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An Exploration of The Relationship Pattern Between Metacognitive Awareness and Academic Achievement Among Vocational Students

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Abstract

Metacognitive awareness has been widely identified as a significant predictor of academic success; however, its relationship with academic achievement in English for Business and Professional Communication (EPBC) programs within Indonesian vocational higher education remains empirically underexplored. This study examined the association between regulation of cognition (RoC), the operational component of metacognitive awareness, and students' academic achievement as measured by Grade Point Average (GPA). A quantitative research design was employed involving 44 students enrolled in an EBPC program. The RoC subscale of the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison was administered as the primary instrument, with data analyzed using Fisher's Exact Test via SPSS. Descriptive findings revealed that although the majority of participants (54.5%) were classified under the High RoC category, a substantial proportion (77.3%) simultaneously fell within the Low GPA category. Cross-tabulation analysis uncovered a paradoxical pattern whereby students with High RoC demonstrated a lower proportion of High GPA attainment (16.7%) compared to their Low RoC counterparts (30.0%). Fisher's Exact Test yielded a significance value of $p = .472$, indicating no statistically significant association between RoC and GPA categories at $\alpha = .05$. These findings suggest that metacognitive regulatory awareness does not automatically translate into academic achievement within the EBPC context, interpreted through the lens of the declarative-procedural knowledge gap, program-specific competency demands, and the potential mediating role of academic self-efficacy and motivational orientation. The study recommends integrating systematic instructional scaffolding into curriculum design to bridge students' metacognitive awareness and its effective application in complex academic tasks.

1. INTRODUCTION

Understanding the metacognitive awareness of students constitutes a critical starting point for educators who seek to design relevant and responsive curricula, as such awareness directly shapes the strategies learners employ to monitor and regulate their own cognitive processes. Students who demonstrate stronger metacognitive skills are consistently expected to achieve better academic outcomes [1]. When educators are equipped with data about how their students think, plan, and self-regulate their learning, they are better positioned to tailor instructional strategies and course content to meet genuine learner needs. This is

particularly significant in the context of the English for Business and Professional Communication study program, where students are expected not only to acquire linguistic competence but also to develop the self-directed, strategic learning capacities required in professional settings [2]. Despite the documented importance of metacognition in academic achievement, English course syllabi, especially in assessment design, have not consistently provided sufficient space for teachers to align metacognitive development with language skill instruction. Addressing this gap requires a clearer empirical understanding of how metacognitive awareness functions within this specific learner population.

Metacognition, a concept first introduced by Flavell (1979) [3], refers to an individual's knowledge and awareness of their own cognitive processes and the ability to reflect on and regulate those processes. Flavell distinguished two core components; metacognitive knowledge and metacognitive awareness. First, metacognitive knowledge is what learners know about cognition in general and about their own cognitive tendencies. And metacognitive experience is the conscious cognitive and affective encounters that accompany intellectual activity. Building on this foundation, subsequent scholars, most notably Nelson [4] and Zimmerman (2000) [5], elaborated the regulatory dimension of metacognition into three interrelated processes: planning, which involves selecting appropriate strategies before engaging a cognitive task; monitoring, which involves tracking one's progress and evaluating comprehension during the task; and evaluating, which involves reflecting on the outcomes and the effectiveness of the strategies employed after task completion. These processes are not passive; they actively shape how learners engage with academic challenges. Critically, these regulatory processes operate within the broader framework of Self-Regulated Learning (SRL), an account developed most systematically by Zimmerman (2000) and Pintrich (2000), which positions the learner as an agent who actively sets goals, monitors progress, and adapts strategies in pursuit of those goals [6]. Metacognition, in this framework, functions as the cognitive engine that drives self-regulation.

