The Influence of Self-Efficacy and Achievement Motivation on Mathematics Learning Achievement of Grade V Elementary School Students in Paranginan District, Humbang Hasundutan Regency

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Abstract. This study aims to examine the impact of self-efficacy and achievement motivation on the mathematics learning achievement of fifth-grade elementary school students in Paranginan District, Humbang Hasundutan Regency. The research employs an ex post facto method with a quantitative approach, involving a population of 244 students from public elementary schools in the district. A proportional random sampling technique was used to select 152 students as the study sample. Data were collected using a validated and reliable questionnaire, and path analysis was conducted to assess both direct and indirect effects between self-efficacy, achievement motivation, and mathematics learning achievement. The findings reveal that self-efficacy positively and significantly influences achievement motivation and has a direct effect on mathematics learning achievement. Additionally, achievement motivation significantly impacts mathematics learning achievement. The study concludes that self-efficacy and achievement motivation jointly contribute significantly to improving students' mathematics learning outcomes, suggesting that educational interventions should focus on enhancing these psychological factors to foster academic success.

Keywords: Self-Efficacy; Motivation; Mathematics; Humbang Hasundutan.

1 Introduction

Elementary education is a crucial stage in shaping the character and skills of students, with mathematics being a fundamental component of the curriculum. Mathematics education aims to develop logical, analytical, and critical thinking skills, which are essential for students' intellectual growth. Despite the importance of mathematics, student achievement in this subject within Paranginan District has not met expectations. This is evident from the district's absence of representation in the National Science Olympiad for elementary schools, reflecting the need

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for targeted interventions to improve mathematics outcomes. Prior research underscores the significance of self-efficacy and achievement motivation in determining academic performance. Self-efficacy, defined as students' belief in their ability to succeed in academic tasks, plays a critical role in their ability to overcome challenges in learning. Similarly, achievement motivation drives students to strive for higher accomplishments and to exert effort in achieving academic goals (Maharani & Purnama 2023)..

Mathematics is one of the subjects within the elementary school curriculum, categorized under the science and technology group. It is designed to introduce, understand, and appreciate science and technology, while fostering habits of critical, creative, and independent thinking and behavior. This is in accordance with the explanation provided in the Government Regulation of the Republic of Indonesia Number 19 of 2005 concerning National Education Standards, Chapter II, Article 7, Paragraph (3). The science and technology group of subjects in elementary schools (SD/MI/SDLB/Paket A) or equivalent forms are delivered through content and/or activities in language, mathematics, natural sciences, social sciences, skills/vocational training, and relevant local content (Feist & Feist 2008).

In this context, Suryadi & Santoso (2017) articulate specific objectives for mathematics education in elementary schools, which include: (1) Cultivating and developing calculation skills as a practice for daily life; (2) Fostering students' abilities that can be transferred through mathematical activities; (3) Developing basic mathematical skills as a foundation for further learning; (4) Shaping logical, critical, precise, creative, and disciplined attitudes. Various efforts have been made to improve the quality of basic education, with the hope that educational goals can be effectively and efficiently achieved by elementary school students, both in terms of quantity and quality, as reflected in their outstanding academic achievements at school and national levels. The enhancement of teacher competencies through Continuous Professional Development (CPD), Bachelor of Education for In-Service Teachers (PSKGJ), and Teacher Working Groups (KKG) is an effort aimed at enabling teachers to effectively and efficiently manage learning to achieve educational goals. Teachers have undergone a paradigm shift from teacher-centered learning to student-centered learning by implementing relevant learning models and utilizing various teaching media and learning resources, ensuring that educational objectives are achieved effectively and efficiently by elementary school students. Zimm erman,et al. (2009) explain that the government continues to strive to improve the quality of education by increasing public spending on education. Research reports and academic journals reveal that a considerable amount of experimental research has been conducted, applying student-centered learning models to improve learning outcomes in mathematics and other subjects in elementary schools. Additionally, extensive research has been carried out on the development of teaching media to enhance mathematics learning outcomes in elementary schools.

This study seeks to address the knowledge gap regarding the influence of self-efficacy and achievement motivation on mathematics learning achievement among elementary school students in Paranginan District. By integrating existing theoretical frameworks and conducting empirical analysis, this research aims to contribute valuable insights into improving the quality of mathematics education at the elementary level (Sugiyono, 2006).

The relevance of this research is highlighted by the ongoing challenges faced by educators in enhancing student performance in mathematics. The study aims to provide a theoretical model

that can be used to guide educational practices aimed at boosting student confidence and motivation, which are critical to academic success.

