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METACOGNITIVE AWARENESS AMONG FIRST-YEAR TEACHER EDUCATION STUDENTS IN A STATE UNIVERSITY

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ABSTRACT

This study focuses on the metacognitive awareness of first-year teacher education students. Through its sub-dimensions, including declarative, procedural, conditional knowledge, planning, monitoring, and evaluation, the research used the Metacognitive Awareness Inventory (MAI) to determine students' knowledge and regulation of cognition. The results showed that students generally have high metacognitive awareness, revealing high comprehension monitoring and adaptive learning strategies. However, some areas, including memory retention and visual learning strategies, were shown to need improvement. It also investigated whether metacognitive awareness varied by sex, socioeconomic status, and academic program. Results showed no significant differences based on sex or socioeconomic background, indicating that these variables do not meaningfully impact metacognitive development. The levels of metacognition were consistent across programs, although minor differences in evaluative skills indicated some differences between the two programs. These findings suggest the need for targeted interventions that focus on specific metacognitive skills and emphasize the influence of educational experiences on those capabilities. The findings highlight the importance of promoting metacognitive awareness in teacher education and provide a foundation for future research and pedagogical approaches to enhance the development of reflective and self-regulated learners among prospective teachers.

Keywords: *Metacognitive awareness, teacher education, first-year students, knowledge of cognition, regulation of cognition*

INTRODUCTION

Metacognition is the ability to reflect and understand one's cognitive processes. It is about being conscious of one's learning and thinking process and problem-solving approaches, and utilizing this awareness to regulate and further develop cognitive strategies. Originating from the early 1970s by John Flavell, the concept of 'metacognition' is rooted in the earlier idea of 'metamemory,' which Flavell had developed initially. Flavell defined metacognition as learners' 'knowledge and cognition regarding cognitive phenomena' and often referred to in the literature as 'thinking about one's own thinking' (Noushad, 2008). Metacognition is commonly defined as comprising two key components: metacognitive knowledge, which is the knowledge of cognition possessed by an individual, and metacognitive regulation, which entails the management of cognitive tasks. Declarative, procedural, and conditional knowledge form the three parts of metacognitive knowledge. Declarative knowledge refers to the awareness of when one learns best and the factors influencing student performance, and this awareness is shown to be utilized more effectively by proficient adults and learners. Procedural knowledge involves learning to perform tasks efficiently and often includes automatic and problem-solving strategies. In contrast, conditional knowledge pertains to understanding when and why specific strategies should be applied and utilized, with studies suggesting that older learners are better than younger students at adjusting their approaches. Studies showed that metacognitive knowledge develops early on and refines further during adolescence, as individuals may not always express them explicitly. Metacognitive regulation refers to the planning, monitoring, and evaluation. Planning is about choosing a strategy, allocating resources, and having skilled learners advanced in planning abilities. Monitoring examines one's understanding and how well the individual performs through training and experience. Lastly, evaluation involves reviewing outcomes and cognitive processes, where effective learners can revise and improve their work. mu Zimmerman's Self-Regulated Learning (SRL) theory further integrates these concepts, emphasizing goal-setting, progress monitoring, and self-reflection (Zimmerman, 2002). Research supports that learners applying SRL strategies achieve more academic success (Zimmerman & Schunk, 2011), highlighting the interplay between metacognitive knowledge and regulation. Despite these insights, questions remain about how individuals consolidate metacognitive understanding, as development varies widely across learners.

Metacognition plays a critical role in teacher education, as it not only helps future educators manage their own learning and professional growth but also equips them to foster reflective, critical thinking in their students, ultimately enhancing the quality of education. Metacognitive awareness is crucial in high-quality education, significantly contributing to effective learning and academic achievement. Identifying the metacognitive awareness levels of teacher education students is vital for enhancing their learning experiences. This insight enables educators to implement effective teaching strategies that improve students' metacognitive skills, ultimately helping them grasp concepts more effectively. Previous studies have shown consistent high metacognitive awareness among teacher trainees (Memnun & Akkaya, 2009; Young & Fry, 2008; Ÿz, 2016), highlighting their strong cognitive self-regulation abilities. Although minor

differences across sex and academic programs exist, these differences are not statistically significant (Bakkaloglu, 2020; Cihanoglu, 2012; Jaleel & P., 2016; Kallio et al., 2017; Memnun & Akkaya, 2009; Palantis et al., 2018; Yıldız & Akdağ, 2017; Young & Fry, 2008; Ÿz, 2016). Studies show high metacognitive awareness among educators, including primary teachers (Palantis et al., 2018), college students (Young & Fry, 2008), and vocational teachers (Kallio et al., 2017). Pre-service teachers also exhibit intense metacognition, with high levels in KOC and ROC (Öz, 2016; Memnun & Akkaya, 2009) and moderate-to-high awareness overall (Cihanoglu, 2012). Among secondary students, metacognitive awareness varies, with no significant differences in distribution (Jaleel & Premachandran, 2016) but a moderate correlation with physics achievement (Bogdanović et al., 2015).

