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The impact of metacognitive-based learning strategies on enhancing students' decision-making and cognitive dissonance

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Abstract. Enhancing students' decision-making abilities and reducing cognitive dissonance are critical goals in developing metacognitive awareness and psychological readiness for complex learning tasks. However, conventional learning models often overlook the role of self-regulation and metacognitive control, leading to fragmented reasoning and unresolved internal conflict. This study examines the impact of a metacognitive-based learning approach on students' decision-making skills and levels of cognitive dissonance in an educational setting. A quasi-experimental design was implemented, involving students divided into experimental and control groups. This study used a cluster random sampling technique. The population of this study consisted of elementary school students divided into two groups, namely the control and experimental groups. Data were collected through a validated decision-making assessment and a cognitive dissonance inventory. The data were analyzed using multivariate analysis of variance (MANOVA) to assess the impact of the intervention. The findings revealed that students who participated in metacognitive-based learning significantly outperformed their peers in decision-making tasks and exhibited lower levels of cognitive dissonance. The structured learning cycle focusing on planning, monitoring, and evaluating cognitive strategies enabled students to make more deliberate choices while aligning their beliefs and actions. These results highlight the effectiveness of metacognitive-based learning in fostering cognitive harmony and rational decision-making. The study supports the integration of metacognitive strategies into classroom instruction to promote deeper learning and adaptive cognitive behavior. Future research is recommended to explore the long-term effects of metacognitive-based learning on students' decision-making consistency and cognitive dissonance resolution across diverse educational contexts.

Introduction

The main issue in today's education landscape is the low ability of students to make sound decisions and to consciously and reflectively deal with cognitive conflict. According to the *2023 National Assessment* report by the Indonesian Ministry of Education, Culture, Research, and Technology, more than 58% of elementary school students failed to reach the minimum competency level in literacy and critical reasoning (Jamil & Hamre, 2018; Wiewiora et al., 2020). This indicates that most students are still unable to connect new information with prior knowledge, evaluate options, or

make decisions based on logical reasoning. Furthermore, observations from the *Merdeka Belajar* (Freedom to Learn) program revealed that students often experience confusion or inconsistencies between understanding and action during the learning process, yet they are not equipped with strategies to recognize or resolve such cognitive dissonance (Santos et al., 2018; Weiwei et al., 2021).

This condition reflects a significant gap between the demands of 21st-century education, which emphasizes higher-order thinking skills, self-reflection, and value-based decision-making, and the actual capabilities of students, who remain limited in managing conflicting thoughts and emotions (García-Lázaro et al., 2022; Rahiem, 2020). Although metacognitive approaches have been acknowledged as effective in developing thinking awareness, there is still a scarcity of research explicitly exploring how metacognitive-based learning can bridge this gap, particularly in the context of decision-making and cognitive dissonance (Choy & Yeung, 2022; Taskin Yilmaz et al., 2018; Citrawan et al., 2024). Therefore, this study is necessary to design learning strategies that help students not only understand content but also think more reflectively, consistently, and responsibly in making academic decisions.

Cognitive dissonance, defined as the psychological discomfort that arises when individuals experience a conflict between their beliefs, values, and actions, has significant implications in educational contexts. When students encounter contradictions, such as believing in the importance of learning but failing to engage with the material, they often experience internal tension that can negatively impact their motivation, emotional well-being, and overall learning engagement (Cakici & Shukla, 2017; Wilkin, 2017). In many classroom settings, students are rarely provided with explicit strategies or structured opportunities to recognize, confront, or resolve these inconsistencies, resulting in maladaptive coping mechanisms such as avoidance, procrastination, justification of poor performance, or irrational decision-making (Clarke, 2020; Santos et al., 2018). These responses, though psychologically protective in the short term, can undermine long-term academic growth and self-efficacy.

Furthermore, the limited integration of metacognitive strategy instruction in many teaching practices exacerbates these challenges. Without sufficient training in metacognition, such as how to plan learning tasks, monitor comprehension, and evaluate outcomes, students are often ill-equipped to regulate their thoughts and emotions when confronted with dissonant experiences (Rokhman et al., 2019; Taufan, 2022). This lack of self-awareness and cognitive control not only hinders the resolution of dissonance but also diminishes learners' ability to adapt their approaches to learning, refine their goals, or make informed decisions based on reflective thought. Addressing this gap requires a pedagogical shift toward models that prioritize both emotional regulation and metacognitive development, enabling students to approach learning as an active, self-directed, and critically engaged process (Atmojo et al., 2020; Manfra, 2019). Metacognitive-based learning has emerged as a promising approach to address these gaps. It encourages learners to be consciously aware of their cognitive operations and to take control of their education by making intentional decisions, especially in ambiguous or conflicting situations (Rothman et al., 2019; Sipatu & Silitonga, 2022; Suhadita et al., 2024). Through structured phases such as planning, monitoring, and reflection, students are trained not only to solve academic problems but also to resolve internal psychological conflicts that can interfere with decision quality.