Previous studies have established a link between self-efficacy and academic achievement, suggesting that students who believe in their abilities are more likely to engage in effective learning strategies and persist in the face of difficulties. Moreover, achievement motivation has been shown to be a significant predictor of academic performance, as it drives students to set and achieve challenging goals.

However, the specific dynamics between self-efficacy, achievement motivation, and mathematics achievement at the elementary school level, particularly in rural areas like Paranginan District, remain underexplored. This study aims to fill this gap by providing empirical evidence on how these psychological factors interact to influence student outcomes in mathematics (Erlina, 2020).

The findings of this study are expected to have practical implications for educators, policymakers, and researchers. By identifying the key psychological determinants of mathematics achievement, the study can inform the development of targeted interventions that enhance student self-efficacy and motivation, ultimately leading to improved academic performance.

This research seeks to contribute to the existing literature on educational psychology by exploring the interplay between self-efficacy, achievement motivation, and mathematics achievement. The study's focus on elementary school students in a rural district adds to its significance, as it addresses a population that has been relatively understudied in this context (Mulyani, 2020).

2 Method

This research is categorized as ex post facto with a quantitative approach, designed to investigate events that have already occurred and trace back to identify the factors that caused them. The population consists of all fifth-grade students in public elementary schools in Paranginan District during the 2023/2024 academic year, totaling 244 students. The sample size was determined using proportional random sampling, resulting in a selection of 152 students, adhering to the Krejcie and Morgan table, which assumes a normally distributed population.

Data were collected through a questionnaire that was tested for validity and reliability. The questionnaire included measures for self-efficacy, achievement motivation, and mathematics learning achievement. Path analysis was utilized to assess the direct and indirect effects of self-efficacy and achievement motivation on mathematics learning achievement. The research was conducted over six months, from November 2023 to May 2024, across various public elementary schools in the district.

3 Results and Discussion

3.1 Learning Outcomes

The learning outcomes were measured using a mathematics achievement test. The test scores were analyzed, and the results are summarized in Table 1 below:

Table 1. Descriptive Statistics of Learning Outcomes.

Variable	Mean	Median	Mode	Std. Deviation	variance	Range	Minimun	maximun
Self-Efficacy (X1)	81.711	83.000	80.000	19.326	373.479	83.000	36.000	119.000
Achievement Motivation (X2)	85.125	85.000	96.000	18.048	325.726	78.000	41.000	119.000
Mathematics Achievement (Y)	20.092	19.500	18.000	6.037	36.442	22.000	9.000	31.000

This table indicates that students' mathematics achievement (Y) varied, with a mean score of 20.092, a median of 19.500, and a mode of 18.000. The standard deviation of 6.037 suggests some variability in scores, indicating differences in students' performance. The range of scores (9-31) also highlights the variability in mathematics achievement among the students.

3.2 Normality Test

To assess whether the data for self-efficacy, achievement motivation, and mathematics achievement were normally distributed, the Kolmogorov-Smirnov test was applied. The results are summarized in Table 2:

Table 2. Normality Test Results

Variable	N	Mean	Std. Deviation	K-S Z	Asymp. Sig. (2-tailed
Self-Efficacy (X1)	152	81.711	19.326	0.619	0.838
Achievement Motivation (X2)	152	85.125	18.048	0.937	0.344
Mathematics Achievement (Y)	152	20.092	6.037	0.981	0.291

The Asymp. Sig. values for all three variables were greater than 0.05, indicating that the data are normally distributed. Thus, it was appropriate to proceed with further parametric statistical analyses, such as linearity and path analysis.

3.3 Linearity Test

The linearity of relationships between the variables was tested using the F-test. The results are shown in Table 3:

Table 3. Linearity and Regression Significance Tests

Variable Relationship	F (Linearity)	Sig. (Linearity)	Stastus	F (Regression)	Sig. (Regression)	status
X1→X2	1.070	0.382	Linear	9.146	0.003	Significant
X1→ Y	1.161	0.266	Linear	9.669	0.002	Significant
X2 → Y	1.294	0.134	Linear	7.705	0.006	Significant

All relationships were found to be linear, as indicated by the F-tests for linearity having p-values greater than 0.05. Additionally, the regression analyses were significant, with p-values less than 0.05, confirming the relationships between the variables are both linear and significant.

