problems and schools provide activities that can improve student confidence.

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