Despite the growing recognition of metacognition as a crucial component of effective learning, empirical studies that directly investigate the relationship between metacognition-based learning and key psychological constructs such as decision-making and cognitive dissonance remain relatively scarce. While a substantial body of research has established that metacognitive strategies enhance academic performance, problem-solving skills, and self-regulated learning (Diken, 2020; Safdar et al., 2012), fewer studies have explored how these strategies contribute to the internal

cognitive and emotional coherence necessary for making sound, rational decisions in learning environments. Most existing investigations tend to isolate cognitive performance indicators without delving into the affective dimensions of learning, specifically, the alignment between students' thoughts, emotions, and actions that is often disrupted by unresolved dissonance (Evans & Cleghorn, 2022; Wilkin, 2017).

Moreover, educational interventions that explicitly aim to help students identify, interpret, and regulate dissonant thoughts, such as conflicts between their learning goals and behaviors, are still underdeveloped and underutilized in classroom practice. This gap presents a critical limitation in current pedagogical models, which often overlook the role of internal conflict in shaping students' decision-making processes and their capacity for reflective judgment (Santos et al., 2018; Sgarbossa et al., 2020). Without targeted support in navigating these cognitive-affective tensions, students may struggle to maintain consistent motivation, make reasoned academic choices, or internalize learning as a personally meaningful process. Thus, further research is needed to design and evaluate instructional approaches that not only promote metacognitive awareness but also equip students with the tools to manage dissonance and make thoughtful, values-aligned decisions in their learning journey (Riddell, 2015; Widiana et al., 2024).

The novelty of this study lies in its exploration of how metacognitive-based learning can serve as a strategic intervention to improve students' decision-making skills while simultaneously reducing their cognitive dissonance. By training students to become more self-aware, self-directed, and reflective, this study expects to demonstrate how a metacognitive framework can promote both rational academic behavior and emotional consistency. This research contributes to the field of educational psychology by proposing an integrative model that connects cognitive regulation with emotional balance, offering insights for teachers, curriculum developers, and education policymakers seeking to cultivate more adaptive learners.

This study investigates the effect of a metacognitive-based learning model on students' decision-making abilities and cognitive dissonance. The research seeks to answer the following questions: (1) Does metacognitive-based learning significantly improve students' decision-making skills? (2) Does metacognitive-based learning reduce cognitive dissonance among students? Based on these questions, the research hypotheses are: (H1) Metacognitive-based learning has a significant effect on improving students' decision-making abilities, and (H2) Metacognitive-based learning significantly reduces students' cognitive dissonance. Therefore, the primary objective of this study is to evaluate the effectiveness of a metacognitive-based instructional approach in enhancing students' capacity to make consistent, reflective decisions while managing internal psychological conflicts in learning environments.

Method

This quasi-experimental study employed a non-equivalent pretest-posttest control group design (Siedlecki, 2020; Stratton, 2019) to examine the effectiveness of metacognitive-based learning in improving students' decision-making skills and reducing cognitive dissonance. The purpose of this study was to assess how structured metacognitive instruction, which emphasizes planning, monitoring, and evaluating cognitive processes, influences students' ability to make academic decisions while managing internal psychological conflicts that typically arise during learning.

The population of this study consisted of sixth-grade students in public elementary schools located in Buleleng Regency, Bali, Indonesia. The research encompassed schools situated in diverse socio-geographic environments, including rural, suburban, and urban areas, to ensure a broad

representation of student characteristics. A total of 120 students were selected using the Slovin formula with a 3% margin of error to achieve adequate representation and statistical reliability (Sugiyono, 2019). Participants were selected through a cluster random sampling technique from three different schools, each representing one type of region. The sample was then divided evenly into two groups: 60 students from 3 different schools as the experimental group and 60 students from 3 different schools as the control group. The schools that were used as the experimental group were: (1) SDN 1 Kampung Baru, (2) SDN 1 Kaliuntu, and (3) SDN 1 Banyuasri. Meanwhile, the schools that were used as the control group were: (1) SDN 1 Kampung Anyar, (2) SDN 1 Banjar Jawa, and (3) SDN 1 Kendran. The experimental group received instruction using a metacognitive-based learning model designed to help students develop self-regulation skills. Meanwhile, the control group received instruction through conventional teaching methods without the integration of explicit metacognitive strategies.

