

Assessing the Metacognitive Awareness of Freshman University Students: Basis for the Development of an Instructional Material in Facilitating Student-Centered Teaching

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Abstract

Metacognitive knowledge is crucial for efficient independent learning because it fosters forethought and self-reflection. This study investigated the metacognitive awareness of the 90 education freshman students at Iloilo State University of Fisheries Science and Technology Main Campus Tiwi Site for Academic Year 2023-2024, Iloilo, Philippines. The analysis was undertaken using the Statistical Package for the Social Sciences and descriptive and inferential statistics such as Mean, Standard Deviation, Frequency and Percentage, t-test, One-Wat ANOVA were used in the analysis at .05 significant level. Results revealed that students possess a very high level of implicit knowledge and knowledge related to methods, procedures or operation of equipment. However, they only demonstrate a moderate verbal or factual knowledge. In terms of regulation of cognition, students had extreme level of knowledge in the area of planning, comprehension monitoring, debugging strategies, and Evaluation. However, they demonstrate moderate level of awareness on information management strategies. In terms of regulation of cognition, student expressed an extreme level of skills in goal setting, and allocating resources prior to learning, assessing their own learning or strategy, and using appropriate strategies to correct comprehension and performance errors. But, they perceived some areas of improvement such as their ability and strategy sequences used to process information more efficiently such as organizing, elaborating, summarizing, and selective focusing. In terms of profile, gender orientation does not define what students know about themselves, strategies, and conditions under which strategies are most useful; and their knowledge about the way they plan, implement strategies, monitor, correct comprehension errors, and evaluate their learning. An instructional material must be developed for classroom used in areas such as Science, Physical Education, English, Mathematics, Filipino, and Social Science using metacognitive strategies through metacognitive questions to improve students' metacognitive ability in process new information by planning and evaluating.

Keywords: Metacognitive Awareness, Descriptive Survey, Iloilo, Philippines

Background of the Study

Freshmen university students considered first year as critical when it comes to their future success,

resistance, and persistence in school (Ribeiro et al., 2019). Oftentimes, there is a conflict between

expectations of students and reality, and therefore distress, poor academic performance, and higher drop-out rates increase in number. Another factor that freshmen students need to learn is to be oriented in the new academic setting and predict many social distractions which come along with being a new member of the university (Hassel & Ridout, 2018).

Metacognition, commonly known as "thinking about thinking" was introduced as a concept and as a field of investigation by John Flavell (Constantino, Sison, and De Guzman, 2020). It refers to one's awareness of the process and the ability to control it (Ovan et al., 2018). With this ability, students will be encouraged to examine how they will learn best, which in turn helps them develop self-awareness as a significant part of learning (Constantino, Sison, and De Guzman, 2020). Metacognition is considered important but most of the time being taken for granted as a component of learning (Constantino, Sison, and De Guzman, 2020). It can be applied in any course and made it part of everyday language by both teachers and students. In the current educational environment, metacognition is a powerful construct, and its systematic teaching may promote a sense of independence and autonomy among college students (Biscocho, 2021).

Jaleel and Premachandran (2016) stressed that metacognitive knowledge is crucial for efficient independent learning, because it fosters forethought and self-reflection. Good metacognitive thinkers are able to direct their learning in the proper ways to build understanding. Metacognition improves learning ability, retention and achievement. When students are supported by metacognitive instructions as cognitive supports, the effectiveness of peer interaction tasks is improved. When a teacher demonstrates the proper way of using metacognition, students' self-regulation is enhanced (Sato, 2020).

According to Craig et al. (2020), learning metacognition is one of the main goals of today's

major initiatives. School students must develop solid content knowledge by responding to various audience demands, tasks, goals, and disciplines, by critically synthesizing various resources and evaluating credible evidence. However, without a metacognitive assessment that can provide relevant data and instructional guidance, educational initiatives seem to unreliably take students' metacognitive development or adequacy for granted (Ozturk, 2017).

