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The Effects of Self-Confidence, Self-Efficacy, and Metacognitive Skills on the Mathematical Problem-Solving Ability of Elementary School Teacher Education Students at STKIP Andi Matappa

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Abstract

Mathematical problem-solving ability is an essential competency that university students must possess to develop critical, logical, and systematic thinking skills. However, preliminary observations revealed that students of the Elementary School Teacher Education Program (PGSD) at STKIP Andi Matappa still encounter difficulties in applying mathematical concepts, selecting appropriate problem-solving strategies, and explaining mathematical concepts in their own words. This limitation is assumed to be influenced by internal factors, namely self-confidence, self-efficacy, and metacognitive skills. This study aimed to examine the partial and simultaneous effects of self-confidence, self-efficacy, and metacognitive skills on the mathematical problem-solving ability of PGSD students at STKIP Andi Matappa. The study employed a quantitative approach using an ex post facto *research design. The population consisted of fifth-semester PGSD students at STKIP Andi Matappa, who also served as the research sample. Data were collected using self-confidence, self-efficacy, and metacognitive skills questionnaires, as well as a mathematical problem-solving test. The data were analyzed using descriptive statistics, classical assumption tests, significance tests, and the coefficient of determination (R^2) to determine both the individual and simultaneous effects of the independent variables on students' mathematical problem-solving ability. The findings indicate that self-confidence, self-efficacy, and metacognitive skills have a significant influence on the mathematical problem-solving ability of PGSD students at STKIP Andi Matappa.*

Keywords: *self-confidence, self-efficacy, metacognitive skills, mathematical problem-solving ability*

Introduction

Mathematics education is an integral part of the national education system and is recognized as a universal discipline. It provides the fundamental foundation for the advancement of modern technology and contributes significantly to the development of various fields of science while fostering individuals' intellectual abilities. Through mathematics learning, students are expected to develop logical, critical, and systematic thinking skills, as well as the ability to solve problems effectively (Cynthia, R. E., & Sihotang, H., 2023).

As one of the fundamental scientific disciplines, mathematics has extensive applications in everyday life. Many real-world problems can be represented mathematically and solved through the application of mathematical principles and theories. The mathematics learning process involves several essential components, including teachers, students, instructional materials, and a supportive learning environment (Istiqomah, 2023). Therefore, mathematics should not merely be viewed as a school subject but also as an essential discipline that equips learners with practical skills applicable beyond the classroom.

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Furthermore, mathematics education extends beyond memorizing formulas or performing routine calculations. It aims to develop fundamental competencies that enable students to think critically and solve complex problems. According to the National Council of Teachers of Mathematics (NCTM), mathematics instruction should foster five essential competencies: conceptual understanding, problem solving, mathematical communication, mathematical connections, and reasoning. Among these competencies, mathematical problem-solving ability is regarded as one of the most important because it reflects students' conceptual understanding and higher-order thinking skills.

Mathematical problem-solving is one of the primary objectives of mathematics education because it is closely related to real-life situations. Individuals are constantly confronted with problems that require logical, critical, and systematic thinking to determine appropriate solutions (Kurniawati et al., 2019). In educational settings, problem-solving encourages students to develop strategies, evaluate alternative solutions, and make sound decisions. Likewise, Fauzan and Anshari (2024) emphasized that mathematics instruction should cultivate positive learning attitudes, such as logical thinking, critical thinking, accuracy, honesty, and perseverance. Meaningful mathematics learning not only strengthens conceptual understanding but also develops students' confidence and competence in solving increasingly complex problems.

Despite its importance, the mathematical problem-solving ability of students in the Elementary School Teacher Education (PGSD) Program at STKIP Andi Matappa remains relatively low. Based on an interview conducted with Firdha Razak, S.Pd., M.Pd., Head of the Elementary School Teacher Education Program at STKIP Andi Matappa, on July 8, 2025, it was found that many students still experience difficulties in applying mathematical formulas and performing calculations, even when dealing with basic mathematical problems. Furthermore, they often struggle to explain fundamental mathematical concepts in their own words. These findings indicate insufficient conceptual understanding and underdeveloped reflective and strategic thinking skills in mathematical problem-solving.

