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The Effect of Self-Efficacy on Senior High School Students' Economic Problem-Solving Ability: The Mediating Role of Metacognition

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ABSTRACT

Objective: *This study examines the effect of self-efficacy on students' economic problem-solving ability through metacognition.* ***Method:*** *This study used a quantitative correlational design with a survey involving 134 students from SMA Pembangunan Jaya 2 Sidoarjo who had taken economics classes. Self-efficacy and metacognition were measured using five-point Likert scales, while economic problem-solving ability was assessed through contextual case-based essay questions. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.* ***Results:*** *The findings show that self-efficacy has a positive and significant effect on both metacognition and economic problem-solving ability. Metacognition also contributes positively and significantly to students' problem-solving ability. Furthermore, it serves as a partial mediator in the relationship between self-efficacy and economic problem-solving ability.* ***Novelty:*** *This study examines the direct and indirect relationships between self-efficacy and economic problem-solving ability through metacognition in a single model. It also uniquely assesses economic problem-solving ability using contextual case-based tasks rather than general problem-solving dispositions or academic achievement.*

INTRODUCTION

Twenty-first-century education expects students to be able to solve problems, which means spotting a problematic situation, working through the information systematically, and coming up with a strategy even when no ready-made method exists (OECD, 2023). For senior high school students of economics, this goes beyond understanding concepts: they also have to make sensible choices in everyday money matters, such as using their allowance wisely and planning personal finances (Annam et al., 2024). These choices are getting harder as young people encounter more complicated economic situations in the digital era. Yet success in solving such problems does not rest on subject knowledge alone; psychological factors, especially self-efficacy and metacognition, also matter.

Self-efficacy, as defined by Bandura (1986), refers to people's beliefs about their capability to organise and carry out the actions needed to a particular level of performance. These beliefs shape the goals individuals set, the strategies they adopt, the effort they put in, and how long they keep going when a task becomes difficult (Moussa, 2023). Among university students, academic self-efficacy shows a moderate association with academic performance, and this link is itself influenced by mediating and moderating factors such as effort regulation and deep-processing strategies (Honicke & Broadbent, 2016). Self-efficacy has also been shown to carry the effect of students' goal orientation on achievement (Honicke et al., 2020), and its relationship with performance appears to be reciprocal, shifting with task difficulty and initial performance (Honicke et al., 2023). In economics lessons, self-efficacy appears as students' confidence that they can grasp concepts, handle information, and work through economic problems. Metacognition is a different thing: it is awareness and control of one's own thinking

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through planning, monitoring, and evaluating strategies. With it, students can decide what to do next, catch their own mistakes while thinking, and judge whether the answer they reached is reasonable. Both constructs may therefore help students solve economic problems. Metacognition is also one of the more consistent correlates of school performance. A meta-analysis of 149 samples found that it predicts academic performance even after intelligence is controlled (Ohtani & Hisasaka, 2018). and a synthesis of elementary and secondary school studies reported modest but positive associations between metacognitive processes and achievement (Dent & Koenka, 2016).

Social Cognitive Theory offers a way to connect self-efficacy, metacognition, and problem solving (Bandura, 1986; Schunk & DiBenedetto, 2020). It maintains that environmental, behavioural, and personal elements interact reciprocally to produce behaviour and achievement. Self-efficacy is a motivating factor in learning that influences how much effort and perseverance students put into challenging assignments. It can also encourage students to control their own learning by organising, observing, and assessing their own thought processes. Students who trust their abilities are more likely to take on a hard economic problem than to avoid it. That trust also shapes how they think: they tend to build a strategy before acting, direct their attention carefully, check their understanding along the way, and change course when an initial solution does not work (Hayat & Shateri, 2019; Panadero, 2017). Students with lower self-efficacy, by contrast, may read difficulty as proof of their own limits and settle for the first solution that comes to mind without exploring further (Bandura, 1986). Metacognition supports problem solving at each stage: planning helps students pin down what the problem requires, monitoring lets them notice and fix errors, and evaluation lets them judge whether an alternative is workable (Ohtani & Hisasaka, 2018; Prakoso et al., 2025). Metacognition can thus be seen as one route through which self-belief relates to success in problem solving, while the rest of the effect may run directly through persistence and effort. Models of self-regulated learning likewise bring motivational beliefs such as self-efficacy and cognitive monitoring into a single framework (Panadero, 2017). Evidence that metacognitive strategy instruction improves academic performance, with effects that persist after the intervention ends (de Boer et al., 2018), also makes metacognition a practical target for classroom teaching.