According to Walle et al. (2019), performing metacognition involves generating strategies to solve problems, implementing strategies, and checking whether the answers obtained correspond logically to the problems identified. To solve problems requires an analysis of metacognitive abilities.

Many studies report that freshmen tends to struggle during their first year in university in terms of keeping up with their learning difficulties (Boakye and N. A., 2017; Wulan and Noviabahari, 2018). Students need to be more self-regulated in their studies (Greene, 2021) and plan a strategy and set goals, monitor their own progress, and implement change for effective learning. These approaches are metacognitive in nature and students' learning can only be achieved if learners can acquire these skills. However, self-regulated learning remains largely absent from educational standards and curricula (Constantino, Sison, and De Guzman, 2020).

Ellery as cited by Jaleel and Premachandran (2016) evaluated the role a two-stage test process played in guiding and assisting student learning through a module in a university at South Africa and the author found that strategic and well-planned use of feedback in the assessment process is key to promoting learning. Students were generally very positive about the assessment process and there was evidence of metacognitive awareness and understanding. However, a number of students experienced difficulty and frustration in judging the quality of their work despite using this approach.

In the study of Constantino, Sison, and De Guzman (2020) on metacognitive awareness of education students in a university in Nueva Ecija, Philippines, they recommended that more studies in metacognition must be done in all the areas and levels of specialization in the College of Education to determine the necessary skills needed by the students taking up Education as their course that requires metacognitive skills in learning and in teaching. They also recommended that schools must be encouraged to hold training programs for students on how to use strategies and skills in metacognition, more so, for college students who will become future educators.

However, as observed by the researcher, the education system in the university does not give sufficient attention to the metacognition process. In this context, the researcher got an interest in the area metacognition and decided to develop a learning module to support a student-centered classroom by analyzing the metacognitive awareness of freshman university students on predetermined indicators and examining the relationship between the knowledge about cognition and regulation of cognition.

Objectives of the Study

This study stems from the following needs and problems: (1) many freshman university students tends to struggle during their first year in university in terms of keeping up with their learning difficulties; (2) students need to be more self-regulated in their studies and plan a strategy and monitor their own progress for effective learning; (3) self-regulated learning remains largely absent from educational standards and curricula of educational institutions; (4) despite the utilization of pedagogical approaches to promote learning in the classrooms, there are many college students who experience difficulty and frustration in judging the quality of their work; (5) here should more studies in metacognition must be done in all the areas and levels of specialization in the college of education to determine the necessary skills needed by the students taking up education as their course that

requires metacognitive skills in learning and in teaching; (6) the absence of metacognitive assessment that can provide relevant data, instructional guidance, and educational initiatives seem to unreliably take students' metacognitive development or adequacy for granted; and (7) the education system does not give sufficient attention to the metacognition process. The study investigated the metacognitive awareness of the education freshman students at Iloilo State University of Fisheries Science and Technology Main Campus Tiwi Site for Academic Year 2023-2024.

With this, this study aimed to:

1. find out the metacognitive awareness of the BS education students in terms of knowledge (declarative, procedural, and conditional) and regulation (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation when taken as a whole and when grouped as to sex and specialization);
2. find out whether there exist any significant differences in the metacognitive awareness of BS education students in terms of knowledge (declarative, procedural, and conditional) and regulation (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when grouped as to sex and specialization;

Methodology

This study adopted the descriptive-survey type of research design since it aims to develop and evaluate a learning module in facilitating a student-centered teaching based on students' metacognitive awareness and by integrating metacognitive strategy and implementation in the evaluation process. It was conducted at Iloilo State University of Fisheries Science and Technology in Barotac Nuevo, Iloilo, Philippines. All ninety (90) officially enrolled freshman BS Education students during the 2nd Semester of the Academic Year 2023-2024 were utilized as respondents of this study. To determine the metacognitive

processes of the students, the Metacognitive Awareness Inventory developed by the Academic Support Center, Rowan College of South Jersey was used. The instrument consists of Parts A and B. Part A of the survey gathered student demographic information; specifically, sex (Male, Female) and specialization (Mathematics, English, Social Sciences, Science, Physical Education, and Filipino). Part B of the survey consists of 52 questions related to metacognition processes. The metacognition awareness inventory is grouped into two: Knowledge on Cognition (declarative, procedural, and conditional), and Regulation of

Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation). The students were instructed to check True-False for each item.