One of the factors that is believed to improve mathematical problem-solving ability is metacognitive skill. Metacognition refers to an individual's awareness and regulation of cognitive processes, including planning, monitoring, and evaluating problem-solving strategies. Flavell (1979) defined metacognition as knowledge about cognition and the regulation of cognitive processes. In mathematics education, metacognition enables students not only to understand how to solve a problem but also to recognize when and why particular strategies should be employed (Efendi & Lestari, 2022). Aziz and Akgül (2020) found that metacognitive activities play a dominant role in mathematical problem-solving, particularly among high-achieving students. Their study revealed that students alternated between cognitive and metacognitive processes, allowing them to solve mathematical problems more flexibly and effectively in collaborative settings. Activities such as rethinking, verifying solution steps, and evaluating strategies were identified as key indicators of active metacognition.

Previous studies have demonstrated that students with strong metacognitive skills are better able to identify errors, modify ineffective strategies, and generate alternative solutions when confronted with obstacles (Zohar & Barzilai, 2013). Metacognitive awareness enhances the effectiveness of students' thinking processes, particularly when solving non-routine mathematical problems that require deep reasoning. In addition, students with high metacognitive awareness tend to become more independent, reflective, and emotionally resilient when facing intellectual challenges in mathematics learning.

Besides metacognitive skills, self-confidence and self-efficacy are also considered important factors influencing mathematical problem-solving ability. According to Karunia et al. (as cited in Istiqomah, 2023), self-confidence is defined as an individual's belief in their own abilities and the perception of themselves as a complete and capable person based on a positive self-concept. This suggests that individuals with high self-confidence are more prepared to face challenges and are more likely to maintain positive beliefs about their abilities. Furthermore, self-confidence encourages students to take intellectual risks and actively engage in solving challenging mathematical problems. Meanwhile, Hasanah et al. (2019) stated that self-efficacy does not merely reflect actual ability but rather an individual's belief in what they are capable of accomplishing with that ability, particularly in complex and demanding situations. Students with high self-efficacy tend to be more resilient under pressure, less likely to give up, and better able to regulate themselves while solving mathematical problems. Collectively, self-confidence, self-efficacy, and metacognitive skills represent an integrated combination of psychological characteristics and higher-order thinking skills that support successful mathematical problem-solving.

Although previous studies have examined the relationships between self-confidence, self-efficacy, or metacognitive skills and mathematics learning outcomes, research investigating the combined influence of these three variables on mathematical problem-solving ability remains limited. Most existing studies have focused on one or two variables independently without considering their interconnected contributions to students' mathematical problem-solving ability.

This study is expected to fill an important gap in the literature by investigating the combined effects of self-confidence, self-efficacy, and metacognitive skills on students' mathematical problem-solving ability. The findings are anticipated to provide empirical evidence that can serve as a foundation for designing more effective mathematics learning strategies aimed at improving students' higher-order thinking skills and mathematical problem-solving competencies.

Method

This study employed a quantitative research approach. The population consisted of all active students enrolled in the Elementary School Teacher Education (PGSD) Program at STKIP Andi Matappa, totaling 124 students. The sample was selected using a cluster sampling technique, in which participants were grouped based on shared characteristics. The selected cluster consisted of 54 fifth-semester students. The research instruments included a self-confidence questionnaire, a self-efficacy questionnaire, a metacognitive skills questionnaire, and a mathematical problem-solving test. The data were analyzed using descriptive statistics, classical assumption tests, significance tests, and the coefficient of determination (R^2).

Results

Before conducting further analyses, a descriptive statistical analysis was performed for each variable examined in this study, namely self-confidence, self-efficacy, metacognitive skills, and students' mathematical problem-solving ability. The purpose of this descriptive analysis was to provide an overview of the data distribution, including the minimum and maximum values, mean, and standard deviation for each research variable.