A substantial and growing body of empirical research supports the view that metacognitive awareness is among the strongest predictors of academic success. Within language learning contexts where learners must manage complex cognitive processes across interconnected skills such as reading, writing, and listening, metacognitive regulation has been shown to play a particularly decisive role. For instance, Khiat and Vogel [7] found that structured support for self-regulated learning significantly enhanced students' motivation and metacognitive reflection in online higher education contexts, indicating that learners benefit when guided to consciously plan and evaluate their learning processes. Likewise, Normawati et al. [8] reported that self-regulated learning strongly mediated the relationship between students' perceptions of teaching quality and their academic engagement, suggesting that even supportive instruction becomes more effective when students actively regulate their own learning. The importance of metacognition becomes even more evident in learner-centered and professional education environments. Gupta et al. [9], in a scoping review of undergraduate dental education, concluded that self-regulated learning and self-directed learning are essential for developing learner agency and preparing students to become independent professionals capable of lifelong learning. Similarly, Zidi et al. [10] found that self-regulated learning significantly mediated the influence of teaching and social presence on students' cognitive development in vocational blended-learning contexts. These studies suggest that in applied disciplines where learners must integrate theory, practice, and professional judgment, metacognitive regulation becomes especially valuable. Through the interplay of planning, monitoring, and evaluation, learners are able to regulate their comprehension, organize ideas coherently, and adjust strategies flexibly in response to task demands. Such metacognitive engagement has been consistently shown to enhance learning outcomes, underscoring the centrality of cognitive self-regulation in effective language learning. These findings align with SRL theory's core proposition: that learners who actively regulate their own cognitive processes outperform those who engage with tasks passively [5]. Meanwhile, in the domain of reading, studies have consistently found a positive linear relationship between students' metacognitive awareness of reading strategies and their text comprehension abilities [11]. Strategic readers utilize metacognitive knowledge to stay in control of the reading process, maneuver their attention toward critical text features, and purposefully regulate their behaviors to understand a writer's intent [12]. Beyond reading, metacognitive regulation has been identified as a significant predictor of success in vocabulary learning, where a learner's capacity to plan, monitor, and evaluate their own efforts determines the depth of word acquisition [13]. In writing, metacognitive engagement, particularly the deliberate planning of organizational structure and the self-evaluation of textual quality, has been found not only to improve writing performance but also to enhance motivation and foster greater learner autonomy [14]. In listening comprehension, interventions that develop metacognitive awareness have demonstrated significantly superior effects compared to those focused on cognitive strategies alone, as they equip students with a systematic and self-directed approach to processing aural input [15].

The importance of metacognitive skills is especially pronounced in student-centered learning environments. Research comparing problem-based and project-based learning has found that contexts providing higher levels of student autonomy and ill-structured, authentic tasks are more effective at stimulating deep-level metacognitive self-regulation [16]. This pattern is similarly evident in remote learning settings, where the absence of direct teacher supervision demands a high degree of self-management; in such contexts, metacognitive strategies serve as a critical mediating mechanism between learners' dispositional orientations and their actual academic achievement [17]. It should be noted, however, that the relationship between metacognitive awareness and learning outcomes may not be uniform across all proficiency levels. Particularly in listening, lower-proficiency learners may require a sufficient level of comprehensible linguistic input before they can fully capitalize on metacognitive strategies, a consideration that has implications for how findings from the present study are interpreted and generalized [18].

Despite the extensive literature documenting the relationship between metacognitive awareness and academic achievement across general and language learning contexts, relatively little attention has been directed toward how this relationship manifests within vocational education settings, particularly in specialized programs such as English for Business and Professional Communication (EBPC) in Indonesian higher education. Unlike students in general academic programs, vocational students are typically engaged in hands-on, practice-oriented learning environments that emphasize the application of knowledge in authentic or simulated workplace contexts. This distinctive orientation may shape not only what students learn but also how they plan, monitor, and evaluate their learning processes. However, most established theories and empirical studies of metacognition have been developed within general academic contexts, with limited consideration of how these frameworks operate in vocational settings. As a result, the applicability of existing metacognitive models to vocational learners remains insufficiently examined. Students in the EBPC context face a unique combination of demands, requiring them to simultaneously develop language proficiency, disciplinary knowledge, and professional communicative competence. Whether and how metacognitive awareness contributes to academic achievement in this specific and underexplored context therefore represents an important empirical and theoretical question.