The analysis was undertaken using the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive and inferential statistics such as Mean, Standard Deviation, Frequency and Percentage, t-test, One-Wat ANOVA were used in the analysis at .05 significant level. The total score for that chart would be 5/8. For interpretation the following scale was used:

Index	Semantic Differential	Scale	Verbal Description	Definition
0	False	.80 – 1.00	Extremely Metacognitively Aware	Students demonstrate very high level of self-knowledge: They are extremely familiar what strategies and conditions work best for them while they are learning.
1	True	.60 – .79	Moderately Metacognitively Aware	Students demonstrate moderate level of self-knowledge: They are moderately familiar what strategies and conditions work best for them while they are learning.
		.40 - .59	Somewhat Metacognitively Aware	Students demonstrate somewhat accepting level of self-knowledge: They are somewhat familiar what strategies and conditions work best for them while they are learning.
		.20 - .39	Slightly Metacognitively Aware	Students demonstrate low level of self-knowledge: They are slightly familiar what strategies and conditions work best for them while they are learning.
		.00 - .19	Not at all Metacognitively Aware	Students are not familiar what strategies and conditions work best for them while they are learning.

Results and Discussion

Character of Respondents

Table 1 presents the distribution of the freshman students in the college of education according to their gender orientation and specialization.

As to gender orientation, a little less than three-fourths (70.1 percent) were female and a little less than one-third (29.9 percent) were male.

In terms of specialization, a little more than one-fourth (25.3 percent) specialized in English, a little less than one-fourth (23.0 percent) were Physical Education and Social Science (23.0 percent), a little less than one-fifth (18.4%) specialized in Science, less than one-tenth (5.7 percent) were Mathematics and Filipino (4.6 percent).

Table 1. Profile of the Respondents (n=87)

Demographic Profile	F	Percent (%)
Gender Orientation		
Male	26	29.9
Female	61	70.1
Total	87	100.00
Specialization		
Science	16	18.4
Physical Education	20	23.0
English	22	25.3
Filipino	4	4.6
Mathematics	5	5.7
Social Science	20	23.0
Total	87	100.00

Metacognitive Awareness of the Respondents in terms of Knowledge about Cognition (Declarative, Procedural, And Conditional) and Regulation of Cognition (Planning, Comprehensive Monitoring, Information Management Strategies, Debugging Strategies, And Evaluation) when Taken as a Whole (n=87)

Table 2 shows the awareness of the respondents in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when taken as a whole.

As to Knowledge about Cognition, the results showed that the respondents had extreme level of Procedural and Conditional Knowledge (M=.88, SD=.17; M=.89, SD=.14, respectively). However, they only had moderate level of Declarative Knowledge (M=.71, SD=.19).

In terms of Regulation of Cognition, the results showed that the students had extremely metacognitively awareness in the area of planning (M=.89, SD=.14), Comprehension Monitoring (M=.89, SD=.16), debugging strategies (M=.94, SD=.11), and Evaluation (M=.83, SD=.18). However, they demonstrate a moderately metacognitively awareness on information management strategies (M=.79, SD=.16).

Of the 52 items in the questionnaire, the first five (5) items with the highest mean were “I learn more when I am interested in the topic (46).” (M=1.0, SD=.00), “I stop and reread when I get confused (52).” (M=.99, SD=.11), “I ask myself periodically if I am meeting my goals (1).” (M=.98, SD=.15), “I try to use strategies that have worked in the past (3).” (M=.98, SD=.15), “I understand my intellectual strengths and weaknesses (5).” (M=.98, SD=.15), and “I think about what I really need to learn before I begin a task (6).” (M=.98, SD=.15).