Previous studies have demonstrated how self-efficacy shapes students' dispositions and problem-solving skills through cognitive processes. According to Wang et al. (2024) metacognition and critical thinking acted as mediating elements in the relationship between university students' self-efficacy and their problem-solving disposition. Tang et al. (2021) similarly stressed the connection between metacognition and learning and problem solving, and Koyuncuoğlu, (2023), reported associations among metacognition, self-efficacy, and university students' academic success. In economics education, Ningrum & Rafsanjani, (2024) reported that academic self-efficacy is associated with problem-solving skills through enhanced self-regulation and critical-thinking dispositions. Research involving secondary school students has also shown that critical thinking dispositions play a mediating role in the relationship between self-efficacy and problem-solving skills (Tasgin & Dilek, 2023). In Indonesian economics classrooms, self-efficacy has also been linked to students' achievement and learning outcomes (Ermannudin, 2021; Miftah & Karyadi, 2023; Zahro & Surjanti, 2021); these studies, however, assessed learning outcomes rather than problem solving as a higher-order

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thinking skill. Previous studies have explored the relationship between metacognition and self-regulation across several learning contexts, including general problem-solving (Bal, 2022; Heidari & Bazgirpour, 2025) mathematical problem-solving (Amelia et al., 2025; Zhao & Saleh, 2025), mathematical modeling (Hidayat et al., 2023; Zhang et al., 2024), and science education (Winarti et al., 2022). Research involving high school students has also investigated creative problem-solving in connection with cognitive flexibility and classroom engagement (Çalışkan & Altun, 2025). Problem-solving has also been explored in relation to the connection between self-efficacy and aspiration goals, with findings suggesting that it may serve as a moderating factor (Yendi et al., 2025).

Even so, the evidence is not entirely consistent. Prakoso et al. (2025), studying pre-service economics teachers, found no significant direct effect of self-efficacy on problem-solving ability, while metacognition helped explain how psychological factors relate to that ability. Akuba et al. (2020), by comparison, found that self-efficacy had a positive effect on mathematical problem solving. Taken together, these mixed results suggest that the link between self-efficacy and problem solving is not fixed, and may change with who the students are and what kind of problems they face. The studies also measured different outcomes, which could be another reason their findings do not match. These include students' problem-solving disposition, which refers to their tendency to engage with challenging problems (Wang et al., 2024); economics learning outcomes (Ermannudin, 2021; Miftah et al., 2023; Zahro & Surjanti, 2021) and mathematical problem-solving ability (Akuba et al., 2020). Problem-solving disposition concerns students' readiness and willingness to engage with problems, whereas academic achievement reflects the knowledge and skills they develop through learning. The current study, however, examines how students perform when working on specific economic problems. This performance involves recognizing the problem and the information needed to address it, developing possible solutions, and assessing whether those solutions are feasible. Therefore, these outcomes should not be considered equivalent. While solving mathematical issues usually entails determining the right solution, solving economic questions frequently necessitates that students explore multiple options while taking limited resources into account. These differences in the nature of the problems may lead self-efficacy and self-regulation to operate differently depending on the problem-solving context. Most earlier work has also involved university students or subjects other than economics, and few studies have treated metacognition specifically as a mediator rather than merely a predictor (Hayat & Shateri, 2019; Wang et al., 2024; Prakoso et al., 2025). Testing the relationships among these three constructs among senior high school students in economics learning therefore remains necessary.

The importance of developing this ability is further underscored by Indonesia's financial literacy data. The National Financial Literacy and Inclusion Survey for 2024 (SNLIK), conducted by the Financial Services Authority and Statistics Indonesia, revealed that individuals aged 15–17 had a financial literacy index of 51.70%, representing the lowest level among all age groups (OJK & BPS, 2024). Financial literacy plays a key role in shaping individuals' financial decisions (Yanti & Sabandi, 2025), while financial self-efficacy has been identified as a mediating factor in the relationship between financial literacy and financial well-being (Lone & Bhat, 2024). Beyond its role in decision-making, financial literacy is increasingly recognized as an investment in human capital that can influence individuals' financial well-being. This recognition has encouraged many

countries to incorporate financial literacy education into school curricula (Lusardi & Mitchell, 2023). A meta-analysis of 76 randomized experiments shows that financial education improves both financial knowledge and downstream behavior (Kaiser et al., 2022), and a review of school-based programs reports gains in students' knowledge and attitudes, although evidence on actual behavior is thinner and experiential methods appear promising (Amagir et al., 2018). Evidence from a large-scale randomized study in Peru also suggests that the impact of financial literacy education is influenced by its implementation approach. Frisancho, (2020) found that students who participated in compulsory financial education courses achieved greater improvements in financial literacy than those who joined voluntary after-school programs. This finding suggests that economics education should go beyond teaching students to understand economic concepts. It should also help them build confidence and develop the habit of examining their own thinking when facing economic situations in daily life.