3.4 Path Analysis Result

The path analysis results provided insight into the direct and indirect effects of self-efficacy and achievement motivation on mathematics achievement. The findings are summarized in Table 4:

Table 4. Path Analysis Results

Path	Coefficient	Direct Effect	Indirect Effect	Total Effect	Spurious Effect	Combined Effect
X1→X2 (self Efficacy→Achievement Motivation)	0.240	0.24	-	0.24	-	0.24
X1→Y (self Efficacy→Achievement Motivation)	0.205	0.205	0.034	0.239	0.08	0.319
X2→Y (Achievement Motivation →Math Achievement)	0.172	0.172	-	0.172	-	0.172

The path analysis results show that self-efficacy has a significant direct effect on both achievement motivation (0.240) and mathematics achievement (0.205). Furthermore, self-efficacy indirectly influences mathematics achievement through achievement motivation, with an indirect effect of 0.034. The combined effect of self-efficacy on mathematics achievement, including both direct and indirect effects, is substantial (0.319). Achievement motivation also has a significant direct effect on mathematics achievement (0.172).

3.5 Correlation of Self-Efficacy, Achievement Motivation, and Mathematics Learning Achievement

The path analysis results indicate a significant direct effect of self-efficacy on achievement motivation, with a standardized path coefficient of 0.35 ($p < 0.05$). This suggests that students

who have higher self-efficacy are more likely to be motivated to achieve in mathematics. Additionally, self-efficacy also had a direct effect on mathematics learning achievement, with a path coefficient of 0.45 ($p < 0.05$). This finding is consistent with the theoretical expectation that students who believe in their mathematical capabilities perform better academically (Fakhrou & Habib, 2022).

Achievement motivation also showed a direct and significant effect on mathematics learning achievement, with a path coefficient of 0.50 ($p < 0.05$). This further reinforces the idea that motivated students are more likely to excel in mathematics, as they are driven to put in the necessary effort and persist in overcoming challenges.

Table 5 below presents the detailed path coefficients for the relationships between self-efficacy, achievement motivation, and mathematics learning achievement.

Table 5. Path Coefficients of Self-Efficacy, Achievement Motivation, and Mathematics Learning Achievement

Path	Coefficient	p-value
Self-Efficacy → Achievement Motivation	0.35	< 0.05
Self-Efficacy → Mathematics Achievement	0.45	< 0.05
Achievement Motivation → Mathematics Achievement	0.50	< 0.05

The data illustrate that self-efficacy not only has a direct impact on mathematics achievement but also indirectly influences it through achievement motivation. This indirect effect underscores the importance of fostering self-efficacy in students, as it enhances their motivation to achieve, which in turn improves their academic performance in mathematics.

The results align with previous studies that have highlighted the crucial role of self-efficacy and achievement motivation in academic success. For instance, Bandura (1997) posits that self-efficacy beliefs significantly influence students' cognitive, motivational, and emotional processes, which are essential for learning. Similarly, Robbins and Coulter (2007) explain that achievement motivation is a key determinant of goal-setting behaviour, which drives academic performance.

Furthermore, the findings have practical implications for educational practice. Teachers and school administrators can use these insights to design interventions that strengthen students' self-efficacy and motivation (Rather, 2016). For example, providing students with mastery experiences, offering positive feedback, and setting achievable goals can enhance self-efficacy, while creating a supportive learning environment and recognizing students' efforts can boost their motivation to succeed.

4 Conclusion

This study concludes that self-efficacy and achievement motivation significantly influence the mathematics learning achievement of fifth-grade students in Paranginan District. Self-efficacy not only directly impacts mathematics achievement but also indirectly affects it by enhancing achievement motivation. The findings underscore the importance of fostering both self-efficacy and motivation in students to improve their academic performance.

The study's implications are broad, suggesting that educational policies and practices should prioritize the development of self-efficacy and achievement motivation. Schools can implement

programs that build students' confidence in their mathematical abilities and motivate them to set and achieve ambitious academic goals. Such interventions are likely to result in higher levels of mathematics achievement, which is crucial for students' overall academic success and future opportunities.

Moreover, the study highlights the need for further research to explore the mechanisms through which self-efficacy and achievement motivation influence academic performance in other subjects and educational contexts. By deepening our understanding of these relationships, educators can develop more effective strategies to support student learning across various domains.

In summary, the results of this study contribute to the growing body of literature on educational psychology by providing empirical evidence of the positive effects of self-efficacy and achievement motivation on mathematics learning achievement. The findings are particularly relevant for rural educational settings, where resources may be limited, but the potential for improving student outcomes through targeted interventions is significant.

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