Different studies demonstrate that metacognitive awareness serves as a key element for strong academic results but these findings lack substantial research related to first-year education students within Biliran Province State University and other similar local settings. Research examines demographic factors of sex, academic program, and socioeconomic status, but studies produce inconsistent or inconclusive results. The impact of socioeconomic factors is often inadequately addressed when these aspects are ignored or approached indirectly. There is a need for more context-specific investigations that account for how these variables may impact metacognitive awareness in teacher education. This study seeks to fill that gap by providing empirical data on first-year education students' metacognitive awareness levels and exploring whether significant differences exist based on these demographic factors. The findings can support improvements in instructional methods and educational support systems designed for future teachers participating in early teacher education programs.

Understanding their metacognitive awareness can help students identify their strengths and weaknesses, strengthen their study habits, and support their adaptation to higher education. To prepare teachers to become reflective and practical, it is important to develop strong metacognitive skills early in their academic journey for long-term professional growth. The study findings will help teachers improve instructional techniques and intervention programs. The curriculum could include explicit training in metacognitive strategies if low metacognitive awareness levels are identified. In addition, mentoring programs can guide the creation of student support services and policies in BiPSU as the study's result. Ultimately, this research serves as a foundation for future studies on metacognition, with potential applications across various disciplines and academic levels. This study delved into the metacognitive awareness of first-year teacher education students at Biliran Province State University, filling in the limited research about this topic in the local contexts.

The scope of the study is limited to examining metacognitive awareness and differences based only on sex, socioeconomic status, and program. Other possibly impactful factors were not considered, which tend to also play a role in honing metacognitive abilities. Another limitation is the reliance on self-reported data from the metacognitive skills rather than their actual abilities, potentially introducing response bias.

Research Questions

The aim of this study was to examine the metacognitive awareness of 1st-year Teacher Education students at Biliran Province State University. Specifically, the study sought to address the following:

1. What were the levels of metacognitive awareness among 1st-year Teacher Education students based on the total and sub-dimension scores of the Metacognitive Awareness Inventory, categorized by:
    a) Sex,
    b) Socio-economic status, and
    c) Program?
2. Was there a significant difference in the metacognitive awareness levels of 1st-year Teacher Education students when grouped according to:
    a) Sex,
    b) Socio-economic status, and
    c) Program?

METHODOLOGY

Research Design

This study used a descriptive-survey research design to assess the metacognitive awareness of teacher education students. Descriptive-survey research design is a non-experimental research method that describes characteristics, behaviors, or perceptions of collected and quantified data of a population at a particular time (Siedlecki, 2019, cited in Siemoh et al., 2025). The respondents were profiled based on their demographic characteristics: sex, program, and socioeconomic status, and their levels of metacognitive awareness across its subdimensions: Declarative Knowledge, Procedural Knowledge, Conditional Knowledge, Planning, Information Management Strategies, Debugging Strategies, Comprehension Monitoring, and Evaluation. Additionally, this study assessed the differences in the metacognitive awareness of respondents based on their demographic profiles.

Locale and Respondents of the Study

This study was conducted at Biliran Province State University, the only university in the Biliran Province that is committed to providing quality teacher education. The university offers ten (10) teacher education programs, including Bachelor of Secondary Education (BSED) (with majors in English, Mathematics, Science, Filipino, and Social Studies), Bachelor of Elementary Education (BEED), Bachelor of Physical Education (BPEd), Bachelor of Early Childhood Education (BECEd), Bachelor of Special Needs Education (BSNEd), and Bachelor of Technology, and Livelihood Education (BTLEd).

Total enumeration was employed in the study - a non-sampling method- to ensure accuracy by including all the target population members. The respondents consisted of

202 first-year students from the School of Teacher Education. However, only 176 students responded, resulting in a response rate of 87.13%. Metacognitive awareness is essential for effective teaching and learning. Examining future educators provides insights into their professional readiness. First-year students are at the crucial stage of adapting to college-level learning. This makes the respondents the ideal candidates to evaluate their metacognitive skills for potential interventions.

Research Instrument

The instrument that was utilized in this study was the Metacognitive Awareness Inventory (MAI), developed by Schraw and Dennison (1994). The MAI measured metacognitive knowledge and regulation, consisting of two major components: knowledge about cognition (declarative, procedural, and conditional knowledge) and regulation of cognition (planning, monitoring, evaluating, debugging strategies, and information management strategies). The inventory is composed of 52 Likert-scale items to identify and evaluate the metacognitive awareness of the students.

The MAI showed strong psychometric properties. It had been validated through factor analysis and showed high internal consistency reliability, with Cronbach's alpha values exceeding 0.90 for the overall scale, indicating excellent reliability. All subscales demonstrated equally high reliability levels which maintained consistency between every part of the instrument. The MAI shows strong content and construct validity standards which make it suitable for educational research that measures metacognitive awareness.

Data Analysis

The IBM SPSS Statistics trial version was employed to analyze the data, beginning with descriptive statistics (frequencies and percentages) to assess respondents' metacognitive awareness levels. This analysis examined both the subdimensions of metacognitive awareness (Declarative Knowledge, Procedural Knowledge, Conditional Knowledge, Planning, Informational Management Strategies, Debugging Strategies, Comprehension Monitoring, and Evaluation) and demographic variables (sex, program, and socioeconomic status). The descriptive results were interpreted using a predefined scale: 4.21-5.00 (Very High Awareness), 3.41-4.20 (High Awareness), 2.61-3.40 (Moderate Awareness), 1.81-2.60 (Low Awareness), and 1.00-1.80 (Very Low Awareness).

