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# The Relationship Between Self-Efficacy and Elementary School Students' Mathematics Learning Outcomes

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**Abstract**
The purpose of this study was to examine the relationship between students' self-efficacy and their mathematics learning outcomes in elementary school. Perceived self-efficacy is very important for academic success, as it reflects students' confidence in their ability to understand and solve mathematical problems. This quantitative correlational study was conducted with 34 students from grades four to six. The Morgan-Jinks Student Self-Efficacy Scale was used, and daily mathematics assessment results were used as information related to achievement. Data analysis was performed using Spearman's rank correlation coefficient (rho) with SPSS version 25. The data revealed that the average self-efficacy score of students was 15.01 (standard deviation: 2.12), while the average mathematics score was 86.88 (standard deviation: 10.56). Correlation analysis revealed a coefficient of r of 0.401 and a p-value of 0.019, highlighting a positive and significant relationship between self-efficacy and mathematics performance. This observation shows that students with higher self-efficacy achieve better learning outcomes. This study underscores the need to develop self-efficacy through pedagogical approaches that foster students' confidence, engagement, and active participation in mathematics learning activities.

**Keywords:**
Self Efficacay; Elementary School; Learning Outcomes; Mathematics.

## A. INTRODUCTION

Mathematics is a fundamental science that plays an important role in developing students' logical, critical, and analytical thinking skills from elementary school onwards Jannah et al. (2024). A strong understanding of mathematical concepts is the main foundation for students in learning various other disciplines and facing the rapid development of science and technology Nurhida & Safari (2024). However, in practice, mathematics is often perceived as a difficult and confusing subject, even causing anxiety for many elementary school students Nurlaily Naje & Nur Amalia (2025). This negative view has implications for the decline in student motivation and academic achievement in mathematics.

According to Bandura (1997), self-efficacy can be defined as a person's belief in their ability to plan and carry out the actions needed to achieve a specific goal Susiani (2021). In the field of education, this concept plays a very important role. Students who have high self-confidence usually show perseverance in learning, dare to face difficulties, and continue to strive until they achieve the expected results Ariesandi & Herawati (2023). Conversely, students with low self-efficacy tend to give up easily, lack confidence, and avoid tasks that are considered challenging, including when dealing with mathematics Yulita (2025). Operationally, the application of Bandura's theory in Indonesia, particularly in mathematics learning through four aspects of Mathematical Self-Efficacy (MSE) according to Yuliyanto et al. (2021) namely mastery experience, vicarious experience, verbal persuasion, and psychological index. Students build self-efficacy

through personal success in completing mathematics tasks, observation of the success of friends and teachers, verbal support from the environment, and emotional conditions while learning.

A study conducted in Singapore revealed that a high level of self-efficacy can enhance the perseverance and problem-solving abilities of elementary school students in mathematics Usher & Pajares (2009). These results are reinforced by Loliyana et al. (2022) research that found a strong relationship between self-efficacy and elementary school students' mathematics learning achievement with a correlation value of 0.7322. Similar research was conducted by Mahmudah & Hermanto, 2024) which confirmed that self-efficacy has a significant effect on students' mathematics learning outcomes during online learning with a contribution of 63.7%. Meanwhile, Rakhmat Riyadi & Dyas Fitriani (2025)findings from showed a meaningful relationship between self-efficacy and the mathematical problem-solving abilities of elementary school phase C students, with a correlation coefficient of 0.674 and an influence contribution of 43.6%. Overall, these results show that self-efficacy not only has an impact on improving mathematics learning outcomes but also plays an important role in shaping students' critical thinking and problem-solving abilities. However, this study has not specifically investigated the relationship between self-efficacy and mathematics learning outcomes in Indonesian elementary schools, which have different social and learning environment characteristics. In addition, daily learning outcomes that describe actual academic achievement in the classroom are not prioritized in research that focuses more on online learning or problem solving. This gap is the basis for the importance of this study to provide empirical evidence of the relationship between self-efficacy and mathematics learning outcomes of elementary school students in Indonesia.