Drawing on the theoretical rationale and earlier findings, four relationships are examined in this study. First, students with stronger self-efficacy are more likely to engage in metacognitive activities such as planning and monitoring their thinking strategies. Academic self-efficacy has been linked to better metacognitive learning strategies (Hayat & Shateri, 2019), and among university students it has been shown to foster metacognitive engagement as part of a staged route toward problem solving (Wang et al., 2024). A positive association between self-efficacy and metacognitive skills has also been observed in upper-grade elementary school students (Duratun & Maryani, 2023), indicating that this relationship extends beyond university-level populations. Furthermore, students who are able to plan, monitor, and assess their strategies generally demonstrate better problem-solving performance; Prakoso et al. (2025) found that metacognition plays an important role in predicting problem-solving ability among pre-service economics teachers. Third, *Social Cognitive Theory* predicts that self-belief sustains effort and persistence on difficult tasks (Bandura, 1986; Moussa, 2023), yet the empirical evidence is mixed: no direct effect was found among university students (Wang et al., 2024; Prakoso et al., 2025), whereas one was reported for mathematical problem solving (Akuba et al., 2020). The direct path was therefore tested again with senior high school students. Fourth, if the first two relationships hold, metacognition can serve as the link between self-belief and problem-solving performance. This reasoning agrees with Wang et al. (2024) and with evidence that critical thinking develops through the interplay of self-efficacy and self-regulation (Yudha et al., 2022).

In response to the identified theoretical and empirical gaps, this study aims to investigate the direct influence of self-efficacy on senior high school students' economic problem-solving ability, as well as its indirect influence through the mediating role of metacognition. Unlike Prakoso et al. (2025), who focused on pre-service economics teachers, it examines senior high school students using problem-solving tasks based on contextual cases, so the ability under study concerns resolving economic problems rather than problem-solving disposition, general academic achievement, or mathematical problem solving. This study is expected to provide three main contributions. Theoretically, this study combines self-efficacy and metacognition within a single framework drawn from Social Cognitive Theory and self-regulated learning. This framework positions metacognition as the cognitive mechanism through which students' beliefs in their own abilities may influence their performance, while also examining

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whether a direct relationship exists between these variables. Empirically, the study broadens existing evidence regarding motivational factors and metacognitive processes by examining students' performance in contextual economic problem-solving activities, particularly those involving pocket-money management and personal financial planning, which are evaluated using an assessment rubric. Its contribution lies in the integration these variables within a single model and in assessing performance directly, which extends earlier work that mostly examined general problem-solving dispositions (Wang et al., 2024), mathematical problem solving (Akuba et al., 2020), or academic achievement and learning outcomes (Ermannudin, 2021; Zahro & Surjanti, 2021). The school level is therefore the setting of the study, not the basis of its novelty. Practically, the findings may serve as a reference for teachers and schools in developing learning strategies that strengthen students' self-confidence, strategic planning, monitoring of thinking processes, and evaluation of solutions. These efforts can be implemented by providing mastery-based learning experiences alongside explicit instruction in planning, monitoring, and evaluating solutions to everyday financial problems.

RESEARCH METHOD

This study employed a quantitative, correlation survey design to examine how senior high school students' self-efficacy, metacognition, and economic problem-solving ability are related. Following social cognitive theory (Bandura, 1986) the research model treats self-efficacy as the independent variable, metacognition as the mediator, and economic problem-solving ability as the dependent variable (Figure 1). The relationships in this model were tested with Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4. This method was selected because it is well suited to predictive-explanatory models aimed at theory development and does not assume normally distributed data (Hair et al., 2019). Although PLS-SEM is commonly employed in social science research, methodological reviews have identified persistent shortcomings in the way its results are reported. PLS-SEM is widely used in the social sciences, yet methodological reviews have repeatedly found that its results are often reported incompletely. For this reason, both the measurement and structural models are reported in detail here (Ringle et al., 2020).

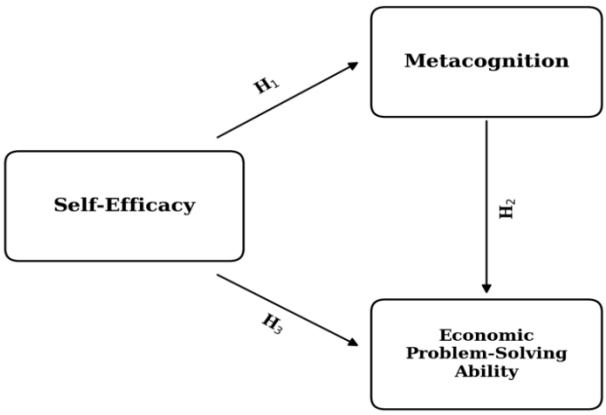


Figure 1. Conceptual framework of the study

The model was used to test four hypotheses. H1: self-efficacy has a positive effect on students' metacognition. H2: metacognition has a positive effect on students' economic problem-solving ability. H3: self-efficacy has a positive effect on students' economic problem-solving ability. H4: metacognition mediates the effect of self-efficacy on students' economic problem-solving ability.