This study was conducted with fifth-semester students of the Elementary School Teacher Education (PGSD) Program at STKIP Andi Matappa as the research participants. It aimed to identify the students' levels of self-confidence, self-efficacy in completing academic tasks, metacognitive skills, and mathematical problem-solving ability. The results of the descriptive analysis serve as a preliminary basis for understanding the characteristics of the data before examining the relationships among the variables.

The descriptive analysis was also applied to the responses obtained from the self-confidence (X_1), self-efficacy (X_2), and metacognitive skills (X_3) questionnaires, which were subsequently analyzed in relation to the mathematical problem-solving ability (Y) of the PGSD students. The results of the descriptive statistics are presented in the following table.

A. Descriptive statistics

a. Descriptive Statistics of Self-Confidence (X_1)

Table 1. Frequency and Percentage Distribution of Self-Confidence (X_1)

Score interval	category	Frequency	Percentage
65 – 68	Very low	6	11,1%
69 – 71	low	10	18,51%
72 – 74	moderate	14	25,92%
75 – 77	high	16	29,62%
78 – 80	Very high	8	14,81%
Total		**54**	**100%**

Based on the results of the frequency distribution analysis of the self-confidence levels of fifth-semester students in the Elementary School Teacher Education (PGSD) Program at STKIP Andi Matappa, the majority of students were classified in the high category, with 16 students (29.62%) out of a total of 54 respondents. Furthermore, 14 students (25.92%) were categorized as having moderate self-confidence, while 10 students (18.51%) fell into the low category. Meanwhile, 8 students (14.81%) were classified in the very high category, and 6 students (11.10%) were in the very low category. Overall, these findings indicate that most students demonstrated a high level of self-confidence. Nevertheless, a considerable proportion of students remained in the low and very low categories, suggesting that efforts to enhance students' self-confidence are still necessary.

b. Descriptive Statistics of Self-Efficacy (X_2)

Tabel 2. Distribusi Frekuensi Dan Persentase Self Efficacy (X2)

Score Interval	Category	Frequency	Percentage
60 – 64	Very low	7	12,96%
65 – 69	low	13	24,07%
70 – 72	moderate	10	18,51%
73 – 75	high	12	22,2%
76 – 80	Very high	12	22,2%
Total		**31**	**100%**

Based on the results of the frequency distribution analysis of the self-efficacy levels of fifth-semester students in the Elementary School Teacher Education (PGSD) Program at STKIP Andi Matappa, the majority of students were classified in the low category, with 13 students (24.07%) out of a total of 54 respondents. Furthermore, 12 students (22.22%) were categorized as having high and very high levels of self-efficacy, while 10 students (18.51%) fell into the moderate category. Meanwhile, only 7 students (12.96%) were classified as having very low self-efficacy. These findings indicate that most students demonstrated relatively low levels of self-efficacy, although a considerable proportion of students also exhibited high and very high levels of self-efficacy.

c. Descriptive Statistics of Metacognitive Skills (X_3)

Table 3. Frequency and Percentage Distribution of Metacognitive Skills (X_3)

No	Score Interpretation Interval	Frequency	Description
1.	0% – 20%	0	Very low
2.	21% – 40%	0	low
3.	41% – 60%	0	moderate
4.	61% – 80%	25	high
5.	81% – 100%	29	Very high
Total		**54**	

Based on the results of the frequency distribution analysis of the students' metacognitive skills, the majority of students were classified in the low category, with 13 students (24.07%) out of a total of 54 respondents. Furthermore, 12 students (22.22%) were categorized as having high and very high levels of metacognitive skills, while 10 students (18.51%) fell into the moderate category. Meanwhile, only 7 students (12.96%) were classified as having very low metacognitive skills. These findings indicate that most students demonstrated relatively low levels of metacognitive skills. Nevertheless, a considerable proportion of students also exhibited high and very high levels of metacognitive skills.

d. Descriptive Statistics of Mathematical Problem-Solving Ability (Y)

Table 4. Frequency and Percentage Distribution of the Mathematical Problem-Solving Ability Test Results (Y)