Nonparametric tests were selected after normality testing yielded a p-value of 0.037 ($p < 0.05$), leading to the rejection of the normal distribution assumption. The Kruskal-Wallis Test was conducted to analyze the differences in metacognitive awareness, both overall and within specific subdimensions, among various groups defined by program and socioeconomic status categories. Meanwhile, the Mann-Whitney U Test was utilized to compare two independent groups based on sex differences and served as a follow-up test for the Kruskal-Wallis Test. Researchers chose these nonparametric methods to analyze their data because of its resistance to non-normal distributions, resistance to outliers, and ability to handle unequal group sizes.

Data Scoring

To assess students' metacognitive awareness, the study utilized a five-point Likert scale with the following scoring interpretation:

Students' Metacognitive Awareness

Scale	Rating	Mean Range	Interpretation
5	Always	4.21 – 5.00	Very High Awareness
4	Often	3.41 – 4.20	High Awareness
3	Sometimes	2.61 – 3.40	Moderate Awareness
2	Rarely	1.81 – 2.60	Low Awareness
1	Never	1.00 – 1.80	Very Low Awareness

The overall awareness score was computed by summing the responses and dividing by the total number of items.

Data Gathering Procedure

The researchers first sought approval from the Dean of the School of Teacher Education to conduct the survey. Upon approval, the researchers created a Google Form containing the MAI along with demographic questions (sex, socioeconomic status, and program). The researchers chose to use Google Forms for its convenience in collecting and analyzing information. Both digital Google Forms and printed survey platforms were used to reach out to every participant. All researchers combined the information from completed forms before performing data encoding processes.

RESULTS AND DISCUSSION

Table 1. Metacognitive Awareness of First-Year Teacher Education Students

Metacognitive Awareness	Mean	Std. Deviation	Std. Error of the Mean	Description
1. I ask myself periodically if I am meeting my goals.	3.77	.853	.064	High Awareness
2. I consider several alternatives to a problem before I answer.	3.76	.814	.061	High Awareness
3. I try to use strategies that have worked in the past.	3.99	.821	.062	High Awareness
4. I pace myself while learning in order to have enough time.	3.70	.775	.058	High Awareness
5. I understand my intellectual strengths and weaknesses.	3.91	.827	.062	High Awareness
6. I think about what I really need to learn before I begin a task.	3.95	.837	.063	High Awareness
7. I know how well I did once I finish a test.	3.79	.886	.067	High Awareness

8.	I set specific goals before I begin a task.	3.82	.862	.065	High Awareness
9.	I slow down when I encounter important information.	3.95	.806	.061	High Awareness
10.	I know what kind of information is most important to learn.	3.99	.767	.058	High Awareness
11.	I ask myself if I have considered all options when solving a problem.	3.86	.798	.060	High Awareness
12.	I am good at organizing information.	3.53	.841	.063	High Awareness
13.	I consciously focus my attention on important information.	3.86	.860	.065	High Awareness
14.	I have a specific purpose for each strategy I use.	3.78	.876	.066	High Awareness
15.	I learn best when I know something about the topic.	4.24	.802	.060	Very High Awareness
16.	I know what the teacher expects me to learn.	3.68	.850	.064	High Awareness
17.	I am good at remembering information.	3.36	1.005	.076	Average Awareness
18.	I use different learning strategies depending on the situation.	3.79	.892	.067	High Awareness
19.	I ask myself if there was an easier way to do things after I finish a task.	3.94	.853	.064	High Awareness
20.	I have control over how well I learn.	3.73	.902	.068	High Awareness
21.	I periodically review to help me understand important relationships.	3.79	.825	.062	High Awareness
22.	I ask myself questions about the material before I begin.	3.76	.907	.068	High Awareness
23.	I think of several ways to solve a problem and choose the best one.	3.97	.897	.068	High Awareness
24.	I summarize what I've learned after I finish.	3.82	.955	.072	High Awareness
25.	I ask others for help when I don't understand something.	3.91	.999	.075	High Awareness
26.	I can motivate myself to learn when I need to.	4.01	.977	.074	High Awareness
27.	I am aware of what strategies I use when I study.	3.94	.870	.066	High Awareness
28.	I find myself analyzing the usefulness of strategies while I study.	3.78	.827	.062	High Awareness
29.	I use my intellectual strengths to compensate for my weaknesses.	3.78	.894	.067	High Awareness
30.	I focus on the meaning and significance of new information.	3.94	.853	.064	High Awareness
31.	I create my own examples to make information more meaningful.	3.89	.878	.066	High Awareness
32.	I am a good judge of how well I understand something.	3.76	.835	.063	High Awareness
33.	I find myself using helpful learning strategies automatically.	3.77	.847	.064	High Awareness
34.	I find myself pausing regularly to check my comprehension.	3.82	.895	.067	High Awareness
35.	I know when each strategy I use will be most effective.	3.78	.836	.063	High Awareness
36.	I ask myself how well I accomplished my goals once I'm finished.	3.82	.889	.067	High Awareness