The participants were Grade X, Grade XI (specialization), and Grade XII (specialization) students at SMA Pembangunan Jaya 2 Sidoarjo who had taken economics, a population of 205 students. A sample-size calculation with a 95% confidence level, a 5% margin of error, and a 50% population proportion gave a minimum sample of 134 students. A total of 134 student responses were included in the final analysis. As a cross-check, the inverse square root method for PLS-SEM (Kock & Hadaya, 2018) gives a minimum of about 40 cases at 80% power and a 5% significance level for the smallest significant path coefficient in this study ($\beta = 0.393$), so the retained sample is adequate. A power analysis for the largest structural equation, in which two predictors point to economic problem-solving ability, points the same way: for a multiple regression with two predictors, a medium effect size ($f^2 = 0.15$; Cohen, 1988), $\alpha = 0.05$, and power = 0.80, at least 68 cases are required, which the retained sample exceeds. The population-proportion formula was therefore used to set the primary minimum, and these PLS-SEM-specific criteria confirm that the sample size is not a binding constraint on the analysis.

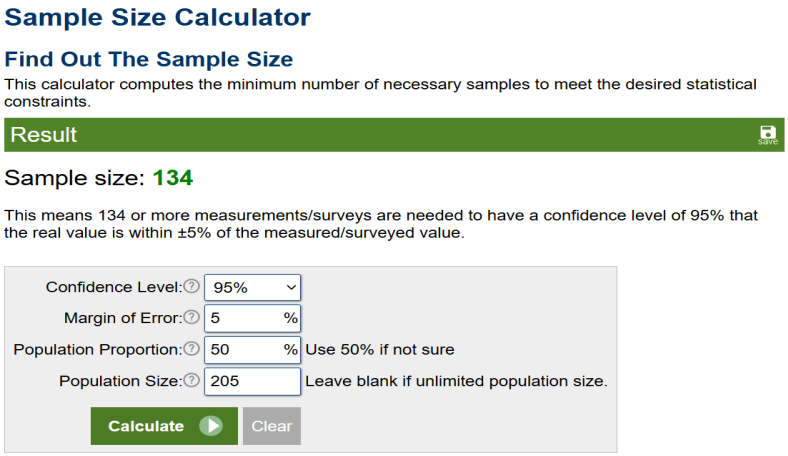


Figure 2. Sample-size determination. Source: Calculator.net

Data collection took place in September 2026 through a Google Forms questionnaire. Before completing the survey, students were provided with an informed-consent statement outlining the study's objectives, the voluntary nature of participation, the confidentiality of their personal information and responses, and the use of collected data exclusively for academic purposes. The researchers did not intervene in any way with the respondents. A question in the identity section about prior experience of economics learning was used to confirm eligibility. The study was carried out with the school's permission.

The analysis followed the three PLS-SEM stages (Hair et al., 2017): model specification, measurement (outer) model evaluation, and structural (inner) model evaluation. All constructs were specified as reflective: self-efficacy (SE) with nine indicators, metacognition (MET) with six indicators, and economic problem-solving ability (PS) with four indicators. The construct codes follow the original Indonesian labels used in the instrument and the SmartPLS output (*self-efficacy*, *metacognition*, and *problem-solving ability*).

In the measurement model, convergent validity was established using outer loading values exceeding 0.70 and AVE values greater than 0.50, while discriminant validity was evaluated based on HTMT values below 0.90 (Henseler et al., 2015). Reliability was evaluated with Cronbach's alpha and composite reliability (rho_a and rho_c) against a minimum of 0.70, and multicollinearity with the Variance Inflation Factor (VIF) below 5 (Hair et al., 2019). These choices follow current best-practice recommendations for reporting reliability and convergent and discriminant validity in structural equation modeling (Cheung et al., 2024).

This series of measurement model assessments follows the confirmatory composite analysis approach commonly applied in PLS-SEM (Hair et al., 2020). For the structural model, the analysis included path coefficients, the coefficient of determination (R^2), and effect size (f^2). Hypothesis significance was assessed through bootstrapping using 5,000 subsamples at a 5% significance level ($t > 1.96$; $p < 0.05$), along with 95% confidence intervals. R^2 values of 0.25, 0.50, and 0.75 were classified as weak, moderate, and substantial, respectively (Hair et al., 2019), and f^2 values of 0.02, 0.15, and 0.35 as small, medium, and large (Cohen, 1988). Mediation was tested through the specific indirect effect and was considered significant when the 95% confidence interval excluded zero. When the direct effect was also significant and had the same sign as the indirect effect, the mediation was classified as complementary partial (Zhao et al., 2010; Hair et al., 2017). The mediation category was determined in accordance with established guidelines for conducting mediation analysis using PLS-SEM (Sarstedt & Moisescu, 2024).

Hypotheses H1–H3 were evaluated using the path coefficients and their bootstrapped 95% confidence intervals, while H4 was judged from the specific indirect effect described above.

The instrument was developed from theory and earlier studies relevant to each construct. It had three parts: self-efficacy, metacognition, and an economic problem-solving test. Self-efficacy and metacognition were measured on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), whereas economic problem-solving ability was measured with an essay test built on contextual cases. The instrument is summarized in Table 1.