On the other hand, the five (5) items with the lowest mean were “I am good at remembering information (17).” (M=.39, SD=.49), “I draw pictures or diagrams to help me understand while learning (37).” (M=.46, SD=.50), “I am good at organizing information (12).” (M=.54, SD=.50), “I focus on overall meaning rather than specifics (48).” (M=.60, SD=.49), and “I am a good judge of how well I understand something (32).” (M=.62, SD=.49).

In contrast to these findings, the study of Saricoban (2015) on metacognitive awareness of pre-service English language teachers in terms of various variables determined the pre-service elementary school teacher candidates’ opinions on their beliefs about metacognitive awareness have been examined in this current study. The results

have shown that they have a high level of metacognition awareness in their academic studies. They seem to have sound knowledge about cognition including procedural, declarative, and conditional knowledge and regulation of

cognition consisting of various strategies ranging from information management, debugging, planning, comprehension monitoring, and evaluation.

Table 2 Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Taken as a Whole

Knowledge About Cognition	M	SD	Description
Declarative Knowledge			
5. I understand my intellectual strengths and weaknesses.	.98	.15	Extremely Metacognitively Aware
10. I know what kind of information is most important to learn.	.86	.35	Extremely Metacognitively Aware
12. I am good at organizing information.	.54	.50	Somewhat Metacognitively Aware
16. I know what the teacher expects me to learn.	.68	.47	Moderately Metacognitively Aware
17. I am good at remembering information.	.39	.49	Slightly Metacognitively Aware
20. I have control over how well I learn.	.63	.49	Moderately Metacognitively Aware
32. I am a good judge of how well I understand something.	.62	.49	Moderately Metacognitively Aware
46. I learn more when I am interested in the topic.	1.0	.00	Extremely Metacognitively Aware
$\bar{X}M=$.71	.19	Moderately Metacognitively Aware
Procedural Knowledge			
3. I try to use strategies that have worked in the past.	.98	.15	Extremely Metacognitively Aware
14. I have a specific purpose for each strategy I use.	.92	.27	Extremely Metacognitively Aware
27. I am aware of what strategies I use when I study.	.95	.21	Extremely Metacognitively Aware
33. I find myself using helpful learning strategies automatically.	.67	.47	Moderately Metacognitively Aware
$\bar{X}M=$.88	.17	Extremely Metacognitively Aware
Conditional Knowledge			
15. I learn best when I know something about the topic.	.97	.18	Extremely Metacognitively Aware
18. I use different learning strategies depending on the situation.	.95	.21	Extremely Metacognitively Aware
26. I can motivate myself to learn when I need to.	.90	.31	Extremely Metacognitively Aware
29. I use my intellectual strengths to compensate for my weaknesses.	.87	.33	Extremely Metacognitively Aware
35. I know when each strategy I use will be most effective.	.75	.44	Moderately Metacognitively Aware