37. I draw pictures or diagrams to help me understand while learning.	3.31	1.013	.076	Average Awareness
38. I ask myself if I have considered all options after I solve a problem.	3.67	.935	.070	High Awareness
39. I try to translate new information into my own words.	3.92	.884	.067	High Awareness
40. I change strategies when I fail to understand.	3.93	.846	.064	High Awareness
41. I use the organizational structure of the text to help me learn.	3.66	.893	.067	High Awareness
42. I read instructions carefully before I begin a task.	4.03	.941	.071	High Awareness
43. I ask myself if what I'm reading is related to what I already know.	3.88	.877	.066	High Awareness
44. I reevaluate my assumptions when I get confused.	3.86	.860	.065	High Awareness
45. I organize my time to best accomplish my goals.	3.70	.947	.071	High Awareness
46. I learn more when I am interested in the topic.	4.20	.964	.073	High Awareness
47. I try to break studying down into smaller steps.	3.95	.874	.066	High Awareness
48. I focus on overall meaning rather than specifics.	3.74	.893	.067	High Awareness
49. I ask myself questions about how well I am doing while I am learning something new.	3.90	.892	.067	High Awareness
50. I ask myself if I learned as much as I could have once I finish a task.	3.86	.826	.062	High Awareness
51. I stop and go back over new information that is not clear.	4.19	.826	.062	High Awareness
52. I stop and reread when I get confused.	4.22	.887	.067	Very High Awareness
Mean	**3.85**	**.513**	**.039**	**High Awareness**

The results of the Metacognitive Awareness Inventory (MAI) revealed that first-year teacher education students generally exhibited a high level of metacognitive awareness, with an overall mean score of 3.85 (SD = 0.513). This shows that most of the students are highly aware of their cognitive processes and actively employ strategies to regulate their learning. Notably, the highest-scoring items were related to comprehension monitoring and adaptive learning strategies, such as "I stop and reread when I get confused" (M = 4.22, SD = 0.887) and "I learn best when I know something about the topic" (M = 4.24, SD = 0.802), both classified as Very High Awareness. The data demonstrates that students are skilled at recognizing materials that present difficulty and adjusting their learning strategies. On the other hand, some areas showed room for improvement. Items such as "I am good at remembering information" (M = 3.36, SD = 1.005) and "I draw pictures or diagrams to help me understand while learning" (M = 3.31, SD = 1.013) received Average Awareness ratings, suggesting that students may struggle with memory retention and visual learning strategies. This could imply a need for targeted instructional support, such as training in mnemonic techniques or the use of graphic organizers, to enhance these specific metacognitive skills.

Table 2. Metacognitive Awareness Levels Among First-Year Teacher Education Students

Level of Metacognitive Awareness	Frequency	Percent (%)
Very High Awareness	45	25.6
High Awareness	90	51.1
Average Awareness	38	21.6
Low Awareness	3	1.7
Very Low Awareness	0	0.0
Total	**176**	**100**

Table 2 presents the levels of metacognitive awareness among first-year teacher education students. The results indicate that a majority (51.1%) of the students exhibit high metacognitive awareness, while 25.6% demonstrate very high awareness. Additionally, 21.6% of the students have average awareness, whereas only 1.7% show low awareness, and none fall within the very low awareness category. These findings suggest that most students understand their cognitive processes, which may positively influence their learning strategies and academic performance.

This aligns with previous research on teacher education populations. For instance, Memnun and Akkaya (2009) found that 66.1% of primary teacher trainees had high metacognitive awareness, while Ÿz (2016) reported that 65% of pre-service English teachers exhibited very high levels. Similarly, Palantis et al. (2018) observed that 93% of Malaysian primary school teachers scored at the "higher" level, further supporting the prevalence of strong metacognitive awareness among educators. However, variations exist across different educational stages. Young and Fry (2008) noted that graduate students scored higher than undergraduates in regulating cognition, suggesting that metacognitive skills may develop with academic experience.

Conversely, studies on secondary school students reveal a more varied distribution. Jaleel and Premachandran (2016) found that secondary students' metacognitive awareness was relatively evenly spread across levels, indicating less consistency than teacher education cohorts. Coşkun (2018) highlighted high metacognitive thinking skills among university students across multiple dimensions, including reflective problem-solving and decision-making. Bakkaloglu (2020) and Cihanoglu (2012) further support these trends, reporting moderate to high metacognitive awareness among students and teacher candidates, with no extreme lows.

Table 3. Metacognitive Awareness Across Sub-Dimensions

Metacognitive Awareness Sub-dimensions	Mean	Std. Deviation	Std. Error of the Mean	Description
Knowledge about Cognition	**3.84**	**.541**	**.041**	**High Awareness**
Declarative Knowledge	3.77	.555	.042	High Awareness
Procedural Knowledge	3.87	.602	.045	High Awareness
Conditional Knowledge	3.92	.629	.047	High Awareness
Regulation of Cognition	**3.84**	**.519**	**.039**	**High Awareness**
Planning	3.85	.584	.044	High Awareness
Informational Management Strategies	3.81	.552	.042	High Awareness

Debugging Strategies	4.02	.622	.047	High Awareness
Comprehension Monitoring	3.78	.533	.040	High Awareness
Evaluation	3.80	.611	.046	High Awareness
Metacognitive Awareness	**3.85**	**.513**	**.039**	**High Awareness**

The table above shows descriptive statistics of different sub-dimensions of metacognitive awareness. The results reveal that all subdimensions fall within the high awareness category, including knowledge about cognition (M = 3.84, SD = 0.541) and regulation of cognition (M = 3.84, SD = 0.519). Debugging strategies have the highest mean score (M = 4.02, SD = 0.622), which suggests that students are experts in recognizing and correcting errors in their cognitive process. These results indicate that first-year education students have well-developed metacognitive awareness across all dimensions.