Self-efficacy was measured with nine statements based on the three dimensions of self-efficacy in (Siregar et al., 2023): task difficulty (*magnitude/level*), strength of belief (*strength*), and breadth of application (*generality*), with three statements per dimension. Sample items include "I am confident that I can solve difficult economics problems if I try seriously" (task difficulty), "I keep trying other approaches when my first strategy fails to solve an economics problem" (strength), and "I am confident that I can apply the same way of thinking to solve various economic problems, both at school and in everyday life" (generality).

Metacognition was measured with six statements covering three indicators: strategy planning, monitoring of strategy execution, and evaluation of the outcome of thinking, with two statements per indicator. Sample items are "Before working on an economics problem, I first think through the steps I will use" (planning), "I notice when I make a mistake while working through an economics problem" (monitoring), and "I assess whether the strategy I used was effective in solving the economics problem" (evaluation).

Economic problem-solving ability was measured with four essay items based on two contextual cases: managing pocket money and personal financial planning. Each case had two sub-questions. In the pocket-money case, students identified the main problem and the relevant data and then developed at least two alternative solutions along with their consequences. In the financial-planning case, they determined the most realistic strategy

using simple calculations and judged the feasibility of the target within six months.

Students' answers were scored with a rubric ranging from 1 to 5. A score of 1 was given when an answer was incomplete and did not fit the context of the question; 2 when it was incomplete but fit the context; 3 when it was complete but missed the core of the question; 4 when it was complete and answered the question but offered no example; and 5 when it was complete, answered the question, and was supported by a real-life example. The score of each sub-question was then used as an item of economic problem-solving ability in the measurement model.

Table 1. Instrument blueprint

Variable	Indicator	Items	Example statement or task
Self-efficacy (SE)	Task difficulty (magnitude)	SE.1–SE.3	I am confident that I can solve difficult economics problems if I try seriously.
	Strength of belief	SE.4–SE.6	I keep trying other approaches when my first strategy fails to solve an economics problem.
	Generality	SE.7–SE.9	I am confident that I can apply the same way of thinking to solve various economic problems, both at school and in everyday life.
Metacognition (MET)	Strategy planning	MET.1–MET.2	Before working on an economics problem, I first think through the steps I will use.
	Monitoring	MET.3–MET.4	I notice when I make a mistake while working through an economics problem.
	Evaluation	MET.5–MET.6	I assess whether the strategy I used was effective in solving the economics problem.
Economic problem solving (PS)	Case 1: managing pocket money	PS.1–PS.2	(a) Identify the main problem and the relevant data; (b) develop at least two alternative solutions along with their consequences.
	Case 2: personal financial planning	PS.3–PS.4	(a) Determine the most realistic strategy using simple calculations; (b) judge the feasibility of the target within six months.

The fit of the items to their indicators, the clarity of the language, and the suitability for senior high school students were reviewed by the researchers on the basis of theory and earlier studies. The instrument did not undergo expert review or a limited pilot test. Evidence of validity and reliability came from the measurement model evaluation reported in the Results and Discussion section.

RESULTS AND DISCUSSION

Results

All items had outer loadings above 0.70, ranging from 0.703 to 0.854 (Table 2). The AVE of all three constructs exceeded 0.50: 0.542 for SE, 0.609 for MET, and 0.566 for PS. Convergent validity was therefore satisfied.

Table 2. Outer loadings and AVE

Variable	Item	Outer loading	AVE
Self-Efficacy (SE)	SE.1	0.706	0.542
	SE.2	0.715	
	SE.3	0.703	
	SE.4	0.802	
	SE.5	0.748	
	SE.6	0.744	
	SE.7	0.738	
	SE.8	0.742	
	SE.9	0.725	
Metacognition (MET)	MET.1	0.720	0.609
	MET.2	0.759	
	MET.3	0.752	
	MET.4	0.854	
	MET.5	0.780	
	MET.6	0.811	
Economic Problem-Solving Ability (PS)	PS.1	0.726	0.566
	PS.2	0.753	
	PS.3	0.746	
	PS.4	0.782	

The Heterotrait–Monotrait Ratio (HTMT) was used to evaluate discriminant validity. The HTMT values fell between 0.802 to 0.825, below both the stricter threshold of 0.85 and the suggested limit of 0.90 (Table 3). This demonstrates that, despite their substantial correlation, SE, MET, and PS are empirically separate constructs.

Table 3. HTMT discriminant validity criterion

	SE	MET	PS
SE			
MET	0.807		
PS	0.825	0.802	

Cronbach's alpha ranged from 0.755 to 0.894, rho_a from 0.761 to 0.896, and rho_c from 0.839 to 0.914, all above 0.70 and below 0.95. The items of each construct are therefore internally consistent (Table 4).

Table 4. Cronbach's alpha and composite reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
SE	0.894	0.896	0.914	0.542
MET	0.871	0.878	0.903	0.609
PS	0.755	0.761	0.839	0.566

The item VIF values were all below 5, ranging from 1.253 to 4.169 (Table 5). A number of metacognition elements (MET.2, MET.4, MET.5, and MET.6) scored higher than 3, indicating rather close correlations between those things while being within acceptable bounds.