Category	Interval Nilai	Frequency	Percentage
Very low	71 - 73	7	12,96%
low	74 - 76	18	33,33%
moderate	77 - 79	18	33,33%
high	80 - 82	8	14,81%
Very high	83 - 85	3	5,55%
	Total	**54**	**100%**

The results of the frequency distribution analysis indicate that the majority of students were classified in the low category (scores of 74–76) and the moderate category (scores of 77–79), with 18 students in each category, representing 33.33% of the total sample of 54 students. Furthermore, 8 students (14.81%) were classified in the high category (scores of 80–82). The very low category (scores of 71–73) included 7 students (12.96%), while only 3 students (5.55%) were classified in the very high category. These findings indicate that although a considerable proportion of students demonstrated moderate levels of mathematical problem-solving ability, a substantial number of students remained in the low category. This suggests the need for continued efforts to improve the quality of mathematics instruction in order to enhance students' mathematical problem-solving ability.

B. Classical Assumption Tests

a. Normality Test of the Self-Confidence Variable (X_1)

The normality test for the Self-Confidence variable (X_1) was conducted using SPSS. The results of the analysis are presented in the following table.

Table 5. Normality Test Results for the Self-Confidence Variable (X_1)

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	**df**	**Sig.**
Self Confidence	.100	54	.200

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The normality test for the Self-Confidence variable (X_1) was conducted using the Kolmogorov–Smirnov test, as the sample size exceeded 50, comprising a total of 54 students. The results of the Kolmogorov–Smirnov test showed a significance value of 0.200 for the Self-Confidence variable. Since the significance value was greater than 0.05, it can be concluded that the data for the Self-Confidence variable (X_1) were normally distributed.

b. Normality Test of the Self-Efficacy Variable (X_2)

The normality test for the Self-Efficacy variable (X_2) was conducted using SPSS. The results of the analysis are presented in the following table.

Table 6. Normality Test Results for the Self-Efficacy Variable (X_2)

Tests of Normality Kolmogorov-Smirnov

	Statistic	df	Sig.
Self Efficacy	.103	54	.200

*. This is a lower bound of the true significance.

b. Lilliefors Significance Correction

The normality test for the Self-Efficacy variable (X_2) was conducted using the Kolmogorov–Smirnov test, as the sample size exceeded 50, comprising a total of 54 students. The results of the Kolmogorov–Smirnov test indicated a significance value of 0.200 for the Self-Efficacy variable (X_2). Since the significance value was greater than 0.05, it can be concluded that the data for the Self-Efficacy variable (X_2) were normally distributed.

c. Normality Test of Metacognitive Skills (X_3)

The normality test for the Metacognitive Skills variable (X_3) was conducted using SPSS. The results of the analysis are presented in the following table.

Table 7. Normality Test Results for the Metacognitive Skills Variable (X_3)

Tests of Normality Kolmogorov-Smirnov

	Statistic	df	Sig.
Metakognitif	,088	54	,200

*. This is a lower bound of the true significance.

c. Lilliefors Significance Correction

The normality test for the Metacognitive Skills variable (X_3) was conducted using the Kolmogorov–Smirnov test, as the sample size exceeded 50, comprising a total of 54 students. The results of the Kolmogorov–Smirnov test indicated a significance value of 0.200 for the Metacognitive Skills variable (X_3). Since the significance value was greater than 0.05, it can be concluded that the data for the Metacognitive Skills variable (X_3) were normally distributed.

d. Normality Test of the Mathematical Problem-Solving Ability Variable (Y)

Table 8. Normality Test Results for the Mathematical Problem-Solving Ability Variable (Y)

Tests of Normality Kolmogorov-Smirnov[a]

Statistic		df	Sig.
Hasil Tes Kemampuan Pemecahan Masalah	.117	54	.064

*. This is a lower bound of the true significance.

d. Lilliefors Significance Correction

The normality test results for the Problem-Solving Ability Test Variable (Y) were obtained using the Kolmogorov–Smirnov test because the sample size consisted of more than 50 participants, namely 54 students. Based on the results of the Kolmogorov–Smirnov test, the significance value obtained for the Problem-Solving Ability Test variable was 0.064. Since the significance value is greater than 0.05, it can be concluded that the data for the Problem-Solving Ability Test Variable (Y) are normally distributed.