These results align with existing literature on metacognitive awareness in teacher education populations. Ÿz (2016) found that 65% of pre-service teachers have very high awareness of the knowledge of cognition, while 63% scored similarly in the regulation of cognition, revealing the robustness of self-regulation and cognitive monitoring skills among teacher trainees. Similarly, Bulut (2018) reported high metacognitive awareness across all subdimensions, including declarative, procedural, and conditional knowledge, as well as planning, monitoring, and evaluation, among both classroom and preschool teachers. Additionally, vocational teachers also demonstrated strong metacognitive regulation, particularly in planning and evaluation (Kallio et al., 2017). The consistency of the findings among teacher education settings suggests that metacognitive awareness is a critical and widely cultivated competency in teacher preparation programs.

Table 4. Metacognitive Awareness by Sex, Program, and Socio-Economic Status

Variable	Mean	Std. Deviation	Std. Error of the Mean	Description
Sex				
Male	3.87	.567	.072	High Awareness
Female	3.83	.482	.045	High Awareness
Program				
BSEd – Mathematics	3.92	.361	.083	High Awareness
BSEd - English	3.97	.375	.104	High Awareness
BSEd - Social Studies	3.93	.626	.144	High Awareness
BSEd - Filipino	3.97	.441	.127	High Awareness
BSEd - Science	3.59	.555	.116	High Awareness
BEEd	3.55	.555	.147	High Awareness
BECEd	3.95	.549	.133	High Awareness
BSNEd	3.75	.337	.084	High Awareness
BPEd	3.97	.394	.114	High Awareness
BTLEd	3.92	.569	.102	High Awareness
Socio-Economic Status				
Poor	3.82	.539	.051	High Awareness
Lower Income	3.90	.488	.075	High Awareness
Lower middle-income	3.80	.475	.137	High Awareness
Middle middle-income	3.90	.440	.139	High Awareness
Mean	**3.85**	**.513**	**.039**	**High Awareness**

Table 4 summarizes the mean scores of metacognitive awareness across sex, program, and socioeconomic status. The findings indicate that male (M = 3.87, SD = 0.567) and female (M = 3.83, SD = 0.482) students exhibit high metacognitive awareness, with minimal differences between the two groups.

Among the different programs, BSEd-English (M = 3.97, SD = 0.375), BSEd-Filipino (M = 3.97, SD = 0.441), and BPEd (M = 3.97, SD = 0.394) students reported the highest metacognitive awareness. At the same time, BEEd (M = 3.55, SD = 0.555) and BSEd-Science (M = 3.59, SD = 0.555) had the lowest. Regarding socioeconomic status, students from the lower-income (M = 3.90, SD = 0.488) and middle-middle-income (M = 3.90, SD = 0.440) categories exhibited slightly higher awareness than those in the poor (M = 3.82, SD = 0.539) and lower middle-income (M = 3.80, SD = 0.475) groups. These findings suggest that while metacognitive awareness remains high across all categories, some variations exist based on program and socioeconomic status.

Table 5. Significant Differences in Metacognitive Awareness by Sex

Metacognitive Awareness Sub-dimensions	Sex	Mean	SD	Std. Error of the Mean	p value
Knowledge about Cognition	**Male**	**3.80**	**.627**	**.079**	**.565**
	Female	**3.76**	**.514**	**.048**	
Declarative Knowledge	Male	3.89	.633	.080	.506
	Female	3.86	.586	.055	
Procedural Knowledge	Male	3.93	.668	.084	.627
	Female	3.91	.609	.057	
Conditional Knowledge	Male	3.86	.602	.076	.751
	Female	3.83	.506	.048	
Regulation of Cognition	**Male**	**3.86**	**.628**	**.079**	**.525**
	Female	**3.84**	**.560**	**.053**	
Planning	Male	3.87	.593	.075	.192
	Female	3.78	.528	.050	
Informational Management Strategies	Male	4.01	.679	.086	.961
	Female	4.03	.591	.056	
Debugging Strategies	Male	3.80	.562	.071	.552
	Female	3.76	.518	.049	
Comprehension Monitoring	Male	3.80	.639	.081	.840
	Female	3.80	.598	.056	
Evaluation	Male	3.87	.564	.071	.380
	Female	3.83	.495	.047	
Metacognitive Awareness	**Male**	**3.87**	**.567**	**.071**	**.414**
	Female	**3.83**	**.482**	**.045**	

Table 5 presents the significant levels of metacognitive awareness across sexes. The results shows that no statistically significant differences exist between male (M = 3.87, SD = 0.567) and female (M = 3.83, SD = 0.482) students in any sub-dimension ($p > .05$). This suggests that both male and female students possess comparable levels of metacognitive awareness, reinforcing the idea that metacognition is not strongly influenced by gender.