	\bar{X}	M	
	.89	.14	Extremely Metacognitively Aware
Regulation of Cognition			
Planning			
4. I pace myself while learning in order to have enough time.	.84	.37	Extremely Metacognitively Aware
6. I think about what I really need to learn before I begin a task.	.98	.15	Extremely Metacognitively Aware
8. I set specific goals before I begin a task.	.90	.31	Extremely Metacognitively Aware
22. I ask myself questions about the material before I begin.	.88	.32	Extremely Metacognitively Aware
23. I think of several ways to solve a problem and choose the best one.	.90	.31	Extremely Metacognitively Aware
42. I read instructions carefully before I begin a task.	.97	.18	Extremely Metacognitively Aware
45. I organize my time to best accomplish my goals	.78	.42	Moderately Metacognitively Aware
	.89	.14	Extremely Metacognitively Aware
Comprehension Monitoring			
1. I ask myself periodically if I am meeting my goals.	.98	.15	Extremely Metacognitively Aware
2. I consider several alternatives to a problem before I answer.	.94	.23	Extremely Metacognitively Aware
11. I ask myself if I have considered all options when solving a problem.	.77	.42	Moderately Metacognitively Aware
21. I periodically review to help me understand important relationships.	.85	.36	Extremely Metacognitively Aware
28. I find myself analyzing the usefulness of strategies while I study.	.93	.25	Extremely Metacognitively Aware
34. I find myself pausing regularly to check my comprehension.	.83	.38	Extremely Metacognitively Aware
49. I ask myself questions about how well I am doing while I am learning something new.	.91	.29	Extremely Metacognitively Aware
	.86	.16	Extremely Metacognitively Aware
Information Management Strategies			
9. I slow down when I encounter important information.	.90	.31	Extremely Metacognitively Aware
13. I consciously focus my attention on important information.	.91	.29	Extremely Metacognitively Aware
30. I focus on the meaning and significance of new information.	.93	.25	Extremely Metacognitively Aware
31. I create my own examples to make information more meaningful.	.78	.42	Moderately Metacognitively Aware
37. I draw pictures or diagrams to help me understand while learning.	.46	.50	Somewhat Metacognitively Aware
39. I try to translate new information into my	.89	.32	Extremely Metacognitively Aware

own words.

41. I use the organizational structure of the text to help me learn. .83 .38 Extremely Metacognitively Aware

43. I ask myself if what I'm reading is related to what I already know. .93 .25 Extremely Metacognitively Aware

47. I try to break studying down into smaller steps. .72 .45 Moderately Metacognitively Aware

48. I focus on overall meaning rather than specifics. .60 .49 Moderately Metacognitively Aware

$\bar{X}M =$.79 .16 Moderately Metacognitively Aware

Debugging Strategies

25. I ask others for help when I don't understand something. .92 .27 Extremely Metacognitively Aware

40. I change strategies when I fail to understand. .89 .32 Extremely Metacognitively Aware

44. I re-evaluate my assumptions when I get confused. .97 .18 Extremely Metacognitively Aware

51. I stop and go back over new information that is not clear. .97 .18 Extremely Metacognitively Aware

52. I stop and reread when I get confused. .99 .11 Extremely Metacognitively Aware

$\bar{X}M =$.94 .11 Extremely Metacognitively Aware

Evaluation

7. I know how well I did once I finish a test. .74 .44 Moderately Metacognitively Aware

19. I ask myself if there was an easier way to do things after I finish a task. .87 .33 Extremely Metacognitively Aware

24. I summarize what I've learned after I finish. .76 .43 Moderately Metacognitively Aware

36. I ask myself how well I accomplish my goals once I'm finished. .85 .36 Extremely Metacognitively Aware

38. I ask myself if I have considered all options after I solve a problem. .79 .41 Moderately Metacognitively Aware

50. I ask myself if I learned as much as I could have once I finish a task. .89 .32 Extremely Metacognitively Aware

$\bar{X}M =$.83 .18 Extremely Metacognitively Aware

Scale: .80 – 1.00 Extremely Metacognitively Aware
 .60 – .79 Moderately Metacognitively Aware
 .40 - .59 Somewhat Metacognitively Aware
 .20 - .39 Slightly Metacognitively Aware
 .00 - .19 Not at all Metacognitively Aware

Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Gender Orientation

Table 3 shows the awareness of the respondents in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when they are grouped according to gender orientation.

Knowingly, male and female respondents demonstrate a moderate level of declarative knowledge of cognition (M=.73, SD=.18; M=.71, SD=.19, respectively).

In terms of regulation of cognition, male students were extremely metacognitively aware on information management strategies (M=.81,

SD=.13) than female counterparts (M=.79; SD=.17) but with negligible difference on their mean scores.