Accordingly, this study aims to examine the correlation between metacognitive awareness and academic achievement among EBPC students, and to characterize the pattern of that relationship as a basis for understanding students' learning behaviors and self-regulatory strategies. Beyond establishing a statistical association, the findings are intended to generate practically relevant insights for curriculum development, informing the design of learning activities that systematically support metacognitive growth in alignment with SRL principles. In doing so, this study seeks to bridge the gap between empirical research and instructional practice, contributing to efforts to improve learning effectiveness in professional English education at the tertiary level.

2. RESEARCH METHOD

This study employed a quantitative approach to examine the relationship between metacognitive awareness and academic achievement among vocational students. Data were collected through a structured questionnaire distributed to 44 respondents, all of whom were enrolled in an English for Business and Professional Communication (EBPC) vocational program. The relatively small sample size (N = 44) reflects the total population of students within the targeted cohort; therefore, this study employed a saturated sampling technique, in which all accessible members of the population were included as respondents. This approach ensures that the sample is representative of the specific vocational context under investigation, allowing for a more accurate depiction of metacognitive awareness within this program despite the limited number of participants.

The instrument used to measure metacognitive awareness was the Metacognitive Awareness Inventory (MAI) developed by Gregory Schraw and Rayne Sperling Dennison [14]. In this study, only the regulation of cognition component of the MAI was utilized. This component focuses on individuals' ability to manage and control their learning processes, including planning, monitoring, evaluating, debugging strategies, and information management. Academic achievement was represented by the students' Grade Point Average (GPA). The selection of the regulation of cognition component was based on its direct relevance to students' learning behaviors and performance outcomes. Regulation of cognition reflects how students actively control their learning strategies in real time, which is considered more closely related to academic performance compared to knowledge of cognition, which is more declarative in nature. Therefore, focusing on this component allows for a more targeted analysis of how metacognitive regulation contributes to academic achievement.

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). To identify the pattern of association between metacognitive awareness and academic achievement, Fisher's Exact Test was employed. This statistical method is particularly appropriate for small sample sizes and categorical data, as it provides an exact probability of the relationship between variables. In this study, Fisher's Exact Test was used not only to determine whether there was a statistically significant association between the categorized variables, but also to examine the distribution and emerging patterns across categories of metacognitive awareness and academic achievement. Through this analysis, the study aims to reveal distinct patterns of association between levels of metacognitive regulation and students' academic performance. In addition to inferential analysis, descriptive statistics were also conducted to provide a more detailed examination of students' responses across individual items within the regulation of cognition subscale. This analysis aimed to identify which specific aspects of metacognitive regulation—such as planning, monitoring, evaluating, debugging strategies, or information management, were more prominently demonstrated by the students and which areas remained relatively underdeveloped.

3. FINDINGS AND DISCUSSIONS

3.1 Descriptive Overview of RoC and GPA Categories

Table 1. Distribution of Students' GPA Category

GPA Category	N	%
High	10	22,7
Low	34	77.3
Total	**44**	**100**

Table 2. Distribution of Students' Regulation of Cognition Category

RoC Category	N	%
High	24	54,5
Low	20	45,5
Total	**44**	**100**

**RoC = Regulation of Cognition*
**GPA = Grade Point Avarage*

Prior to examining the pattern of association between the two categorical variables, a descriptive overview of their distribution is warranted. Of the 44 participants enrolled in this study, 34 students (77.3%) were classified under the Low GPA category, while the remaining 10 students (22.7%) fell within the High GPA category. With respect to the Regulation of Cognition (RoC) dimension of metacognitive awareness, 20 students (45.5%) were categorized as demonstrating Low RoC, and 24 students (54.5%) were categorized as demonstrating High RoC. This distribution indicates that while the majority of participants exhibited relatively stronger metacognitive regulatory capacity, academic achievement, as reflected through GPA, remained predominantly concentrated in the lower category. Such a skewed distribution of GPA warrants careful interpretive attention in the subsequent analysis of cross-categorical patterns.

