Evaluating Metacognitive Awareness and Course Effectiveness in Macroeconomics: A Study Using the Mai and Kirkpatrick Model Among Commerce Students at Politeknik Ungku Omar (Academic Session II 2024/2025)

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Abstract. This quantitative survey study explores the relationship between metacognitive awareness and the effectiveness of student learning in the Macroeconomics course at the Commerce Department, Politeknik Ungku Omar during Academic Session II of 2024/2025. The study targets 100 students and employs the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison to assess students' metacognitive knowledge and regulation. In addition, the study incorporates the Kirkpatrick Four-Level Model to evaluate course effectiveness across Reaction, Learning, Behavior, and Results. The data is analyzed using Statistical Package for Social Sciences (SPSS v.26), and findings indicate a strong positive correlation ($r > 0.7$) between students' metacognitive awareness and course effectiveness, demonstrating that higher metacognitive engagement leads to improved comprehension, problemsolving abilities, and knowledge retention in macroeconomics. The structured, practical-oriented learning environment in polytechnic institutions further reinforces this relationship, as evidenced by Kirkpatrick's Level 3 (Behavior) and Level 4 (Results), where students actively apply macroeconomic principles beyond classroom settings. Recognizing and fostering metacognitive awareness and effective course design can lead to enhanced knowledge acquisition and practical application, ultimately preparing students for critical thinking and informed decision-making in economic contexts.

Keywords: metacognitive, effectiveness, awareness

INTRODUCTION

Politeknik Ungku Omar is an institution of higher education which focuses in technical and vocational areas. Thus, the effectiveness of instructional approaches and the development of students' higher-order thinking skills remain critical areas of focus. Macroeconomics, as a core subject in commerce education, requires not only conceptual understanding but also the ability to self-regulate learning through effective metacognitive strategies. The integration of metacognitive awareness into teaching and learning processes can significantly enhance students' academic performance and their ability to apply knowledge in real-world economic contexts. To answer the research objectives and questions, the researchers have developed 3 research questions and objectives, including one hypothesis.

RESEARCH OBJECTIVES

a. To measure the level of metacognitive awareness among Commerce students in the Macroeconomics course using the Metacognitive Awareness Inventory (MAI).
b. To evaluate students' perceptions of course effectiveness based on the Kirkpatrick Model (reaction, learning, behavior, and results) in Macroeconomics course.
c. To examine the correlation between metacognitive awareness and course effectiveness in a Macroeconomics course.

RESEARCH QUESTIONS

a. What is the level of metacognitive awareness among Commerce students in the Macroeconomics course?
b. How do students perceive the effectiveness of the Macroeconomics course in terms of The Kirkpatrick Model?
c. Is there a significant correlation between students' metacognitive awareness and their perception of course effectiveness in a Macroeconomics course?

RESEARCH HYPOTHESIS

H_{01}: There is no significant correlation between students' metacognitive awareness and their perceived course effectiveness in a Macroeconomics course.

LITERATURE REVIEW

Metacognitive Awareness in Learning

Metacognition, also known as "thinking about thinking," plays a critical role in learners' ability to plan, monitor, and regulate their cognitive processes. Schraw and Dennison (1994) introduced the Metacognitive Awareness Inventory (MAI), which breaks metacognition into two key domains: knowledge of cognition and regulation of cognition. This framework has since been widely used to assess students' self-awareness of learning strategies and their ability to control them effectively.

Numerous studies have emphasized the importance of metacognitive awareness in academic achievement. For instance, Young and Fry (2008) found that college students with higher MAI scores tended to perform better academically, highlighting the role of metacognition in self-directed learning. Similarly, Magno (2010) demonstrated that metacognitive strategies contributed significantly to the development of critical thinking, especially in higher education contexts.

In the Malaysian context, Yusoff and Seman (2018) explored metacognitive awareness among TVET students and found a moderate positive correlation with academic performance. Their study suggests that increasing students' metacognitive awareness can enhance engagement and learning outcomes, especially in technical and vocational institutions such as Politeknik Ungku Omar.

Evaluating Course Effectiveness Using the Kirkpatrick Model

The Kirkpatrick Model, developed by Donald Kirkpatrick in 1959 and refined over time (Kirkpatrick & Kirkpatrick, 2006), remains one of the most widely used frameworks for evaluating training and learning outcomes. The model comprises four levels: Reaction, Learning, Behavior, and Results. It assesses not only the learners' satisfaction and knowledge gained but also behavioral changes and overall impact.

While originally developed for corporate training, the model has since been adapted for higher education. Praslova (2010) emphasized its applicability in evaluating learning outcomes and curriculum effectiveness in academic programs. The model's strength lies in its holistic approach, considering both learner perception and performance outcomes.