Further, the results showed an extreme level of metacognitive awareness among students in other parameters, both in Knowledge and Regulation of Cognition.

Table 3 Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped According to Gender Orientation

Parameters	Male			Female		
	M	SD	Des	M	SD	Des
Knowledge About Cognition						
Declarative Knowledge	.73	.18	Moderately Metacognitively Aware	.71	.19	Moderately Metacognitively Aware
Procedural Knowledge	.89	.19	Extremely Metacognitively Aware	.87	.17	Extremely Metacognitively Aware
Conditional Knowledge	.89	.14	Extremely Metacognitively Aware	.89	.15	Extremely Metacognitively Aware
Regulation of Cognition						
Planning	.91	.14	Extremely Metacognitively Aware	.89	.14	Extremely Metacognitively Aware
Comprehension Monitoring	.90	.18	Extremely Metacognitively Aware	.88	.15	Extremely Metacognitively Aware
Information Management Strategies	.81	.13	Extremely Metacognitively Aware	.79	.17	Moderately Metacognitively Aware
Debugging Strategies	.97	.09	Extremely Metacognitively Aware	.93	.11	Extremely Metacognitively Aware
Evaluation	.83	.20	Extremely Metacognitively Aware	.84	.17	Extremely Metacognitively Aware
Scale:	.80 – 1.00		Extremely Metacognitively Aware			
	.60 – .79		Moderately Metacognitively Aware			
	.40 - .59		Somewhat Metacognitively Aware			
	.20 - .39		Slightly Metacognitively Aware			
	.00 - .19		Not at all Metacognitively Aware			

Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped According to Specialization

Table 4 shows the metacognitive awareness of education students in terms of knowledge about cognition (declarative, procedural, and conditional) and regulation of cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when grouped according to specialization

As to knowledge about cognition, students who specialized in Mathematics and Social Science

were extremely metacognitively aware in terms of declarative knowledge about cognition (M=.86, SD=.09; M=.80, SD=.15, respectively). However, results showed that students who specialized in Physical Education, English and Filipino demonstrate only a moderate declarative knowledge about cognition (M=.65, SD=.15; M=.76, SD=.16; M=.78, SD=.21, respectively). Expressively, those who specialized in Science were somewhat metacognitively aware in terms on their declarative knowledge about cognition (M=.55, SD=.20).

In terms of Regulation of Cognition, student who specialized in Science and Physical Education demonstrate a moderate metacognitive awareness on information management strategies (M=.71; SD=.15; M=.77; SD=.15, respectively) and evaluation (M=.73; SD=.19; M=.79; SD=.22, respectively).

Table 4 Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped According to Specialization

Parameters	Science			Physical Education			English			Filipino			Mathematics			Social Science		
	M	SD	Des	M	SD	Des	M	SD	Des	M	SD	Des	M	SD	Des	M	SD	Des
Knowledge About Cognition																		
1. Declarative	.55	.20	SO	.65	.15	M	.76	.16	M	.78	.21	M	.86	.09	E	.80	.15	E
2. Procedural	.77	.21	M	.85	.15	E	.91	.12	E	.81	.38	E	.90	.22	E	.98	.08	E
3. Conditional	.88	.20	E	.87	.15	E	.88	.12	E	.90	.20	E	1.0	.00	E	.89	.14	E
Regulation Of Cognition																		
1. Planning	.83	.15	E	.84	.17	E	.88	.14	E	1.0	.00	E	1.0	.00	E	.96	.08	E
2. Comprehension Monitoring	.84	.16	E	.82	.22	E	.91	.10	E	.89	.21	E	.91	.13	E	.96	.08	E
3. Information Management Strategies	.71	.15	M	.77	.15	M	.81	.18	E	.87	.80	E	.80	.23	E	.85	.11	E
4. Debugging Strategies	.96	.08	E	.96	.10	E	.93	.12	E	1.0	.00	E	.92	.18	E	.93	.12	E
5. Evaluation	.73	.19	M	.79	.22	M	.85	.17	E	.92	.17	E	.93	.09	E	.91	.10	E

Scale:	.80 – 1.00	Extremely Metacognitively Aware (E)
	.60 – .79	Moderately Metacognitively Aware (M)
	.40 - .59	Somewhat Metacognitively Aware (SO)
	.20 - .39	Slightly Metacognitively Aware (SL)
	.00 - .19	Not at all Metacognitively Aware (N)

Difference in the Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Gender Orientation

Table 5 shows the difference in the metacognitive awareness of education students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Gender Orientation.