This finding aligns with multiple studies examining metacognition in teacher

training programs. Memnun and Akkaya (2009), Ÿz (2016), and Cihanoglu (2012) similarly reported no significant gender differences in metacognitive awareness. Further supporting this trend, Palantis et al. (2018) found no gender disparities among Malaysian teachers, and Kallio et al. (2017) reported equivalent metacognitive skills between male and female vocational teachers in Finland. Young and Fry (2008) also observed no gender differences in metacognitive awareness among college students, reinforcing that metacognition may be more stable across sexes in higher education contexts. Additionally, Jaleel and Premachandran (2016), Yıldız and Akdağ (2017), and Bakkaloglu (2020) found no significant gender differences in metacognitive awareness.

However, some studies report differences based on gender, particularly in specialized or younger populations. Bulut (2018) found that female preschool teachers have significantly higher metacognitive awareness than males, suggesting that teaching specialization may influence gender effects. Similarly, Coşkun (2018) reported that female university students outperformed males across all metacognitive subdimensions, including decision-making and reflective thinking. Among adolescents, Bogdanović et al. (2015) found that 15-year-old girls demonstrated significantly higher metacognitive awareness than boys (P = 0.001), while Abdelrahman (2020) noted that females generally report stronger metacognitive knowledge and regulation skills.

Table 6. Significant Differences in Metacognitive Awareness by Program

Metacognitive Awareness Sub-dimensions	Program	Mean	SD	Std. Error of the Mean	p value
Knowledge about Cognition	BSEd – Mathematics	3.87	.354	.081	.088
	BSEd - English	3.95	.412	.114	
	BSEd - Social Studies	3.92	.618	.142	
	BSEd - Filipino	3.93	.479	.138	
	BSEd - Science	3.55	.616	.128	
	BEEd	3.56	.525	.140	
	BECEd	4.04	.586	.142	
	BSNEd	3.77	.361	.090	
	BPEd	3.99	.364	.105	
	BTLEd	3.90	.633	.114	
Declarative Knowledge	BSEd – Mathematics	3.77	.377	.086	.136
	BSEd - English	3.88	.497	.138	
	BSEd - Social Studies	3.86	.629	.144	
	BSEd - Filipino	3.86	.521	.150	
	BSEd - Science	3.50	.655	.137	
	BEEd	3.49	.453	.121	
	BECEd	3.89	.577	.140	
	BSNEd	3.68	.387	.097	
	BPEd	3.93	.343	.099	
	BTLEd	3.90	.657	.118	
Procedural Knowledge	BSEd – Mathematics	3.89	.304	.070	.154
	BSEd - English	3.98	.473	.131	
	BSEd - Social Studies	3.89	.620	.142	
	BSEd - Filipino	4.00	.564	.163	
	BSEd - Science	3.55	.695	.145	
	BEEd	3.57	.646	.173	
	BECEd	4.09	.673	.163	

	BSNEd	3.80	.557	.139	
	BPEd	4.06	.371	.107	
	BTLEd	3.94	.676	.121	
	BSEd – Mathematics	4.02	.516	.118	
	BSEd - English	4.05	.491	.136	
	BSEd - Social Studies	4.03	.781	.179	
	BSEd - Filipino	3.98	.529	.153	
Conditional Knowledge	BSEd - Science	3.62	.621	.129	.172
	BEEd	3.66	.663	.177	
	BECEd	4.24	.645	.156	
	BSNEd	3.89	.467	.117	
	BPEd	4.03	.538	.155	
	BTLEd	3.86	.695	.125	
	BSEd – Mathematics	3.94	.386	.088	
	BSEd - English	3.98	.383	.106	
	BSEd - Social Studies	3.92	.645	.148	
	BSEd - Filipino	3.98	.432	.125	
Regulation of Cognition	BSEd - Science	3.59	.556	.116	.122
	BEEd	3.53	.584	.156	
	BECEd	3.92	.538	.130	
	BSNEd	3.75	.370	.092	
	BPEd	3.96	.424	.122	
	BTLEd	3.93	.549	.099	
	BSEd – Mathematics	3.99	.457	.105	
	BSEd - English	3.91	.514	.143	
	BSEd - Social Studies	4.00	.677	.155	
	BSEd - Filipino	3.89	.460	.133	
Planning	BSEd - Science	3.56	.656	.137	.412
	BEEd	3.64	.668	.179	
	BECEd	4.02	.645	.156	
	BSNEd	3.73	.401	.100	
	BPEd	3.91	.507	.146	
	BTLEd	3.87	.598	.107	
	BSEd – Mathematics	3.90	.416	.096	
	BSEd - English	4.00	.449	.125	
	BSEd - Social Studies	3.80	.694	.159	
	BSEd - Filipino	3.92	.441	.127	
Informational Management Strategies	BSEd - Science	3.60	.649	.135	.312
	BEEd	3.51	.560	.150	
	BECEd	3.86	.556	.135	
	BSNEd	3.73	.501	.125	
	BPEd	3.93	.458	.132	
	BTLEd	3.90	.551	.099	
	BSEd – Mathematics	4.12	.518	.119	
	BSEd - English	4.11	.620	.172	
	BSEd - Social Studies	4.11	.776	.178	
	BSEd - Filipino	4.20	.533	.154	
Debugging Strategies	BSEd - Science	3.72	.525	.109	.110
	BEEd	3.64	.801	.214	
	BECEd	4.05	.615	.149	
	BSNEd	4.04	.486	.121	
	BPEd	4.20	.591	.171	
	BTLEd	4.11	.604	.108	
Comprehension Monitoring	BSEd – Mathematics	3.80	.319	.073	.122
	BSEd - English	3.94	.337	.093	