C. Multicollinearity test

The multicollinearity test aims to determine whether there is a high relationship or correlation among the independent variables in the regression model. High multicollinearity can cause the regression results to become inaccurate. The purpose of the multicollinearity test is to ensure that each independent variable provides a unique and non-overlapping contribution to the dependent variable.

Tabel 9. Uji Multikolinearitas

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	35,500	7,638		4,648	,000		
	Self Confidence	,239	,120	,268	1,985	,053	,565	1,771
	Self Efficacy	,303	,086	,482	3,543	,001	,565	1,771
	Metakognitif	,027	,042	,066	,649	,520	,998	1,002

a. Dependent Variable: students' mathematics learning outcomes

Based on the table above, the Tolerance values greater than 0.1 indicate that there is no multicollinearity. Meanwhile, the VIF values below 10 indicate that there is no multicollinearity problem among the independent variables.

Therefore, based on the results of the multicollinearity test, both the Tolerance and VIF values of the Self Confidence and Self Efficacy variables show that there are no symptoms of multicollinearity in this regression model. Thus, both variables are appropriate to be included in the multiple regression model.

D. Heteroscedasticity test

The heteroscedasticity test is used to determine whether the regression model has unequal variances of residuals (prediction errors) across different values of the independent variables. If the variances are not constant, heteroscedasticity occurs. The purpose of the heteroscedasticity test is to ensure that the regression model meets the homoscedasticity assumption, which is a condition where the residual variance remains constant at all prediction points. Violations of this assumption can affect the accuracy of the model estimation.

Tabel 10. Uji heteroskedastisitas

Coefficients[a]

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	,610	5,052		,121	,904
Self Confidence	,197	,107	,759	1,840	,076
Self Efficacy	-,107	,057	-,335	-1,776	,087
Metakognitif	,042	,028	,202	1,513	,137

Therefore, it can be concluded that the results of the heteroscedasticity test using the Glejser test show that there is no significant relationship between all independent variables and the absolute residual values, as indicated by the significance values (Sig.) greater than 0.05**.** Thus, no symptoms of heteroscedasticity were found in this regression model. This means that the model is free from heteroscedasticity and meets the assumption of homoscedasticity.

E. Autocorrelation Test

The correlation test is used to determine the relationship between two variables, whether the relationship is positive, negative, or there is no relationship at all. The purpose of the correlation test is to determine the strength and direction of the relationship between two variables. This test is commonly used in social, educational, and psychological research to measure the relationships among constructs.

Table 11. Model Autocorrelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.691[a]	.478	.446	2,295	1,069

a. Predictors: (Constant), *Self Efficacy*, *Self Confidence*

b. Dependent Variable: Hasil Belajar Matematika Mahasiswa

Based on the comparison table, the dU value = 1.6800**,** 4 – dU = 2.32**,** DW = 1.069, and dL = 1.4464**.** The DW value is smaller than the dL value **(**1.069 < 1.4464**),** indicating that the Durbin–Watson test results show the presence of positive autocorrelation**.** Therefore, further testing is required, such as the Breusch–Godfrey test, as presented in the following table.

Tabel 12. uji Breusch Godfrey Coefficients[a]

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	-,213	7,508		-,028	,977
Self Efficacy	-,024	,119	-,038	-,203	,840
Self Confidence	,037	,087	,082	,429	,670
Metakognitif	-,015	,043	-,050	-,348	,729
RES_2	,350	,210	-,245	1,664	,102

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a. Dependent Variable: Unstandardized Residual

Based on the results of the autocorrelation test using the Breusch–Godfrey test, as indicated by the significance value of 0.102 > 0.05, it can be concluded that there is no autocorrelation in the regression model. This indicates that the model residuals are not correlated with each other, thus satisfying one of the classical assumptions of linear regression.