The results showed that there is a slight difference in the means of the metacognitive awareness of the respondents in terms knowledge about cognition of two groups. And when these means in the metacognitive awareness of students in terms declarative knowledge ($t=.437$, $p>0.05$), procedural knowledge ($t=.520$, $p>0.05$), and conditional knowledge ($t=.202$, $p>0.05$) were tested using the Independent Sample t-test, it was found out that the difference was not significant at 0.05 level. The hypothesis stating that that there is no significant difference in the metacognitive awareness of education students on Knowledge about Cognition in terms of declarative knowledge, procedural knowledge, and conditional knowledge when grouped according to gender orientation finds support in this study.

These results found support from the study of Jaleel & Premachandran (2016) on the Metacognitive Awareness of Secondary School Students. The mean and standard deviation of

metacognitive awareness of secondary school boys are 110.63 & 14.67 and that are 114.30 & 30.72 respectively. When the differences in means of secondary school boys and girls were tested for significance of difference between means, we get a t- value of 1.07 which is less than the values for .01 and .05 levels of significance. Hence it is inferred that there is no significant difference in the metacognitive awareness of secondary school students based on Gender.

Moreover, there is a slight difference in the means of the metacognitive awareness of the respondents in terms regulation of cognition of two groups. And when the means in the metacognitive awareness of education students in terms of planning ($t=.644$, $p>0.05$), comprehension monitoring ($t=.346$, $p>0.05$), information management strategies ($t=.506$, $p>0.05$), debugging ($t=1.375$, $p>0.50$), and evaluation ($t=-.216$, $p>0.05$) were tested using the Independent Sample t-test, it was found out that the difference was not significant at 0.05 level. The hypothesis stating that there is no significant difference in the metacognitive awareness of education students on regulation of cognition in terms of planning, comprehension monitoring, information management strategies, debugging, and evaluation when grouped according to gender orientation also finds support in this study.

Generally, the results showed that there is no statistically significant difference in the metacognitive awareness of education students on knowledge about cognition (declarative, procedural, and conditional) and regulation of cognition (planning, comprehension monitoring, information management strategies, debugging, and evaluation) when they are grouped according to gender orientation.

Table 5 Difference in the Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Gender Orientation

Knowledge about Cognition	t	Df	Sig	Decision
Declarative	.427	85	.670	Accept H _o
Procedural	.520	85	.605	Accept H _o
Conditional	.202	85	.840	Accept H _o
Regulation of Cognition				
Planning	.644	85	.522	Accept H _o
Comprehension Monitoring	.346	85	.730	Accept H _o
Information Management Strategies	.506	85	.614	Accept H _o
Debugging	1.375	85	.173	Accept H _o
Evaluation	-.216	85	.830	Accept H _o

Difference in the Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Specialization

Table 6 shows the difference in the metacognitive awareness of education students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Specialization.

The results showed that there is a slight difference in the means of the metacognitive awareness of the respondents in terms knowledge about cognition of the different specializations (Science, Physical Education, English, Filipino, Mathematics, and Social Science). And when these means in the metacognitive awareness of students in terms declarative knowledge ($F=6.455$, $p<0.05$) and procedural knowledge ($F=.3.348$, $p<0.05$) were tested using the One Way Analysis of Variance (One-Way ANOVA), it was found out

that the differences were significant at 0.05 level. However, the mean difference in terms of conditional knowledge ($F=.652$, $p>0.05$) was not significant. The hypothesis stating that that there is no significant difference in the metacognitive awareness of education students on Knowledge about Cognition in terms of declarative knowledge and procedural knowledge when grouped according to gender orientation finds support in this study but not in terms of conditional knowledge.