3.2 Cross-Categorical Distribution of RoC and GPA

Tabel 3. Cross-Tabulation: RoC Category and GPA Category Using Fisher's Exact Test

RoC Category	GPA Category						*P Value*
	High GPA		Low GPA		Total		
	n	%	n	%	N	%	
High	4	16,7	20	83,3	24	100	**0.472**
Low	6	30	14	70	20	100	
Total	**10**	**22,7**	**34**	**77,3**	**44**	**100**	

As shown in Table 3, students classified under Low RoC (n = 20) exhibited a distribution of 14 individuals with Low GPA (70.0%) and 6 individuals with High GPA (30.0%). By contrast, students classified under High RoC (n = 24) demonstrated a markedly different , and theoretically unexpected, profile: 20 students (83.3%) were categorized as Low GPA, with only 4 students (16.7%) achieving High GPA. Consequently, the proportion of students attaining High GPA was notably lower within the High RoC group (16.7%) than within the Low RoC group (30.0%), representing a difference of 13.3 percentage points in a direction contrary to theoretical expectations.

An examination of the Low GPA column further reinforces this pattern. Of the 34 students classified as Low GPA, 20 individuals (58.8%) originated from the High RoC group, while only 14 (41.2%) came from the Low RoC group. In other words, more than half of all underachieving students in this sample, in terms of GPA, were those who demonstrated higher levels of metacognitive regulatory awareness. This internal

composition underscores the complexity of the relationship between metacognitive regulation and academic performance and signals that the two constructs do not operate in a straightforwardly linear fashion within this particular learner population.

From an inferential standpoint, Fisher's Exact Test was designated as the primary reference statistic, yielding an exact two-sided significance of $p = .472$. These results indicate that the null hypothesis. positing no association between RoC category and GPA category, cannot be rejected at the conventional $\alpha = .05$ threshold. Statistically, the observed distributional differences between groups may be attributable to sampling variability rather than a systematic relationship between the two variables. Nevertheless, the absence of statistical significance does not preclude meaningful descriptive and theoretical interpretation of the observed patterns, particularly given the relatively modest sample size ($N = 44$) and the highly unequal marginal distribution of GPA categories, both of which constrain the statistical power of the test.

3.3 Interpreting the Paradoxical Pattern

The cross-categorical pattern identified in this study presents what may be characterized as a paradox within the SRL framework: students with higher metacognitive regulatory capacity did not exhibit correspondingly higher academic achievement. Several theoretically grounded explanations may account for this phenomenon, each of which carries important implications for how metacognitive development is understood and operationalized within the EBPC vocational context.

To better understand the apparent, disconnect between metacognitive regulation and GPA outcomes, Figure 1 illustrates a conceptual pathway in which the relationship is mediated and potentially interrupted by psychological and contextual variables.