In a critical reflection, Bates (2004) argued that while the model is practical, it must be applied carefully to avoid over-simplification, especially in academic settings where learning goals are complex and multi-layered. Nevertheless, its structured evaluation levels continue to provide value for educational institutions seeking to assess the impact of teaching and learning interventions.

Linking Metacognitive Awareness and Course Effectiveness

The intersection between metacognition and course effectiveness has been increasingly examined in recent years. Students with high metacognitive awareness are more likely to engage meaningfully with course content, evaluate their learning progress, and adjust strategies accordingly — all of which influence how they perceive and benefit from a course (Sperling et al., 2002).

Young and Fry (2008) suggested that metacognitive abilities not only affect academic performance but also shape students' satisfaction and engagement — aligning closely with the reaction and behavior levels of the Kirkpatrick Model. In vocational and polytechnic settings, Zohar and Dori (2003) demonstrated that metacognitive instruction significantly enhanced the learning outcomes even for students considered low achievers.

Taken together, these studies support the relevance of combining the MAI and Kirkpatrick Model to evaluate both internal cognitive factors and external learning outcomes. Such a dual-framework approach offers a comprehensive view of student learning, particularly valuable for curriculum refinement in technical education. If you need to arrange a number of figures, a good tip is to place them in a table, which gives you additional control of the layout. Leave a line space between your figure and any text above it, like this one:

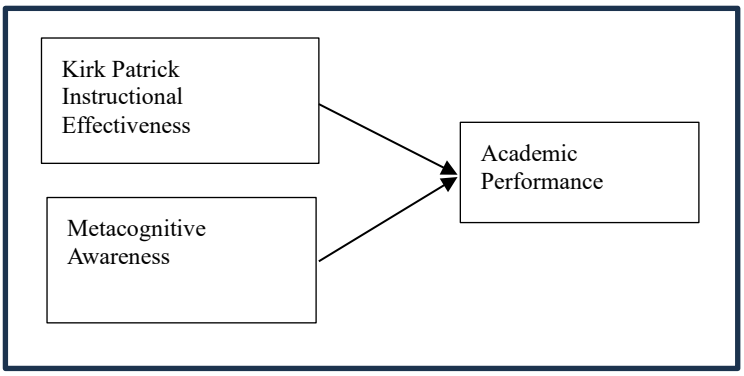


FIGURE 1-Conceptual Framework

RESEARCH METHOD

This quantitative research aims to evaluate students' metacognitive awareness and the effectiveness of the Macroeconomics course using the Metacognitive Awareness Inventory (MAI) and the four levels of the Kirkpatrick Model. This chapter describes the research design, population and sample, instruments used, data collection procedures, and data analysis methods. This study employed a cross-sectional survey method, using structured questionnaires to collect numerical data that could be statistically analyzed. The combination of descriptive and inferential statistics enabled the researcher to interpret trends, relationships, and predictive outcomes among the variables under investigation.

Population and Sampling

The study involved Commerce students at Politeknik Ungku Omar (PUO) who were enrolled in the Macroeconomics course during Academic Session II 2024/2025. Using simple random sampling, 108 students were selected to participate in the study. This sample size is considered adequate for statistical generalization in small to medium-sized populations and ensures that the data collected are representative and unbiased.

Research Instruments

Two structured instruments were used in this study: the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) and a Kirkpatrick Four-Level Course Evaluation Questionnaire, both adapted for the local polytechnic context.

The MAI developed by Schraw and Dennison (1994) consists of 52 items measuring two major components: i. Knowledge of Cognition (18 items): includes declarative, procedural, and conditional knowledge. ii.

Regulation of Cognition (34 items): includes planning, information management, monitoring, debugging, and evaluation.

During the effectiveness of the Macroeconomics course, an instrument based on the Kirkpatrick Model was developed, covering all four evaluation levels containing a total of 20 items.

i. Level 1: Reaction – Assesses students' satisfaction with course delivery, teaching methods, materials, and learning environment. (6 items)

ii. Level 2: Learning – Measures students' self-reported improvement in knowledge and skills related to macroeconomic concepts. (5 items)

iii. Level 3: Behavior – Evaluates students' ability to apply what they learned in classroom or assessment activities (e.g., assignments, discussions). (5 items)

iv. Level 4: Results – Assesses perceived outcomes, including impact on academic performance, problem-solving abilities, and readiness for real-world economic applications.

Both instruments were collected using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This inventory is widely used in educational research and has demonstrated high levels of reliability and validity. For the students' result, the conversion was done so that researchers were able to test the correlation between the independent variable with the dependent variable. The result conversion was done by referring to the Zarei (2019) as shown in Table 1.