The results of these studies show that the relationship between self-efficacy and mathematics learning outcomes does not always show a consistent pattern. Differences in this relationship can be influenced by social, cultural, and learning environment factors where students interact. In the Indonesian context, especially at the elementary school level, studies on self-efficacy in mathematics learning are still relatively few. In fact, the elementary education stage is a crucial period in the formation of self-confidence and positive attitudes toward academic abilities, which will determine learning success at the next level. The limited number of studies specifically discussing the relationship between self-efficacy and mathematics learning outcomes at the elementary school level indicates an important research gap that needs to be filled.

A lack of in-depth understanding of the role of self-efficacy in the mathematics learning process can have a negative impact on the planning and implementation of learning strategies. In practice, educators often place more emphasis on achieving cognitive aspects, without paying attention to psychological factors that actually influence student learning success. This condition results in pedagogical strategies that are less than optimal in improving overall mathematics learning outcomes. Therefore, this study is of high urgency because it is expected to contribute to the development of a learning approach that not only focuses on conceptual understanding but also strengthens students' confidence in their ability to solve mathematical problems.

In line with this background, the purpose of this study is to analyze the relationship between self-efficacy and mathematics learning outcomes in elementary school students. The research question asked in this study is: “Is there a relationship between self-efficacy and mathematics learning outcomes in elementary school students?”.

## B. METHODS

This research design uses a quantitative approach with a correlational design. A correlational design was chosen because this study aims to determine the relationship between students' self-efficacy as an independent variable and mathematics learning outcomes as a dependent variable, without providing treatment and without manipulating the two variables. Therefore, this study focuses on measuring the relationship between variables in the field in accordance with real conditions.

The location of this research was at SDN Sisir 04 Batu, located in Batu District, Batu City, East Java Province. The reason the researcher chose this school as the location for the research

was because this school had students with diverse characteristics in terms of academics and socio-cultural backgrounds. This diversity is due to the fact that this school accepts students from the Wamena Indonesia Foundation (YWI), namely students from Papua who have the opportunity to study in Batu City. In addition, SDN Sisir 4 Kota Batu has neatly recorded daily test score data, which supports this study.

The population in this study included all 55 students of SDN Sisir in the 2025/2026 academic year. The sampling technique used was purposive sampling, which is a sampling technique based on certain considerations or criteria relevant to the research objectives. The selection of samples was based on the students' psychological abilities and maturity, especially in terms of self-confidence or learning ability. Therefore, the sample studied consisted of 34 students from grades IV, V, and VI, each of whom had a better understanding of concepts, learning independence, and self-confidence than lower grade students. Therefore, this sample was more suitable for describing the variables studied.

The instrument used to measure self-efficacy in this study was the Morgan–Jinks Student Efficacy Scale (MJSES), developed by Jinks and Morgan in 1999 (Jinks & Morgan, 1999). This scale was first compiled and published through a study entitled Children's Perceived Academic Self-Efficacy: An Inventory Scale. The main purpose of developing this instrument was to gain a deeper understanding of the level of academic self-confidence of elementary school students regarding their abilities in the learning process. Preliminary results showed that the MJSES had a consistent construction and met the criteria for good validity and reliability, so it could be widely applied in research in the field of basic education. The MJSES consists of 30 statements arranged on a four-point Likert scale, namely really agree, kind of agree, kind of disagree, and really disagree. Scoring is done on a scale, where a higher score indicates a stronger level of academic self-confidence in students.

The reliability test conducted by the developers showed that the MJSES had a Cronbach's Alpha coefficient of 0.82 for the entire scale, which can be categorized as highly reliable. The reliability values for each dimension were 0.78 for the Talent dimension, 0.70 for the Context dimension, and 0.66 for the Effort dimension. These three dimensions represent the main aspects of students' academic self-efficacy, namely belief in personal ability (talent), perception of the learning environment and support (context), and belief in the importance of effort to achieve success (effort). Meanwhile, student learning outcome data was obtained from the teacher's grade book for mathematics, which was used as the basis for assessing academic achievement levels and correlating them with the self-efficacy scores of each student.

