

## METACOGNITIVE REGULATION PROFILES AND ITS POTENTIAL IN DEALING WITH COMPLEX ISSUE

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### ABSTRACT

In facing increasingly complex global challenges, metacognitive regulation skills are very important. Metacognitive regulation helps a person in solving the problems they face comprehensively because they can regulate their thinking strategies. This study uses a descriptive approach and uses the MAI (Metacognitive Awareness Inventory) instrument adapted from Schraw and Dennison's work. The researcher involved 37 tenth-grade students from a high school in West Java. The study aimed to map and classify metacognitive regulation skills, with special attention to five main aspects and its potential in dealing with complex issue. Data analysis integrated the Likert scale results with the calculation of the average percentage for each aspect. The research findings revealed varied metacognitive regulation achievements: the Planning aspect reached 81%, Information Management Strategies 73%, Comprehension Monitoring 75%, Debugging Strategy 60%, and Evaluation 76% of the maximum score of 100%. This data indicates that students' metacognitive regulation skills still need development. The study results highlight the importance of developing learning steps that are specifically designed to improve students' metacognitive regulation skills, so that they are better prepared to face complex issues in learning.

**Keywords:** Profile students, Metacognitive regulation, Complex issue, Learning.

### INTRODUCTION

As the next generation, students must always be equipped with the necessary skills to address problems, such as problem-solving abilities. This is particularly important for issues that require in-depth analysis, such as

complex problems that span across multiple disciplines. One of the factors influencing problem-solving abilities is metacognitive regulation. A person's success in solving problems depends on their ability to regulate their thinking skills effectively during the problem-solving process (Roslina, 2017). Studies have shown a positive correlation between metacognitive regulation and problem-solving skills. Metacognitive regulation plays a critical role in addressing complex problems in learning by enabling students to monitor, control, and adjust their cognitive processes (Jeronen et al., 2016; Panchu et al., 2016; Tanner, 2012). This approach fosters deeper understanding and engagement, leading to more effective solutions.

Schraw (1994) stated that cognitive regulation within the scope of metacognition refers to a set of activities that help individuals control their learning processes. The application of metacognitive regulation in decision-making processes demonstrates its potential to overcome emerging challenges. However, many students exhibit inadequate metacognitive regulation skills, which may hinder their learning outcomes. Several studies have indicated that students' metacognitive regulation remains suboptimal. Students generally do not engage deeply with their metacognitive processes (Backer et al., 2011). Research conducted by Heswandi (2013) revealed that students still struggle to master effective learning strategies. They are not yet accustomed to connecting prior knowledge with new information, planning their learning, or evaluating their understanding. Consequently, their academic performance tends to be low. Similar findings were reported by Wicaksono (2013), who stated that students' metacognitive regulation is still underdeveloped. Based on the explanations provided, the researcher is interested in examining the condition of students' metacognitive regulation and its potential in addressing complex issues or problems.

## **METHODS**

This study use a descriptive research method. According to Rukajat (2018), descriptive research aims to portray phenomena realistically, factually, and contemporarily. It involves the creation of descriptions, illustrations, or depictions in a systematic, factual, and accurate manner regarding facts, characteristics, and relationships among the studied phenomena. This method is suitable for understanding the condition of students' metacognitive regulation and its potential in solving complex problems. The study population consisted of all 10th-grade high school students at a school in West Java. The sample used in this study comprised 37 participants selected using simple random sampling. The sampling process aimed to collect comprehensive information on metacognitive regulation within the target student population. Data collection in this study utilized the Metacognitive Awareness Inventory (MAI) questionnaire developed by

Schraw & Dennison, which is based on a Likert scale. This scale provides a structured framework for students to express their perspectives on metacognitive regulation. The questionnaire enables the systematic collection of responses for analyzing various domains of metacognitive regulation among students. The questionnaire is divided into five domains, as outlined in Table 1.