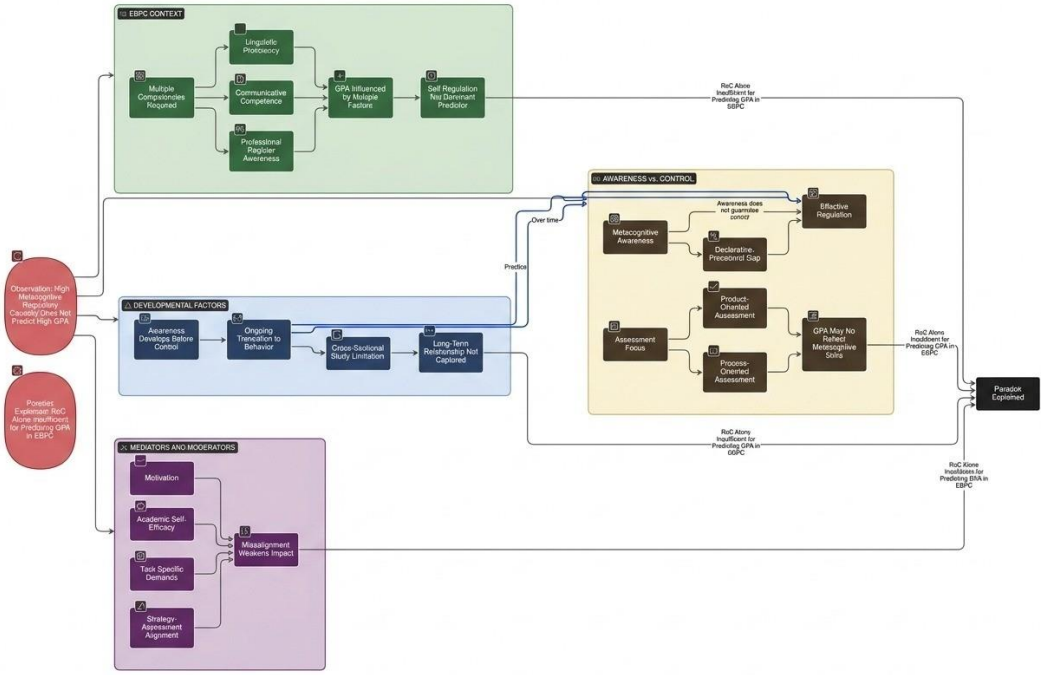

Figure 1. Flowchart of Paradoxical Patter

First, the observed pattern may reflect a fundamental distinction between metacognitive awareness and metacognitive control. Awareness of one's cognitive processes does not automatically translate into the effective regulation of those processes during actual task performance [19]. Students who score higher on the regulation dimension of the Metacognitive Awareness Inventory (MAI) may possess a relatively sophisticated understanding of what strategic self-regulation entails, yet may nonetheless encounter difficulties in consistently executing those strategies under the demands of formal academic assessment. In the context of vocational education, this declarative–procedural gap warrants more critical examination. EBPC, as a practice-oriented program, emphasizes the application of language skills in authentic or simulated professional tasks such as presentations, business correspondence, and workplace communication scenarios. However, it remains an open question whether the existing assessment system fully captures students' metacognitive regulatory processes or primarily evaluates their technical language performance outcomes. If assessment practices are predominantly product-oriented, focusing on accuracy, fluency, and task completion, rather than process-oriented, students' ability to plan, monitor, and evaluate

their learning may not be adequately reflected in their GPA. Consequently, students may demonstrate high levels of metacognitive awareness without this being translated into measurable academic success, thereby reinforcing the apparent disconnect observed in this study.

Second, the contextual specificity of the EBPC program may partially account for the divergence between RoC and GPA. Unlike general academic programs, EBPC demands the simultaneous development of linguistic proficiency, discipline-specific communicative competence, and professional register awareness. In such a context, GPA is likely determined by a constellation of competencies that extend beyond cognitive self-regulation alone. As a result, metacognitive awareness, while potentially facilitative, may not function as a dominant predictor of academic achievement when other performance-based criteria carry substantial evaluative weight.

Third, it is plausible that the relationship between RoC and GPA in this population is mediated or moderated by variables not captured in the present study. Prior research has consistently demonstrated that the relationship between metacognition and academic achievement is not uniformly direct but is frequently conditioned by motivational orientations [20], academic self-efficacy [21], task-specific demands [22], and the degree of alignment between a student's regulatory strategies and the nature of the assessment tasks encountered. Students may be cognitively aware of effective learning strategies and regulatory processes, yet lack the confidence to implement them in demanding academic situations. In such cases, learners may "know what to do" but do not feel sufficiently or assured to execute those strategies effectively. This misalignment between awareness and self-belief may weaken the functional impact of metacognitive regulation on academic performance, resulting in the non-linear pattern observed in this study. Therefore, metacognitive awareness without corresponding levels of self-efficacy may not translate into improved academic outcomes.

Fourth, the present findings invite reflection on the temporal dimension of metacognitive development. Research in educational psychology suggests that metacognitive awareness tends to develop earlier than the strategic capacity to deploy that awareness with consistency and precision [3], [4]. Students who have recently developed stronger metacognitive awareness, as may be the case in undergraduate populations, may still be in the process of translating that awareness into reliable academic behaviors. The cross-sectional design of the present study captures a single point in this developmental trajectory and therefore may not fully represent the longer-term relationship between RoC and academic outcomes.