a. Uji f

Tabel 13. Uji F

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	240,738	3	80,246	15,235	.000[b]
	Residual	263,355	50	5,267		
	Total	504,093	53			

a. Dependent Variable: Hasil Belajar Matematika Mahasiswa
b. Predictors: (Constant), *Self Efficacy*, *Self Confidence* **Interpretasi**:

Since the significance value is 0.00 < 0.05, it can be concluded that there is a significant simultaneous relationship between Self Confidence, Self Efficacy, and Metacognition on the Problem-Solving Ability Test.

Perbandingan F hitung dan F Tabel:

F tabel = F (k ; n-k) = F (3 ; 51) = 2,79

Based on the F-distribution table, it can be concluded that the F-calculated value is greater than the F-table value, where 15.235 > 2.79. Therefore, there is a significant simultaneous relationship between Self Confidence, Self Efficacy, and Metacognition on the Problem-Solving Ability Test.

b. Uji t

Tabel 14. Uji t untuk variabel Self Confidence, Self Efficacy, dan Metakognitif terhadap variabel Tes Kemampuan Pemecahan Masalah

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	41,807	2,957		14,140	,000
	Self Confidence	,236	,047	,354	5,017	,000
	Self Efficacy	,301	,033	,636	9,015	,000
	Metakognitif	-,044	,016	-,147	-2,775	,008

a. Dependent Variable: Tes Kemampuan Pemecahan Masalah

The t-test results for the Self Confidence variable on the Problem-Solving Ability Test variable using the SPSS application show a significance value (Sig. = 0.000 < α = 0.05). *Therefore, it can be concluded that Self Confidence, Self Efficacy, and Metacognition have a significant relationship with the Problem-Solving Ability Test*.

Thus, it can be concluded that Self-Confidence and Self-Efficacy have a significant influence on the variables examined in this study. This indicates that students' confidence in facing tasks and their belief in their own abilities contribute significantly to improving the performance or learning outcomes that are the focus of the research. Students with high Self-Confidence tend to be more willing to make decisions, express their opinions, and actively participate in the problem-solving process, while high Self-Efficacy encourages students to believe in their capacity to complete academic tasks even when facing difficulties.

Conversely, the Metacognitive variable does not have a significant effect, indicating that students' abilities in planning, monitoring, and evaluating their thinking processes have not become the dominant factors influencing the dependent variable in the context of this study. This condition may occur because metacognitive skills require time, training, and specific learning strategies to develop optimally; therefore, they do not necessarily emerge spontaneously in conventional learning situations. In addition, this finding indicates that, within the context of the studied population, psychological belief aspects have a stronger contribution compared to the ability to manage internal thinking processes (Metacognition).

c. Coefficient of Determination Test (R^2)

Tabel 15. Uji koefisien determinasi (R^2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,927[a]	,859	,851	,895

a. Predictors: (Constant), *Self Efficacy*, *Self Confidence*

Based on the Model Summary output from the multiple regression analysis, the R value obtained was 0.927, indicating that there is a strong relationship between Self-Confidence and Self-Efficacy simultaneously toward students' mathematics learning outcomes. The R Square value of 0.859 indicates that the two independent variables are able to explain 85.9% of the variation in students' mathematics learning outcomes. Meanwhile, the remaining 14.1% is influenced by other factors outside the research model.

The Adjusted R Square value of 0.851 indicates the adjusted coefficient of determination value, which has been corrected based on the number of variables and samples used in the study.

Discussion

This research fundamentally attempts to reveal both the profile and the contribution of students' psychological and cognitive aspects to their proficiency in solving mathematical problems. Involving 54 students from the 2025 cohort of STKIP Andi Matappa as the subjects of analysis, this study measured three main variables: self-confidence, self-efficacy, and metacognitive ability. Through a quantitative approach, the dynamics of the relationships among these variables were analyzed to determine the extent to which the mental readiness and cognitive awareness of PGSD (Elementary School Teacher Education) students could predict their success in solving mathematical problems, which are often considered complex and challenging.