The data collection process in this study was conducted face-to-face (offline) by distributing the MJSES questionnaire directly to fourth, fifth, and sixth grade students at SDN 4 Sisir Kota Batu. The questionnaire was filled out at school with the assistance of researchers and classroom teachers so that each student could understand the content of the questions correctly. The learning outcome data was obtained from the classroom teacher's assessment book for mathematics, which was used as an indicator of student academic achievement. The collected data was analyzed using IBM SPSS Statistics software version 30. Since the main objective of this study was to identify the relationship between self-efficacy and mathematics learning achievement, Spearman's rho correlation analysis technique was used. This technique was chosen because it is suitable for ordinal scale data and does not require the assumption of normal distribution. Decisions were based on the significance value (p-value). If $p < 0.05$, the analysis results showed a significant relationship between the level of self-efficacy and students' mathematics learning outcomes. Conversely, if $p > 0.05$, it can be concluded that there is no significant relationship between the two variables.

## C. RESULT & DISCUSSION

### RESULT

The total score related to student self-efficacy was assessed using four statement categories, with scores ranging from 34 to 113. The average self-efficacy score was 67.56, according to data processing. On this instrument, a lower total score indicates a higher level of

self-efficacy. The categorization results showed that 35% of students were in the high self-efficacy category, meaning low scores, 50% were in the medium category, and 15% were in the low category, meaning high scores. These findings indicate that most students were in the medium to high self-efficacy category.

The total math test scores obtained from the class teacher ranged from 65 to 100, with an average of 86.88. Most students were in the high learning achievement category, 79% were in the medium category, and 21% were in the low category. This indicates that most students were able to achieve or exceed the established math score standards.

A correlation coefficient of 0.401 was obtained from Spearman's correlation analysis (rho) with a significance level of 0.019, indicating a positive and significant correlation between mathematics learning outcomes and self-efficacy. The results showed that both variables had a positive and significant correlation, with 34 students responding. This means that a lower score indicates a higher level of self-efficacy, as indicated by a higher score.

**DISCUSSION**

The results of the data analysis for the self-efficacy scale yielded an average of 15.01. This indicates that, in general, students have a high level of self-efficacy. Students with high self-efficacy demonstrate confidence in their ability to solve mathematical problems and have a positive perception of their own learning process. In the context of primary school, self-efficacy has been shown to be a key element linking student motivation to their engagement in mathematics learning, suggesting that greater self-confidence can intensify engagement and, consequently, optimise academic performance Adira et al. (2024).

The average learning outcome of 86.88 indicates a relatively high level of student ability in understanding mathematical concepts. This shows that many students have met, or even exceeded, the minimum achievement standards set by the institution. These high scores also reflect the effectiveness of the educational process, both through lecturer teaching methods, student participation, and a conducive learning environment.

Based on the results of Spearman's correlation analysis (rho) shown in the previous table, the correlation coefficient ($r_s$) is 0.401, with a significance level of 0.019. The number (N) targeted for analysis consisted of 34 students. The $r_s$ value of 0.401 indicates a significant positive correlation between students' self-efficacy and their performance in mathematics. In other words, the stronger the students' perception of their self-efficacy, the better their performance in mathematics. Furthermore, the significance value of $0.019 < 0.05$ indicates that the correlation is statistically significant. Therefore, the alternative hypothesis (Ha) is accepted, while the null hypothesis ($H_0$) is rejected. Thus, we can conclude that there is a positive and significant relationship between self-esteem in one's effectiveness and students' achievement in mathematics.

According to the analysis of data concerning students' self-efficacy scale, an average of 15.01 was observed, accompanied by a standard deviation of 2.12. These results show that students generally display a high level of self-efficacy. This finding is in line with research (Liani & Mujiasih, 2021) this indicates that the majority of students have faith in their ability to solve mathematical problems and succeed in their studies. Students with high self-efficacy tend to be more confident, persistent, and highly motivated when encountering obstacles in their learning. This indicates that self-efficacy is essential for improving mathematical skills, as students who are confident in their abilities tend to work harder to understand concepts and implement problem solving strategies.

Achievement in mathematics tests showed an average score of 86.88 with a standard deviation of 10.56, placing them in the 'high' category. This means that the majority of students met the minimum passing criteria and had a strong understanding of the subject matter. This success is closely related to students' confidence in their ability to understand mathematical concepts systematically. Studies support Mestika Dewi et al. (2025) these findings by showing that self-efficacy in mathematics has a positive effect on the academic achievement of primary school students, as self-confidence motivates them to engage actively and consistently in their

education.