**Table 1.** Domains of Metacognitive Regulation

<i>Domains of Metacognitive Regulation</i>	<i>Operational Description</i>	<i>Number of Statements</i>
Planning	Planning, goal setting, and allocating resources prior to learning	7
Information management strategy	Skills and strategy sequences used to process information more efficiently (e.g., organizing, elaborating, summarizing, selective focusing)	10
Comprehension monitoring	Assessment of one's learning or strategy use	7
Debugging strategy	Strategies to correct comprehension and performance errors	5
Evaluation	Analysis of performance and strategy effectiveness after a learning episode	6

(Schraw & Dennison, 1994)

Table 1 presents the questionnaire items used to assess each of the domains. The metacognitive regulation domains consist of (1) Planning, (2) Information management strategies, (3) Comprehension monitoring, (4) Debugging strategies, and (5) Evaluation, comprising a total of 35 statements. The questionnaire was administered via Google Forms, containing the 35 statements with a 5-point Likert scale ranging from Strongly Disagree to Strongly Agree. Table 2 shows the alternative scoring options.

**Table 2.** Likert scale for assessment

<i>Alternative Answer</i>	<i>Score</i>
Very Agree	5
Agree	4
Undecided	3
Disagree	2
Very Disagree	1

(Riduwan, 2015)

Then, the percentage value of each statement item is determined using the following formula (Purwanto, 2002):

$$N = \frac{R}{SM} \times 100\% \quad (1)$$

Description:

N = Value

R = The raw score obtained by the teacher

SM = Ideal maximum score

Subsequently, the scores obtained are converted into percentages and categorized into metacognitive regulation domains, as shown in Table 3.

**Table 3.** Interpretasi Nilai

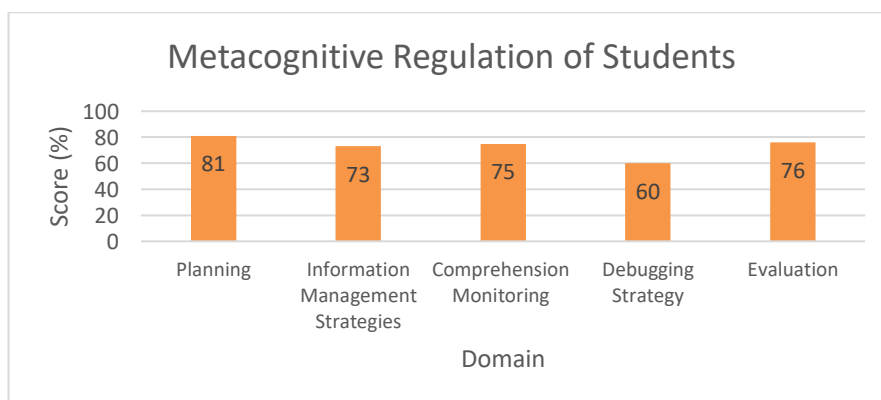
Value interval (%)	Interpretation
81 - 100	Very Good
61 - 80	Good
41 - 60	Enough
21 - 40	Less
0 - 20	Very Less

(Riduwan, 2015)

The use of the Likert scale provides a consistent framework for measuring respondents' attitudes, while the random sampling method ensures a representative sample of tenth-grade students. Furthermore, the systematic classification of data into predefined categories facilitates a comprehensive analysis of metacognitive regulation.

## RESULTS AND DISCUSSION

After the MAI questionnaire was distributed and completed by the students, the condition of students' metacognitive regulation, comprising five domains, was obtained as shown in Figure 1.



**Figure 1.** Metacognitive Regulation of Students

The results were classified based on each domain of metacognitive regulation, with the Planning domain scoring 81%, Information Management Strategies 73%, Comprehension Monitoring 75%, Debugging Strategy 60%, and Evaluation 75%. The Planning domain showed the highest score among the four other domains at 81%. Based on Table 3, the Planning domain falls into the "Very Good" category. This indicates that students are capable of setting goals, selecting strategies, and allocating resources effectively (Cera et al., 2013; Jesus, 2021). According to Schraw and Dennison, the Planning domain in metacognitive regulation is fundamentally related to complex issues through the individual's ability to construct systematic and strategic approaches. In solving complex problems, planning initiates goal-directed behaviors and enhances the quality of interactions within the problem-solving process (Zhang et al., 2024). Planning enables individuals to transform complexity into manageable cognitive structures by anticipating, identifying resources, and designing adaptive problem-solving strategies. When faced with complex problems, the Planning domain acts as a cognitive mechanism that helps individuals conduct in-depth analysis, map relationships among problem components, and develop systematic approaches. This process involves breaking down intricate issues into simpler components, considering various scenarios, and designing potential interventions.