Table 5. Multicollinearity test (item VIF)

Item	VIF	Item	VIF
SE.1	1.736	MET.2	4.055
SE.2	1.838	MET.3	1.739
SE.3	1.824	MET.4	3.507
SE.4	2.250	MET.5	4.169
SE.5	1.938	MET.6	3.217
SE.6	2.071	PS.1	1.253
SE.7	1.904	PS.2	2.598
SE.8	1.991	PS.3	2.639
SE.9	1.768	PS.4	1.387
MET.1	1.576		

The structural model explained 51.3% of the variance in metacognition (R^2 = 0.513) and 59.5% of the variance in economic problem-solving ability (R^2 = 0.595), both in the moderate category (Figure 3). Self-efficacy had a very strong effect on metacognition (f^2 = 1.054, large), whereas the effects of self-efficacy and metacognition on problem solving were each in the medium category (f^2 = 0.233 and 0.186).

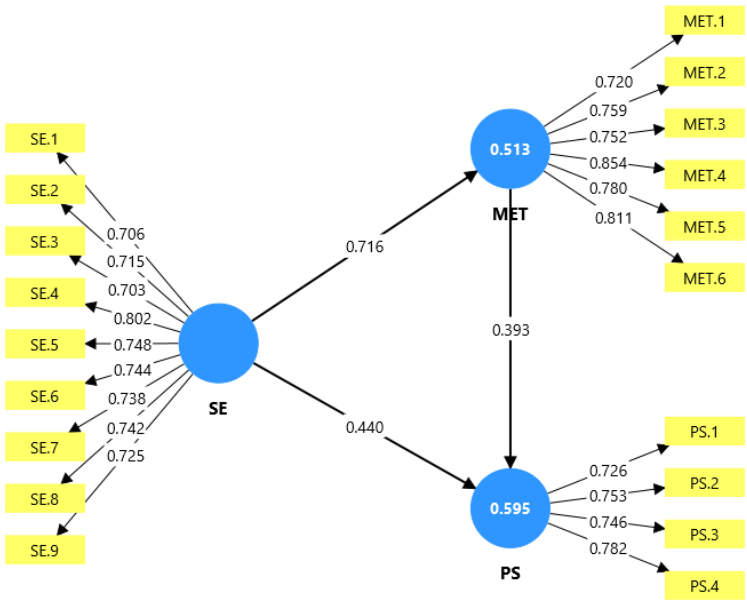


Figure 3. PLS-SEM path model. Source: primary data processed by the authors using SmartPLS 4

Table 6. Hypothesis testing (direct effects)

Hypothesis	Path	Path coefficient	p-value	95% CI	f^2	Decision
H1	SE → MET	0.716	< 0.001	0.633–0.799	1.054	Accepted
H2	MET → PS	0.393	< 0.001	0.187–0.596	0.186	Accepted
H3	SE → PS	0.440	< 0.001	0.223–0.657	0.233	Accepted

Source: data processed with SmartPLS 4.
Note: SE = self-efficacy; MET = metacognition; PS = economic problem-solving ability. A p-value of 0.000 in the output is reported as $p < 0.001$.

Table 7. Mediation test (specific indirect effect)

Hypothesis	Path	Path coefficient	t	p-value	95% CI	Conclusion
H4	SE → MET → PS	0.281	3.739	< 0.001	0.136–0.433	Significant mediation (complementary partial)

All four hypotheses were supported. Self-efficacy showed a significant positive influence on metacognition (H1) and economic problem-solving ability (H3), while metacognition also positively and significantly affected economic problem-solving ability (H2). The mediation analysis revealed a significant indirect effect of self-efficacy on problem-solving ability through metacognition ($\beta = 0.281$; $t = 3.739$; $p < 0.001$; 95% CI [0.136, 0.433]), as the confidence interval did not include zero. Since the direct effect ($\beta = 0.440$) remained significant and had the same direction, the mediation was identified as complementary partial mediation. The indirect effect contributed approximately 39% of the total effect (0.721).

Discussion

Outer loadings of the indicators. Before the structural paths are interpreted, it is worth noting which indicators represent each construct most strongly (Table 2). For self-efficacy, the highest loading belonged to SE.4 (0.802), an item of the strength-of-belief indicator, and the three items of this indicator also had the highest average loading (0.765), ahead of generality (0.735) and task difficulty (0.708). This suggests that self-efficacy in these students was reflected most clearly in how firmly they believed they could keep trying when a strategy failed, more than in confidence about difficult tasks alone. For metacognition, MET.4 (0.854), a monitoring item, was the highest loading in the whole model, followed by MET.6 (0.811), an evaluation item, whereas the planning items were lower (MET.1 = 0.720; MET.2 = 0.759). Metacognition therefore showed up mainly as awareness of one's own mistakes and appraisal of one's strategies, which parallels Prakoso et al. (2025), where the retrospective indicator also carried the highest loading (0.938). For economic problem solving, PS.4 (0.782) was the highest loading and PS.1 (0.726) the lowest; the personal financial planning case (average 0.764) loaded slightly above the pocket-money case (0.740), possibly because that case required concrete calculations and judgments about feasibility. Overall, loadings ranged only from 0.703 to 0.854 and all exceeded 0.70, so every indicator contributes adequately to its

construct; the differences above indicate differences in emphasis, not that any indicator is unimportant.