TABLE 1-Data Conversion

Student CGPA	Classification
3.80	First Class
3.10	Second Upper
2.60	Second Lower
2.10	Pass
1.80	Fail

Sources: Zarai (2019)

RESULT AND DISCUSSION

Data was analyzed using SPSS Version 26. In this study, it involved two types of data analysis, which are descriptive statistics and inferential statistics. Descriptive statistics involved data analysis to find out the level of Metacognitive awareness and also the Kirkpatrick Model. The independent Samples t-Test was done to identify differences in metacognitive awareness based on gender or academic background. While the Pearson Correlation was done to explore the relationship between metacognitive awareness and the Kirkpatrick levels, especially Level 2 (Learning) and Level 3 (Behaviour). These techniques were selected to ensure a comprehensive understanding of both the cognitive and outcome-based dimensions of learning.

Respondents' demographic background in this study involved 108 students as shown in Table 2. The female students are about twice of the male students.

TABLE 2-Respondents' Demographic

Gender	Frequency (n)	Percentage (%)
Female	73	68
Male	35	32
Total	108	100

Through Table 3, a mean score of 3.87 indicates that students generally exhibit a high level of metacognitive awareness. This suggests that they are actively engaged in regulating their own learning, including planning, monitoring, and evaluating their understanding during the macroeconomics course.

TABLE 3-The Metacognitives Awareness and Kirk Patrick Mean Score

Variable	Mean Score	Interpretation
Metacognitive Awareness	3.87	High
KirkPatrick (L1–L3)	4.56	Very High Effectiveness

According to previous studies (e.g., Schraw & Dennison, 1994), a mean score above 3.5 is typically interpreted as indicating strong metacognitive engagement. Therefore, the finding implies that the students are equipped with cognitive strategies that support their academic performance.

For the Kirk Patrick framework, a mean score of 4.56 reflects a very high perception of course effectiveness among the students. According to Kirkpatrick's framework, this suggests:

i. Reaction: Students were highly satisfied with the content, delivery, and relevance of the course.
ii. Learning: They perceived significant improvements in their knowledge and understanding of macroeconomic concepts.
iii. Behavior: Students believed they were able to apply what they learned in academic or practical settings.

This high rating implies that the course is perceived as effective in engaging students and supporting learning transfer, which aligns well with the principles of learner-centered and outcome-based education.

For the correlation of the research variable, the results indicate a moderate to strong positive correlation between students' metacognitive awareness and their perception of the Macroeconomics course effectiveness as shown in Table 4. Since the p-value is less than 0.05, the correlation is statistically significant. This means that students who are more aware of their own learning strategies, planning, and regulation are also more likely to perceive the course as effective in terms of satisfaction, learning, and behavioral application. In other words, the increase in metacognitive awareness increases, the students tend to rate the course effectiveness more positively

TABLE 4-Correlation Between Metacognitive Awareness and Course Effectiveness

Variables	Result	Interpretation
Metacognitive Awareness ↔ Course	0.56**	Moderate - Strong, Significant
Effectiveness	0.64**	Moderate - Strong, Significant

Note: Pearson correlation.
* Correlation is significant at the 0.05 level (2-tailed).

The findings of this study reveal that Commerce students in the Macroeconomics course exhibit a high level of metacognitive awareness (M = 3.87), suggesting they actively plan, monitor, and evaluate their learning processes. Additionally, students perceived the course as highly effective (M = 4.56) across the first three levels of the Kirkpatrick model— reaction, learning, and behavior—indicating strong engagement and knowledge transfer.

The findings of this study demonstrate that both metacognitive awareness and students' perception of course effectiveness (based on the Kirkpatrick model) are significantly correlated with academic performance. The correlation between metacognitive awareness and result ($r = .56$, $p < .05$) indicates a moderate positive relationship, suggesting that students who are more aware of their learning processes—such as planning, monitoring, and evaluating—are more likely to perform better academically. Similarly, the correlation between the Kirkpatrick model and result ($r = .64$, $p < .05$) reflects a stronger positive association, indicating that students

who perceive the course as effective in terms of reaction, learning, and behavioral application tend to achieve higher results. These findings support the notion that both internal cognitive strategies and external instructional factors play critical roles in influencing student achievement. The results align with previous studies (e.g., Magno, 2010; Zarei et al., 2019; Praslova, 2010), highlighting the combined importance of fostering metacognitive development and ensuring high-quality, engaging instruction in higher education settings.

CONCLUSION

This chapter has detailed the methodology employed to examine metacognitive awareness and course effectiveness among commerce students enrolled in Macroeconomics at PUO. Using a quantitative approach, two validated instruments were used: the MAI and a four level Kirkpatrick evaluation tool. Statistical analysis methods were employed to ensure data reliability and meaningful interpretation. This robust methodological approach will help determine how students' metacognitive development relates to their learning outcomes and the overall effectiveness of the course.

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