The Information Management Strategies domain scored 73%, which falls into the "Good" category. This indicates that students are able to select, organize, and synthesize information from various sources in a systematic and critical manner. Effective metacognitive regulation through information management strategies leads to better problem-solving abilities. This is especially evident in collaborative and dynamic environments, where shared regulation and adaptability are key (Raes et al., 2016). According to Schraw and Dennison, the Information Management Strategies domain in metacognitive regulation is fundamentally linked to complex issues through mechanisms for capturing, processing, and transforming information strategically. When dealing with complex issues, information management strategies serve as cognitive mechanisms that help individuals filter relevant information, identify hidden patterns, and construct a comprehensive understanding. This process involves the ability to evaluate source credibility, integrate diverse perspectives, and generate accurate and in-depth cognitive representations of the issues at hand.

The Comprehension Monitoring domain scored 75%, which is categorized as "Good." This means students actively monitor their cognitive processes, identify gaps in understanding, and make strategic adjustments during the problem-solving process. Effective comprehension monitoring can significantly enhance problem-solving by allowing students to recognize when they do not understand a problem and adjust their approach accordingly (Noushad et al., 2024; Zargar et al., 2020). According to Schraw and Dennison, the Comprehension Monitoring domain in metacognitive regulation

is essential for addressing complex issues through continuous mechanisms for evaluating and constructing understanding. When dealing with complex issues, comprehension monitoring serves as a reflective mechanism that helps individuals develop deep metacognitive awareness. This process involves identifying inconsistencies, evaluating the accuracy of understanding, and making ongoing corrections to the frameworks used in addressing the issues.

The Debugging Strategy domain scored 60%, which falls into the "Fair" category. This indicates that students are not yet fully able to critically evaluate the strategies they have used, identify weaknesses in their approach, and design more effective corrective interventions. This strategy is crucial for identifying and correcting errors in understanding or problem-solving approaches (Sugiharto et al., 2017). According to Schraw and Dennison, the Debugging Strategies domain in metacognitive regulation is strategically linked to complex issues through cognitive mechanisms for correction, modification, and continuous improvement. Debugging strategies are critical in complex problem-solving as they allow individuals to adapt their cognitive tactics and strategies to the task at hand. This adaptability is crucial in domains where problems are ill-defined and require iterative refinement (Winne, 1996). When faced with complex issues, debugging strategies act as cognitive adaptation mechanisms that help individuals transform limitations or failures into learning opportunities. This process involves deep reflection, exploring alternative approaches, and constructing more comprehensive and innovative solutions.

The Evaluation domain scored 73%, which is categorized as "Good." This indicates that students are capable of critically assessing the entire cognitive process, analyzing the effectiveness of the strategies employed, and developing a deep understanding of the quality of problem resolution. According to Schraw and Dennison, the Evaluation domain in metacognitive regulation is fundamentally related to complex issues through systematic and reflective assessment mechanisms. Effective metacognitive regulation enables individuals to identify and correct errors, leading to better problem-solving outcomes (Jesus, 2021). When dealing with complex issues, evaluation serves as a metacognitive mechanism that helps individuals construct comprehensive meaning from their thinking processes and outcomes. This process involves identifying strengths and weaknesses of the approaches used, considering the consequences of chosen strategies, and generating reflective insights that facilitate intellectual capacity development.

## **CONCLUSION**

The condition of students' metacognitive regulation shows variation across each domain. The Planning aspect reached 81%, Information Management Strategies 73%, Comprehension Monitoring 75%, Debugging Strategy 60%, and Evaluation 76% of the maximum score of 100%. This data

indicates that students' metacognitive regulation skills still require further development. Furthermore, metacognitive regulation holds significant potential in aiding the resolution of complex issues or problems. Nevertheless, the study results underscore the importance of developing targeted learning strategies specifically designed to enhance students' metacognitive regulation skills, equipping them to better address complex challenges in learning.

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