Students who were more confident in their ability to work on economics problems tended to plan their steps, monitor their process, and evaluate their strategies more often (β = 0.716). This is consistent with social cognitive theory (Bandura, 1986) which views self-efficacy as a source of motivation that propels self-regulatory processes. It is also consistent with Prakoso et al. (2025) for pre-service economics teachers (β = 0.487), with Hayat & Shateri (2019), and with Wang et al. (2024), who treat self-efficacy as a driver of metacognitive engagement. The association here is larger than in Prakoso et al. (2025). One possible explanation is that both questionnaires referred to economics tasks, which brings the two constructs close together conceptually. The HTMT value of 0.807 indicates that they are closely related yet still distinguishable.

Metacognition was positively associated with economic problem-solving ability (β = 0.393). Students who habitually plan their steps, check that their steps match the plan, and appraise the effectiveness of their strategies were better at handling cases such as managing pocket money and planning savings, which demand identifying data, comparing alternatives, and checking whether a solution is feasible. This agrees with Prakoso et al. (2025), who found a positive effect of metacognition on problem solving (β = 0.343), and with Wang et al. (2024) and Tang et al. (2021), who underline the role of metacognition in turning self-belief into problem-solving action. The results are in line with a meta-analysis that showed a strong positive correlation between teenage math achievement and metacognition (Muncer et al., 2022).

Self-efficacy was significantly and directly associated with economic problem-solving ability (β = 0.440). This differs from Prakoso et al. (2025), who found no significant direct effect among pre-service economics teachers (β = 0.041), and from Wang et al. (2024), who reported an indirect relationship through sequential mediation, but is consistent with Akuba et al. (2020) regarding mathematical problem-solving. These differences may relate to the context of the tasks and study characteristics. In this study, self-efficacy items were specifically designed for economic tasks, making them closely aligned with the assessed performance. While Prakoso et al. (2025) suggested that complex problem-solving relies more on knowledge and cognitive ability than self-belief, the present study involved familiar situations, such as pocket money and savings, in which confidence and persistence may be more evident. Differences in participants and model specification, including anxiety in the previous study, may also explain the contrasting results. According to Social Cognitive Theory (Bandura, 1986; Schunk & Dibenedetto, 2020). students with stronger self-efficacy tend to persist when initial strategies fail (Moussa, 2023). which may be relevant to the case-based tasks without obvious solutions, as reflected in the strong loadings of items related to exploring alternative approaches (Table 2). Self-efficacy may also strengthen confidence in selecting strategies, calculating, assessing the feasibility of a six-month target, and considering alternative solutions without being deterred by fear of failure. Previous studies have likewise identified self-efficacy as a proximal predictor of achievement that mediates goal orientation (Honicke et al., 2020), operates partly through effort regulation (Honicke & Broadbent, 2016), and varies according to task difficulty and previous performance (Honicke et al., 2023). However, repeated failure may weaken self-efficacy, suggesting a reciprocal relationship (Talsma et al., 2018). These mechanisms were not directly tested and remain potential explanations. Future research could examine persistence, decision-

making confidence, and exploration of alternative strategies, while also incorporating prior economics knowledge, numeracy, and personal financial management experience as covariates. Thus, the coefficients should be interpreted as associations within this sample rather than causal evidence.

Metacognition served as a partial mediator in the relationship between self-efficacy and economic problem-solving ability. Self-efficacy was related to students' performance through two pathways: a direct pathway, potentially involving effort and persistence, and an indirect pathway operating through metacognitive self-regulation. This pattern fits the logic of social cognitive theory on which the study rests. It differs from Wang et al. (2024) and Prakoso et al. (2025), who found metacognition to be the main connector without a significant direct effect, and so adds evidence that the strength of the direct path from self-efficacy depends on the population, the level of education, and the type of task. Likewise, critical thinking dispositions have been found to play a mediating role in the association between self-efficacy and problem-solving skills among secondary school students (Tasgin & Dilek, 2023), indicating that the influence of self-belief may operate through multiple cognitive pathways. About 39% of the total relationship (0.281 of 0.721) runs through metacognition, and 61% is carried by the direct path. Metacognition represents an important, though not the only, pathway through which self-efficacy is associated with problem-solving performance. While planning, monitoring, and evaluating strategies enable students to formulate more effective solutions, whether they stay engaged with a difficult problem long enough to use those strategies depends on other things, such as persistence and effort. Thus, the remaining direct effect may reflect other mechanisms not included in the model, such as persistence, effort regulation, task engagement, and decision-making commitment (Honicke & Broadbent, 2016; Honicke et al., 2020; Moussa, 2023). The presence of partial rather than full mediation also aligns with Social Cognitive Theory, which explains that self-efficacy can affect performance through several pathways (Bandura, 1986; Schunk & Dibenedetto, 2020). Case-based activities involve both strategic thinking and continuous effort. Consequently, students who demonstrate effective monitoring skills may nevertheless achieve lower scores when they stop making an effort too early. These explanations warrant further examination, particularly through the investigation of motivation, persistence, effort regulation, and task engagement as additional mediating variables operating in parallel.