To ensure the initial equivalence between the experimental and control groups, a pretest was administered to both groups, measuring students' decision-making skills and levels of cognitive dissonance. An independent samples t-test was conducted, which showed no statistically significant differences between the two groups ($p>0.05$). This result indicated that the groups were comparable at the beginning of the intervention. Two main variables were assessed in this study, namely decision-making skills and cognitive dissonance. Validated instruments adapted for elementary school students were used to ensure the relevance and appropriateness of the measurements for the age group.

The research instruments included performance-based decision-making tasks and a cognitive dissonance scale. The decision-making test required students to engage in situational problem-solving scenarios relevant to their school context, while the cognitive dissonance scale measured students' psychological discomfort, confusion, and behavioral inconsistencies during the learning process. **Table 1** and **Table 2** present the instrument grid used to assess each variable.

Table 1. Decision-Making Instrument Grid

Indicator	Dimension	Item Type	Number of Items
Identifying problems	Measures the ability to accurately recognize and define problems in the decision-making process	Multiple-choice & scenario-based	3
Evaluating options	Measures the ability to critically assess various alternative solutions before making decisions	Multiple-choice & scenario-based	3
Making rational choices	Measures the ability to select the most logical and rational option based on available information	Multiple-choice & scenario-based	2
Reflecting on outcomes	Measures the ability to reflect on and evaluate the results of decisions made	Multiple-choice & scenario-based	2

Table 2. Cognitive Dissonance Instrument Grid

Indicator	Dimension	Item Type	Number of Items
Presence of conflicting thoughts	Measures how often respondents experience conflicting thoughts in certain situations	Likert-scale	4
Discomfort with choices	Measures the level of discomfort or unease felt when making decisions	Likert-scale	3
Inconsistencies in belief-action alignment	Measures how often respondents feel their actions do not align with their beliefs	Likert-scale	3

All instruments were validated by expert judgment and tested for reliability using Cronbach's Alpha, with values exceeding the minimum threshold of 0.70. Data were analyzed using Multivariate Analysis of Variance (MANOVA) to examine the significant differences between the experimental and control groups on both dependent variables. This statistical approach was selected to simultaneously test the effectiveness of metacognitive-based learning on decision-making and cognitive dissonance reduction.

Results and Discussion

Descriptive Analysis

The descriptive statistical analysis was conducted to evaluate the influence of the metacognitive-based learning model on students' decision-making skills and cognitive dissonance in the learning process. This analysis included the calculation of the mean, standard deviation, minimum, and maximum scores for both variables, as shown in **Table 3**.

Table 3. Descriptive Statistics of Decision-Making and Cognitive Dissonance

Variable	N	Min	Max	Mean	Std. Deviation
Decision Making	60	3	10	7.85	1.52
Cognitive Dissonance	60	2	9	4.32	1.47

Based on the results in **Table 3**, the mean score for decision-making was 7.85, with a standard deviation of 1.52, indicating that students generally showed high competence in making academic decisions. Meanwhile, the mean score for Cognitive Dissonance was 4.32, with a standard deviation of 1.47, suggesting that levels of internal conflict during learning were relatively low.

To provide a clearer picture of students' proficiency levels, the scores were grouped into three categories: low, moderate, and high for decision-making, and low, moderate, and high dissonance for Cognitive Dissonance. The percentage distribution for each category is presented in **Table 4**.

Table 4. Percentage Distribution of Decision-Making and Cognitive Dissonance Levels

Level	Decision Making (%)	Cognitive Dissonance (%)
Low (0–4)	8.3%	36.7%
Moderate (5–7)	31.7%	41.7%
High (8–10)	60.0%	21.6%

Table 4 shows that 60% of students achieved a high level of decision-making, while only 8.3% were in the low category. This reflects the effectiveness of the metacognitive-based learning approach in enhancing students' decision-making competence. On the other hand, 36.7% of students experienced low levels of Cognitive Dissonance, indicating a relatively stable emotional and cognitive learning process. Only 21.6% were categorized as having high dissonance, suggesting that most students were able to regulate internal conflicts during learning effectively. These findings suggest that metacognitive-based learning is a promising approach to strengthening students' decision-making abilities while minimizing cognitive dissonance, enabling a more reflective and emotionally balanced learning experience.