Spearman's correlation test (rho) revealed a correlation coefficient ($r_s$) of 0.401 and a significance (two-tailed) of 0.019. This figure indicates a marked positive correlation between self-efficacy and pupils' performance in mathematics. According to Ningrum (2022) categorisation of correlations, this value is classified as a moderate correlation (0.40–0.599). In other words, the higher the students' self-efficacy, the better their mathematics results. This positive association confirms that personal confidence, considered a psychological factor, plays a significant role in academic success, particularly in mathematics, a subject that requires persistence and reasoning skills.

These findings are consistent with the work Auliya (2020), who demonstrated that there is a significant link between students' sense of personal competence and their understanding of mathematics. According to these authors, students who have a strong belief in their personal effectiveness are better able to overcome educational anxiety, develop problem-solving tactics, and maintain their attention despite obstacles. From this perspective, self-efficacy not only acts as a motivator, but also influences students' performance in assimilating and understanding abstract ideas in mathematics. This indicates that strengthening the sense of self-efficacy should be a central goal of the educational process.

Furthermore, Putri & Muqodas (2019) highlighted that boosting students' sense of personal competence in mathematics can be achieved through practical and visual learning methods, such as the Concrete-Pictorial-Abstract (CPA) model. This method helps students gradually assimilate mathematical principles, thereby strengthening their confidence in their abilities. Thus, the findings of this research indicate that strengthening self-efficacy should be an essential part of a sustainable learning strategy. To improve mathematics performance, teachers can create a motivating learning environment, provide constructive feedback, and build confidence in their students.

Although there is a significant relationship between self-efficacy and mathematical comprehension, the correlation is only moderate. This suggests that self-efficacy is not the sole factor influencing students' ability to grasp mathematical concepts. This relationship may be weakened by other factors, such as a less conducive learning environment, uneven educational quality, or the level of social support provided by family and friends. Furthermore, observations regarding the importance of nutrition indicate that students consume significant amounts of food, but this abundance does not necessarily guarantee satisfactory nutritional quality. A diet high in calories but low in nutrients can impair students' concentration, stamina, and cognitive abilities, thereby diminishing the impact of self-efficacy on their mathematical comprehension. Success in mathematics depends on a complex interaction between physical condition, social support, learning practices, and the educational environment. Thus, this moderate correlation highlights the importance of enhancing self-efficacy while also emphasizing the need to consider students' overall environment, learning, and well-being.

## D. CONCLUSION

This analysis was conducted with the aim of understanding the link between self-efficacy and primary school pupils performance in mathematics. It emphasises the crucial role of psychological factors in the educational process, particularly pupils confidence in their ability to understand and solve mathematical problems. In elementary education, the perception of self-efficacy is crucial to students motivation, perseverance and achievement of learning objectives. The research approach used was a quantitative correlational method, involving 34 primary school students. Information was collected using a self-efficacy scale with four main criteria (self-confidence, persistence, ability to overcome obstacles, and self-esteem), as well as data related to mathematical academic achievement obtained from regular student assessments. To explore the relationship between these two variables, data analysis was performed using Spearman's rank correlation coefficient (ρ).

The results show that the average self-efficacy score of students is 15.01 (standard deviation: 2.12), which is a high level. Furthermore, the average mathematics score of students is

86.88 (standard deviation: 10.56), which also places them among the highest achievers. Correlation analysis showed a coefficient of r of 0.401 and a p-value of 0.019, indicating a positive and significant relationship between self-efficacy and mathematics achievement among primary school students. In other words, students with a higher perception of their own effectiveness tend to achieve better results. These findings (Shimizu, 2025) support the hypothesis that self-efficacy is crucial for academic success, as stated by Frank Pajares. He argues that students' belief in their abilities influences their choice of tasks, level of effort, and persistence in the learning process. Furthermore (Oktarianto et al., 2024), these findings are consistent with recent research showing a positive correlation between perceptions of self-efficacy in mathematics and success in this subject among primary and secondary school students. Studies also show that self-efficacy promotes creativity, engagement, and problem-solving skills in students.

This study shows that self-efficacy plays a crucial psychological role in optimising primary school students' mathematical achievement. Teachers are expected to build an educational framework that encourages the development of self-efficacy through direct learning, positive feedback, and meaningful learning experiences. Further research exploring intervening variables such as motivation, self-control, and social support is recommended. This will provide a better understanding of the relationship between self-efficacy and academic achievement.

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