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Self-confidence and self-efficacy exert a significant influence on the variables tested in this study. This indicates that students' self-belief in facing tasks, as well as belief in their own capabilities, significantly contributes to enhancing the performance or learning outcomes focused on in this research. Students with high self-confidence tend to be decisive, express their opinions, and actively engage in problem-solving processes. Meanwhile, high self-efficacy encourages students to believe in their capacity to complete academic tasks despite facing difficulties.

Conversely, the metacognitive variable has no significant effect, indicating that students' ability to plan, monitor, and evaluate their thinking processes is not yet a dominant factor influencing the dependent variable within the context of this study. This condition may occur because metacognitive skills require time, training, and specific learning strategies to develop optimally; thus, they do not spontaneously emerge in conventional learning environments. Furthermore, this finding indicates that within the studied population, psychological belief aspects hold a stronger contribution than the ability to manage internal thinking processes (metacognition).

In the context of this study, the coefficient of determination test was conducted to examine the simultaneous influence of self-confidence, self-efficacy, and metacognition on the Mathematical Problem-Solving Ability Test. The results show that there is a fairly strong simultaneous relationship between self-confidence and self-efficacy on students' mathematics learning outcomes. The R^2 (R-square) value of 0.859 indicates that these independent variables are able to explain 85.9% of the variance in mathematics learning outcomes. Meanwhile, the remaining 14.1% is influenced by other factors outside this research model.

Conclusion

This study fundamentally aims to examine the profile and contribution of students' psychological and cognitive factors to their mathematical problem-solving ability. Involving 54 students from the 2025 cohort of STKIP Andi Matappa as research participants, the study measured three main variables: self-confidence, self-efficacy, and metacognitive skills. Using a quantitative approach, the relationships among these variables were analyzed to determine the extent to which the mental readiness and cognitive awareness of students in the Elementary School Teacher Education (PGSD) Program predict their success in solving mathematical problems, which are often perceived as complex and challenging.

The findings indicate that self-confidence and self-efficacy have a significant influence on the dependent variable examined in this study. This suggests that students' confidence in facing academic tasks and their belief in their own capabilities make a substantial contribution to improving the learning outcomes that constitute the focus of this research. Students with high levels of self-confidence tend to be more decisive, willing to express their opinions, and actively engaged in the problem-solving process. Likewise, students with high self-efficacy are more likely to believe in their ability to complete academic tasks successfully despite encountering various difficulties. These findings are consistent with the study conducted by Sa'adah et al. (2022), which reported that self-confidence and self-efficacy jointly made a significant contribution to students' mathematical problem-solving ability. Self-confidence encourages students to take initiative and face challenges without fear of failure, while self-efficacy strengthens their belief that they can successfully accomplish tasks by applying appropriate strategies. In that study, the combined contribution of these two variables to mathematical problem-solving ability reached 89.2%, demonstrating the strong influence of psychological factors on academic performance.

In contrast, metacognitive skills did not have a statistically significant effect. This finding indicates that students' ability to plan, monitor, and evaluate their own thinking processes has not yet become a dominant factor influencing the dependent variable within the context of this study. This condition may be attributed to the fact that metacognitive skills require sufficient time, continuous practice, and specific instructional strategies to develop optimally; therefore, they may not emerge naturally in conventional learning environments. Furthermore, these findings suggest that, within the population studied, psychological belief factors contribute more substantially to mathematical problem-solving ability than the ability to regulate internal cognitive processes (metacognition).

In this study, the coefficient of determination (R^2) was used to examine the simultaneous effect of self-confidence, self-efficacy, and metacognitive skills on students' mathematical problem-solving ability. The results revealed a strong simultaneous relationship between these independent variables and students' mathematical problem-solving ability. The R^2 (R-square) value of 0.859 indicates that the independent variables collectively explain 85.9% of the variance in students' mathematical problem-solving ability. The remaining 14.1% of the variance is explained by other factors outside the scope of the present research model.

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