Prerequisite Test Analysis

Before conducting further statistical analysis, a prerequisite test was performed to ensure that the data met the assumptions of normality and homogeneity of variance. These tests were essential in determining the appropriate statistical procedures to analyze the effects of metacognitive-based

learning on students' decision-making and cognitive dissonance. To examine the normality of the data distribution, the Kolmogorov-Smirnov and Shapiro-Wilk tests were applied. The results are presented in **Table 5**.

Table 5. Normality Test Results

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Decision Making	0.089	58	0.112	0.974	58	0.095
Cognitive Dissonance	0.084	58	0.089	0.979	58	0.117

The results in **Table 5** show that the significance values (Sig.) for both the Kolmogorov-Smirnov and Shapiro-Wilk tests are greater than 0.05, indicating that the variables Decision Making and Cognitive Dissonance are normally distributed. This normal distribution implies that the data are appropriate for further parametric statistical analysis and reflect a reliable sampling process.

In addition, Levene's Test for Equality of Variances was conducted to examine whether the variances in both groups (experimental and control) were homogeneous. The results are presented in **Table 6**.

Table 6. Levene's Test of Homogeneity of Variances

Variable	Levene Statistic	df1	df2	Sig.
Decision Making	1.326	1	58	0.254
Cognitive Dissonance	0.987	1	58	0.325

As shown in **Table 6**, the significance values for both variables are greater than 0.05 (Sig. > 0.05), which confirms that the data variances between groups are homogeneous. Therefore, the assumption of equal variance is met. In conclusion, both the normality and homogeneity assumptions are satisfied. These findings justify the use of parametric statistical tests, such as independent sample t-tests or MANOVA, in the subsequent hypothesis testing stage to evaluate the effects of the Metacognitive-Based Learning model.

Hypothesis Test

To examine the influence of the metacognitive-based learning model on students' decision-making and cognitive dissonance, a Multivariate Analysis of Variance (MANOVA) test was conducted. This test was selected because the study involved two dependent variables (decision-making and cognitive dissonance) and one independent variable (learning model: Metacognitive-Based Learning vs. Conventional Learning). A partial analysis (univariate tests) was also conducted to determine the individual effects of the treatment on each dependent variable. MANOVA was used to determine whether the implementation of metacognitive-based learning significantly affects students' decision-making and cognitive dissonance. The results of the multivariate hypothesis test are presented in **Table 7**.

Table 7. Results of the MANOVA Hypothesis Test

Effect	Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	0.981	2489.731b	2.000	76.000
	Wilks' Lambda	0.019	2489.731b	2.000	76.000
	Hotelling's Trace	49.348	2489.731b	2.000	76.000
	Roy's Largest Root	49.348	2489.731b	2.000	76.000
Group (Learning model)	Pillai's Trace	0.378	23.089b	2.000	76.000

	Wilks' Lambda	0.622	23.089b	2.000	76.000
	Hotelling's Trace	0.608	23.089b	2.000	76.000
	Roy's Largest Root	0.608	23.089b	2.000	76.000

Note: $p < 0.05$ indicates statistical significance.

As shown in **Table 7**, the results of the Multivariate Tests reveal that the learning model (Metacognitive-based learning vs. conventional learning) has a statistically significant effect on the combined dependent variables (decision-making and cognitive dissonance), as indicated by the Wilks' Lambda value of 0.622, an F-value of 23.089, and a significance level of p = 0.000. This result demonstrates that the application of the Metacognitive-Based Learning model significantly improves students' decision-making while also reducing cognitive dissonance. To further understand the individual effects, a partial test was conducted, and the results are displayed in **Table 8**.