These associations should also be read against explanations that the model does not include. Students with stronger prior economics knowledge, better numeracy, or more experience managing their own money may score higher on the case-based tasks whatever their self-efficacy or metacognition, especially in the financial-planning case, which required simple calculations and a judgment about a six-month target. The same students may also report higher self-efficacy because they have handled similar tasks successfully before (Bandura, 1986; Honicke et al., 2023), such prior experiences could lead to an overestimation of the relationship between self-efficacy and problem-solving ability. Since these factors were not included in the data collection, the direct effect (β = 0.440) may partly represent their influence rather than the contribution of self-efficacy alone. Furthermore, collecting self-efficacy and metacognition data through self-reports at a single point in time may have introduced common method variance, potentially strengthening the observed association between these constructs. Accordingly, these possibilities are considered alternative explanations, and the estimated coefficients are interpreted as associations specific to the students included in this study.

The findings indicate several possible directions for classroom practice. These recommendations are based on the observed relationships rather than instructional interventions directly evaluated in this study. First, teachers may incorporate real-life economic situations, including pocket-money management and personal financial planning, into regular learning activities, progressing from guided problem scenarios to more complex and open-ended cases. Second, teachers can support students' metacognitive development by using guiding questions such as, "What problem needs to be addressed, and what information is relevant?", "What possible solutions can be considered, and how do they differ?", and "Are my calculations consistent with my plan, and is the proposed solution realistic?" These questions encourage students to examine the problems they face, select relevant information, explore different solutions, and evaluate their decisions. Third, assessment should take into account not only students' final answers but also the reasoning behind them, particularly their ability to identify relevant information, compare alternatives, and explain their decisions. Fourth, teachers should give students feedback that appreciates their efforts and strategies since self-efficacy and problem-solving success are directly correlated. Such feedback can encourage them to remain persistent when facing difficulties and reconsider their approaches when the strategies they use are not effective.

CONCLUSION

Fundamental Finding: Three key conclusions may be drawn from the study's findings. First, the ability of senior high school pupils to solve economic problems is strongly correlated with self-efficacy. Second, metacognition helps explain this relationship. Students with higher self-efficacy tend to be more actively involved in planning their work, monitoring their thinking, and evaluating the strategies they use. These processes can help them approach and solve economic problems more effectively. Third, the significance of both the direct and indirect effects indicates that metacognition partially mediates the relationship between self-efficacy and economic problem-solving ability, suggesting that it contributes to this relationship without fully accounting for it. **Implication:** Teachers may incorporate real-life situations, such as managing pocket money and preparing personal financial plans, as progressive learning exercises. Beginning with guided cases and gradually introducing more open-ended problems can provide students with mastery experiences that strengthen their self-efficacy (Bandura, 1986). Students can identify issues, choose pertinent data, verify their calculations, and defend solutions with the aid of reflective questions. In addition to final responses, assessments should take into account students' thinking, potential solutions, and the viability of their choices. Given the significant direct effect of self-efficacy, feedback emphasizing effort and effective strategies may encourage persistence. Contextual economic problem-solving activities, combined with explicit instruction in metacognitive strategies, may also help develop students' financial literacy, as metacognitive interventions have been found to improve academic performance (de Boer et al., 2018). **Limitation:** The cross-sectional design does not allow causal conclusions. Self-efficacy and metacognition were measured by self-report at the same time, which leaves the data open to respondent bias and common method bias. The sample came from a single school, SMA Pembangunan Jaya 2 Sidoarjo, so generalization should be cautious. In addition, self-efficacy and performance may influence each other reciprocally (Talsma et al., 2018), which a cross-sectional design cannot disentangle. **Future Research:**

Longitudinal or experimental designs, the addition of variables like motivation or self-regulation, and the testing of more varied samples could all be used in future research. Further research may evaluate the model's predictive performance beyond the observed sample by applying PLSpredict (Hair et al., 2020; Hair & Alamer, 2022). The connections discovered in this study could be explained by a number of reasons. These include students' prior economic knowledge, numeracy abilities, and personal financial management experience none of which were investigated in the current study. In order to better understand how much metacognition contributes to students' capacity to solve economic problems, future research might consider these aspects in addition to motivation, persistence, effort management, and task engagement.

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