	BSEd - Social Studies	3.90	.614	.141	
	BSEd - Filipino	3.92	.524	.151	
	BSEd - Science	3.62	.580	.121	
	BEEd	3.39	.596	.159	
	BECEd	3.83	.502	.122	
	BSNEd	3.60	.411	.103	
	BPEd	3.88	.388	.112	
	BTLEd	3.88	.631	.113	
	BSEd – Mathematics	3.89	.419	.096	
	BSEd - English	3.92	.423	.117	
	BSEd - Social Studies	3.87	.727	.167	
	BSEd - Filipino	4.06	.482	.139	
	BSEd - Science	3.47	.637	.133	
Evaluation	BEEd	3.43	.679	.181	.038
	BECEd	3.86	.584	.142	
	BSNEd	3.68	.592	.148	
	BPEd	3.92	.515	.149	
	BTLEd	3.94	.651	.117	
	BSEd – Mathematics	3.92	.361	.083	
	BSEd - English	3.97	.375	.104	
	BSEd - Social Studies	3.93	.626	.144	
	BSEd - Filipino	3.97	.441	.127	
	BSEd - Science	3.59	.555	.116	
Metacognitive Awareness	BEEd	3.55	.551	.147	.073
	BECEd	3.95	.549	.133	
	BSNEd	3.75	.337	.084	
	BPEd	3.97	.394	.114	
	BTLEd	3.92	.569	.102	

Table 6 explores whether significant differences exist in metacognitive awareness across programs. The p-values for most sub-dimensions exceed .05, indicating no statistically significant differences among students from different teacher education programs. However, the evaluation sub-dimension yielded a p-value of .038, below the .05 alpha level, suggesting a significant difference in how students from different programs assess their cognitive processes. This result suggests that specific programs may be more effective in equipping students with evaluative metacognitive skills than others. Despite slight variations in mean scores, the results suggest that program enrollment does not significantly impact most aspects of metacognitive awareness.

These results partially contrast with existing literature. Cihanoglu (2012) found no significant metacognitive differences across subject specializations, while Young and Fry (2008) observed that program level (graduate vs. undergraduate) rather than discipline affected cognitive regulation. Research on Finnish vocational teachers also demonstrated consistent metacognitive awareness across different teaching sectors (Kallio et al., 2017). Similarly, Bogdanović et al. (2015) noted uniform metacognitive development when students followed identical curricula. The minor differences observed in evaluative metacognition might be attributed to program-specific factors. Akman and Alagöz's (2018) finding that engaged students (measured by reading habits) showed higher metacognitive awareness suggests that qualitative aspects of program experience, rather than program type, maybe more influential.

Table 7. Pairwise Multiple Comparisons of Significant Differences in the Evaluation Aspect of Regulation of Cognition by Academic Program

Program	BSEd – Math.	BSEd – Eng.	BSEd - Soc. Stud.	BSEd – Fil.	BSEd – Sci.	BEEd	BECEd	BSNEd	BPEd	BTLEd
BSEd - Math	-	0.886	0.867	0.549	0.02	0.014	0.793	0.271	0.564	0.399
BSEd – Engl.	0.886	-	0.872	0.547	0.027	0.026	0.763	0.191	0.989	0.687
BSEd - Soc. Stud.	0.867	0.872	-	0.567	0.084	0.084	1	0.435	0.849	0.695
BSEd – Fil.	0.549	0.547	0.567	-	0.013	0.012	0.359	0.063	0.7	0.825
BSEd – Sci.	0.02	0.027	0.084	0.013	-	0.704	0.068	0.352	0.033	0.007
BEEd	0.014	0.026	0.084	0.012	0.704	-	0.056	0.287	0.031	0.013
BECEd	0.793	0.763	1	0.359	0.068	0.056	-	0.425	0.56	0.456
BSNEd	0.271	0.191	0.435	0.063	0.352	0.287	0.425	-	0.337	0.155
BPEd	0.564	0.989	0.849	0.7	0.033	0.031	0.56	0.337	-	0.712
BTLEd	0.399	0.687	0.695	0.825	0.007	0.013	0.456	0.155	0.712	-