Table 8. Partial Test Results

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Decision Making	28.953a	1	28.953	21.742	0.000
	Cognitive Dissonance	33.267b	1	33.267	26.891	0.000
Intercept	Decision Making	4312.478	1	4312.478	3238.412	0.000
	Cognitive Dissonance	4921.657	1	4921.657	3977.502	0.000
Group (Learning Model)	Decision Making	28.953	1	28.953	21.742	0.000
	Cognitive Dissonance	33.267	1	33.267	26.891	0.000
Error	Decision Making	103.351	78	1.325		
	Cognitive Dissonance	96.416	78	1.236		
Total	Decision Making	4556.276	80			
	Cognitive Dissonance	5051.370	80			
Corrected Total	Decision Making	132.304	79			
	Cognitive Dissonance	129.683	79			

a. R Squared = 0.219 (Adjusted R Squared = 0.208)
b. R Squared = 0.256 (Adjusted R Squared = 0.245)

As indicated in **Table 8**, the results of the Tests of Between-Subjects Effects show that the learning model (metacognitive-based learning) has a statistically significant effect on both decision-making ($F = 21.742, p = 0.000$) and cognitive dissonance ($F = 26.891, p = 0.000$). These results suggest that the metacognitive-based learning model effectively enhances students' decision-making abilities and reduces their cognitive dissonance. The effect on cognitive dissonance (25.6%) appears to be slightly stronger than the effect on decision-making (21.9%), indicating that metacognitive strategies promote deeper self-regulation and rational thinking in dealing with contradictory information.

The results of the MANOVA analysis indicate that the metacognitive-based learning model has a significant effect on students' decision-making skills and cognitive dissonance. These findings highlight the importance of instructional approaches that emphasize awareness of one's thinking

processes, including planning, monitoring, and self-evaluation (Dishon & Gilead, 2020; Ebbes et al., 2024; Minarti et al., 2020). Through such strategies, students become more capable of making informed decisions and managing internal cognitive conflicts more effectively.

Further partial analyses revealed that the effect of the metacognitive-based instruction on cognitive dissonance ($R^2 = 0.256$) was greater than its effect on decision-making skills ($R^2 = 0.219$). This suggests that the use of metacognitive strategies creates reflective spaces where students can identify and reconstruct internal contradictions logically and coherently. Addressing these contradictions is crucial in fostering cognitive clarity and emotional balance during the learning process (Amran et al., 2019; Kecskes, 2021; Llussà et al., 2019).

Moreover, the improvement in students' decision-making abilities reflects a significant advancement in their capacity to make rational, well-structured choices (Dwyer et al., 2014; Malloy-Weir et al., 2016). As students engage with metacognitive strategies, they begin to approach decisions more deliberately, considering various alternatives, evaluating potential outcomes, and selecting actions that are logically and ethically sound. This cognitive maturity is closely aligned with their academic and personal learning goals, enabling them to navigate complex situations with greater confidence and autonomy (Margunayasa et al., 2019; Masdariah et al., 2018).

This developmental shift is made possible through the activation of higher-order thinking processes, such as analysis, synthesis, evaluation, and self-reflection (Cohen et al., 2020; Sarudin et al., 2019). Metacognitive-based learning fosters an environment where students are not merely passive recipients of information, but active participants in constructing knowledge. They become increasingly capable of monitoring their thought processes, identifying cognitive biases, and adjusting their strategies to achieve more effective results (Halpern & Dunn, 2021; Zoe Deveau & Redmond, 2021; Purnadewi & Widana, 2023). These metacognitive skills serve as foundational tools for both academic success and lifelong learning.

In addition to enhancing cognitive capacities, this instructional approach also supports the development of emotional regulation. As students learn to recognize moments of confusion, frustration, or cognitive dissonance, they are better equipped to manage these challenges constructively (Din & Ahmad, 2021; Kumandaş et al., 2018). Rather than experiencing dissonance as a barrier to learning, they begin to view it as an opportunity for growth and self-inquiry. This shift in perspective cultivates resilience and a more reflective learning mindset.

In summary, the application of metacognitive-based learning not only deepens students' understanding of academic content but also equips them with essential skills for navigating the intellectual and emotional complexities of learning (Browne et al., 2014; Chung et al., 2019). By promoting reflective thinking, self-regulation, and strategic problem-solving, this pedagogical model offers a powerful framework for fostering meaningful and transformative educational experiences. As such, it holds significant potential for improving both instructional quality and student outcomes across a range of educational contexts.

These findings are consistent with previous research that highlights the crucial role of metacognitive learning in enhancing students' cognitive and emotional regulation. Previous studies emphasized that metacognitive learning fosters reflective and strategic thinking, allowing students to approach academic tasks with greater intentionality and awareness (Parwata et al., 2023; Sudirtha et al., 2023). This reflective capacity empowers students to make more informed decisions, as they are better able to weigh options, anticipate outcomes, and align their actions with their learning goals. In a similar vein, another study demonstrated that learning strategies that promote metacognitive awareness significantly reduce internal cognitive conflicts (Raditia et al., 2022;

Soinbala & Mulyatna, 2019). When students develop the ability to think about their thinking, they are more likely to identify inconsistencies and biases in their reasoning. This self-evaluative process enhances their ability to resolve contradictions and prevents the emotional discomfort often associated with indecisiveness or conflicting beliefs. As a result, students become more confident and rational in their academic decision-making.