3.4 Implications for Curriculum and Instruction

Taken together, the findings of this study carry several practical implications for the design of learning environments within the EBPC program. The descriptive pattern, wherein students with higher RoC do not necessarily achieve higher GPAs, suggests that metacognitive awareness, by itself, may be an insufficient condition for academic success in this context. Accordingly, instructional interventions should be directed not merely toward raising students' awareness of their regulatory processes, but toward scaffolding the strategic application of that awareness within discipline-specific academic tasks.

This may involve the integration of metacognitive scaffolding into assessment design, for instance, through structured self-monitoring protocols embedded in writing tasks, guided reflection activities following oral performance assessments, and iterative feedback cycles that make the connection between regulatory behavior and performance outcomes explicit and legible to students. Such approaches align with the principles of SRL-informed pedagogy and have been shown to strengthen the bridge between metacognitive awareness and actual learning outcomes in language learning contexts.

More importantly, the findings raise critical questions about the alignment between metacognitive development and assessment practices. If assessment systems predominantly evaluate technical language outcomes without capturing regulatory processes, then students' metacognitive growth may remain pedagogically invisible. Therefore, curriculum design should incorporate process-oriented assessment components, such as reflective journals, self-regulated learning logs, and structured self-evaluation tasks, which explicitly assess planning, monitoring, and evaluation behaviors alongside performance outcomes.

Finally, the highly asymmetric distribution of GPA in this sample—with 77.3% of students falling into the Low GPA category—points to a broader systemic issue that extends beyond metacognitive factors. This suggests the need for a comprehensive program-level evaluation that considers instructional design, assessment practices, student support systems, and learner readiness. Future research employing longitudinal designs, larger sample sizes, and multi-variable models incorporating mediating and moderating factors will be essential to developing a more holistic understanding of academic achievement in vocational EBPC program.

4. CONCLUSION

The findings of this study affirm that metacognitive awareness, while theoretically significant and empirically well-supported in broader educational research, does not automatically translate into academic achievement within the specific context of the English for Business and Professional Communication (EBPC) program. The paradoxical pattern observed, wherein students with higher levels of Regulation of Cognition (RoC) did not demonstrate correspondingly superior academic performance as measured by GPA, underscores a critical distinction between possessing metacognitive awareness and being able to deploy it effectively under the complex, multi-dimensional demands of a professionally oriented academic program. This finding suggests that metacognitive regulation, in isolation, constitutes a necessary but insufficient condition for academic success in this context. Rather than functioning as a standalone determinant of performance, it appears to operate within a broader constellation of cognitive, motivational, and contextual factors that collectively shape learning outcomes. Accordingly, efforts to enhance students' regulatory awareness must be accompanied by systematic instructional scaffolding, embedded within discipline-specific tasks, that actively bridges the gap between students' self-regulatory knowledge and their capacity to enact that knowledge with consistency and precision in authentic academic situations.

Several limitations of the present study point to productive directions for future research. First, a longitudinal design would allow researchers to track how the relationship between RoC and GPA develops over time, addressing the inherent inability of the current cross-sectional approach to capture developmental change or support causal inference. Second, studies with larger sample sizes are needed to improve statistical power and enable more sophisticated analytical techniques such as multiple regression or Structural Equation Modeling (SEM). Third, future investigations should incorporate mediating and moderating variables, including academic self-efficacy, goal orientation, academic anxiety, and intrinsic motivation, which may critically determine whether metacognitive awareness translates into actual academic performance. Fourth, administering the complete MAI instrument, including both the Regulation of Cognition and Knowledge of Cognition subscales, would provide a more theoretically comprehensive account of students' metacognitive profiles. Fifth, diversifying measures of academic achievement beyond GPA, through portfolio assessments, standardized proficiency tests, or behavioral observation, would more fully capture the multidimensional nature of competence in the EBPC program. Finally, a mixed-methods approach combining quantitative analysis with qualitative inquiry such as interviews or think-aloud protocols would offer deeper explanatory insight into the conditions under which metacognitive awareness does or does not manifest in measurable academic success.

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