The Mann-Whitney U test results reveal statistically significant differences in evaluation scores among various academic programs, indicating variations in perceived effectiveness, student performance, or assessment rigor. The most notable differences involve BSEd - Science, which shows significant disparities with BSEd - Mathematics ($p = 0.020$), BSEd - English ($p = 0.027$), BSEd - Filipino ($p = 0.013$), BPEd ($p = 0.033$), and BTLEd ($p = 0.007$). These results indicate that Science students' evaluations differ meaningfully from those in other programs. Additionally, BEEd (Bachelor of Elementary Education) exhibits significant differences with BSEd - Mathematics ($p = 0.014$), BSEd - English ($p = 0.026$), BSEd - Filipino ($p = 0.012$), BPEd ($p = 0.031$), and BTLEd ($p = 0.013$). This suggests that BEEd students may have distinct evaluation patterns compared to secondary education programs, potentially reflecting differences in pedagogical focus or student expectations. Interestingly, BSEd - Social Studies and BECEd (Bachelor of Early Childhood Education) do not show significant differences with most other programs, indicating more consistent evaluation trends. Meanwhile, BTLEd (Bachelor of Technology and Livelihood Education) stands out with strong differences from BSEd - Science ($p = 0.007$) and BEEd ($p = 0.013$), which could imply unique assessment dynamics in vocational versus academic tracks.

Table 8. Significant Differences in Metacognitive Awareness by Socio-Economic Status

Metacognitive Awareness Sub-dimensions	Socio-Economic Status	Mean	SD	Std. Error of the Mean	p value
Knowledge about Cognition	Poor	3.83	.583	.056	.928
	Lower Income	3.88	.495	.076	

	Lower middle-income	3.73	.485	.140	
	Middle middle-income	3.82	.363	.115	
	Poor	3.78	.592	.056	
	Lower Income	3.77	.517	.080	
Declarative Knowledge	Lower middle-income	3.67	.545	.157	.904
	Middle middle-income	3.84	.364	.115	
	Poor	3.83	.637	.061	
	Lower Income	3.98	.553	.085	
Procedural Knowledge	Lower middle-income	3.75	.533	.154	.663
	Middle middle-income	3.98	.506	.160	
	Poor	3.93	.671	.064	
	Lower Income	3.97	.600	.093	
Conditional Knowledge	Lower middle-income	3.82	.471	.136	.509
	Middle middle-income	3.68	.434	.137	
	Poor	3.81	.535	.051	
	Lower Income	3.92	.508	.078	
Regulation of Cognition	Lower middle-income	3.85	.498	.144	.740
	Middle middle-income	3.92	.478	.151	
	Poor	3.79	.601	.057	
	Lower Income	3.95	.550	.085	
Planning	Lower middle-income	3.83	.632	.182	.437
	Middle middle-income	4.04	.477	.151	
	Poor	3.78	.560	.053	
	Lower Income	3.88	.544	.084	
Informational Management Strategies	Lower middle-income	3.83	.558	.161	.588
	Middle middle-income	3.88	.516	.163	
	Poor	3.99	.611	.058	
	Lower Income	4.09	.648	.100	
Debugging Strategies	Lower middle-income	4.00	.693	.200	.626
	Middle middle-income	4.08	.627	.198	
	Poor	3.75	.563	.054	
	Lower Income	3.82	.491	.076	
Comprehension Monitoring	Lower middle-income	3.79	.495	.143	.748
	Middle middle-income	3.84	.469	.148	
	Poor	3.79	.631	.060	
Evaluation	Lower Income	3.85	.592	.091	.405

	Lower middle-income	3.78	.473	.137	
	Middle middle-income	3.77	.567	.179	
	Poor	3.82	.539	.051	
	Lower Income	3.90	.488	.075	
Metacognitive Awareness	Lower middle-income	3.80	.475	.137	.933
	Middle middle-income	3.90	.440	.139	

Table 8 examines whether socioeconomic status influences metacognitive awareness. Research data shows that socioeconomic background does not affect ($p > .05$) student metacognitive awareness across all sub-dimensions. Students from different financial circumstances demonstrate comparable levels of metacognitive awareness. Socioeconomic status makes no difference in the development of metacognitive skills since education experiences are more influential than economic factors in shaping these skills.

Conclusions

Teacher education students showed intensive knowledge about metacognitive abilities, which particularly focused on monitoring comprehension and implementing learning strategies. These results indicate that students can clearly recognize their knowledge gaps because they modify their learning methods. Targeted instructional interventions should focus on developing memory retention and enhancing visual learning strategies because these areas show weaker student performance. The results also indicated that sex and socioeconomic status do not impact metacognitive awareness levels among participants. Findings prove that personal background factors remain unimportant when developing metacognitive abilities because this consistency shows that these factors do not determine student performance. Across academic programs, most dimensions of metacognition showed uniformity, though minor variations in evaluative skills hinted at possible program-specific influences on how students assess their learning strategies.

Recommendations

Research-based workshops about memory strategies, along with self-evaluation techniques should be provided to students demonstrating weak performance in these areas. Specific tutoring programs should be provided to subjects who scored poorly on the metacognitive awareness inventory. Further research is needed to explore qualitative factors, such as teaching methods and student engagement, that may explain program differences and longitudinal studies to track metacognitive development throughout teacher training.

Compliance with Ethical Standards

The researchers assured strict confidentiality of the respondents. The researchers emphasized that their responses will be used solely for the purpose of research.

Respondents were given the option to answer voluntarily. Only those who signed the informed consent were given the questionnaire to answer. Grammarly was utilized in the correction and organization of the content structure.

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