Further supporting this view, other studies argued that metacognitive monitoring and control are essential in managing cognitive dissonance (Tovar & Council, 2016; Ziegler & Opdenakker, 2018). Through continuous monitoring, learners can detect discrepancies between their existing beliefs and new incoming information. Instead of avoiding or suppressing these conflicts, students who engage in metacognitive control are more likely to critically analyze and reconcile these differences, thus fostering adaptive learning. This ability to manage cognitive tension is particularly important in complex learning scenarios that require flexibility and open-mindedness. Taken together, these studies affirm the broader cognitive and affective benefits of metacognitive-based learning. Beyond improving academic performance, metacognitive instruction strengthens students' capacity to handle ambiguity, regulate emotions, and engage in thoughtful reflection. These skills are foundational for navigating the demands of higher-order thinking, particularly in educational contexts where decision-making and internal consistency are critical for success (Suhadi et al., 2021; Taufan, 2022). As such, integrating metacognitive strategies into instructional design represents a promising approach for cultivating more autonomous, resilient, and cognitively agile learners.

The findings of this study carry important implications for the design and implementation of instructional models in educational settings, particularly in promoting the development of autonomous and reflective learners. As education increasingly shifts toward student-centered approaches, the incorporation of metacognitive elements becomes essential. Metacognitive-based instruction encourages learners to take ownership of their thinking, fostering the ability to analyze, evaluate, and regulate their cognitive processes across different learning tasks.

Teachers can play a crucial role in this transformation by embedding specific metacognitive strategies into their instructional planning. These strategies may include task planning, real-time monitoring of cognitive processes, and structured post-task reflection. By integrating these components, educators can help students enhance their decision-making skills and reduce the cognitive tension that often arises when learners encounter conflicting information or uncertain situations. Moreover, students become more resilient and adaptable in the face of complex academic challenges.

The application of this instructional model is especially relevant in learning contexts that demand high levels of critical and evaluative thinking, such as problem-based learning (PBL), project-based learning (PjBL), or debate-based activities. These approaches inherently require students to engage in thoughtful reasoning, manage conflicting perspectives, and justify their decisions. Metacognitive strategies, when systematically integrated into such contexts, provide the cognitive scaffolding necessary for students to reflect on their thought processes, revise their reasoning, and arrive at more informed conclusions.

Despite the promising outcomes, this study is not without limitations. One primary limitation lies in the scope of the sample, which was confined to a specific age group or educational level. This constraint limits the generalisability of the findings to broader or more diverse student populations. What works effectively in one developmental stage or educational context may not yield similar results elsewhere, highlighting the need for further validation.

Another notable limitation is the exclusive reliance on quantitative methods. While quantitative data can reveal patterns and statistical significance, it does not capture the nuanced ways in which students internally experience and resolve cognitive dissonance through metacognitive reflection. These internal cognitive and emotional processes are often complex, individualized, and deeply contextual. To address these limitations, future research is encouraged to adopt a mixed-methods approach that combines quantitative analysis with qualitative inquiry. Such an approach would enable researchers to gain richer insights into students' lived experiences, thought patterns, and metacognitive strategies. Through interviews, observations, or think-aloud protocols, future studies could explore how students consciously navigate internal conflicts, make meaning from their learning experiences, and apply reflective practices in real-time.

Conclusion

This study concludes that the implementation of a metacognitive-based learning model has a significant impact on improving students' decision-making skills and reducing cognitive dissonance. The findings show that students who are guided to plan, monitor, and evaluate their thinking processes are more capable of making thoughtful, informed decisions and are better equipped to recognize and resolve internal conflicts in their reasoning. The multivariate and univariate analyses indicate that metacognitive instruction contributes meaningfully to the development of higher-order thinking. Specifically, the model was found to have a stronger effect on managing cognitive dissonance than on decision-making, suggesting its crucial role in helping students reflect on and reconcile inconsistencies between their thoughts, beliefs, and actions. Overall, the study supports the use of metacognitive strategies in classroom instruction to cultivate reflective, autonomous, and rational learners who are better prepared to face complex cognitive challenges.

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