On the other hand, there is a slight difference in the means of the metacognitive awareness of the respondents in terms regulation of cognition of all groups. And when the means in the metacognitive awareness of education students in terms of planning ($F= 3.661$, $p<0.05$) and evaluation ($F=-2.724$, $p<0.05$) were tested using the One Way Analysis of Variance (One-Way ANOVA), it was found out that the differences were significant at 0.05 level. However, when the means of comprehension monitoring ($F=2.059$, $p>0.05$), information management strategies ($F=1.782$, $p>0.05$), and debugging ($F=.596$, $p>0.50$) were tested using the same procedure, the differences were found not significant at 0.05 level. The hypothesis stating that there is no significant

difference in the metacognitive awareness of education students on regulation of cognition in terms of planning and evaluation when grouped according to specialization does not find support in this study. However, the results support the outcomes in terms of comprehension monitoring, information management strategies, and debugging.

Generally, when the respondents were grouped according to specialization, the results showed

that there are statistically significant differences in the declarative and procedural knowledge of the respondents but not in terms of conditional knowledge. As to regulation of cognition, the differences were significant only in terms of planning and evaluation but in terms of comprehension monitoring, information management strategies, and debugging, the differences were noted not significant.

Table 6: Difference in the Metacognitive Awareness of Education Students in terms of Knowledge about Cognition (declarative, procedural, and conditional) and Regulation of Cognition (planning, comprehensive monitoring, information management strategies, debugging strategies, and evaluation) when Grouped as to Specialization

Parameters		Sum of Squares	df	Mean Square	F	Sig.	Decision
Knowledge about Cognition							
Declarative Knowledge	Between Groups	.874	5	.175	6.455	.000	Reject H ₀
	Within Groups	2.192	81	.027			
	Total	3.066	86				
Procedural Knowledge	Between Groups	.447	5	.089	3.348	.008	Reject H ₀
	Within Groups	2.161	81	.027			
	Total	2.608	86				
Conditional Knowledge	Between Groups	.073	5	.015	.652	.661	Accept H ₀
	Within Groups	1.823	81	.023			
	Total	1.896	86				
Regulation of Cognition							
Planning	Between Groups	.316	5	.063	3.661	.005	Reject H ₀
	Within Groups	1.397	81	.017			
	Total	1.713	86				
Comprehension	Between Groups	.235	5	.047	2.059	.079	Accept H ₀
	Within Groups	1.852	81	.023			
	Total	2.087	86				
Information	Between Groups	.221	5	.044	1.782	.126	Accept H ₀
	Within Groups	2.006	81	.025			
	Total	2.227	86				
Debugging	Between Groups	.036	5	.007	.596	.703	Accept H ₀
	Within Groups	.979	81	.012			
	Total	1.015	86				
Evaluation	Between Groups	.400	5	.080	2.724	.025	Reject H ₀
	Within Groups	2.378	81	.029			
	Total	2.778	86				

Conclusions:

Students possess a very high level of implicit knowledge and knowledge related to methods, procedures or operation of equipment. They are extremely familiar how to perform a specific skill or task. However, they only demonstrate a moderate verbal or factual knowledge. They have an average amount of knowledge how to describe things, events, or processes; their attributes and relation to each other. Student are also moderately familiar what strategies and conditions work best for them while they are learning. In terms of regulation of cognition, students had extreme level of knowledge in the area of planning, comprehension monitoring, debugging strategies, and Evaluation. However, they demonstrate moderate level of awareness on information management strategies.

In terms of regulation of cognition, student expressed an extreme level of skills in goal setting, and allocating resources prior to learning, assessing their own learning or strategy, and using appropriate strategies to correct comprehension and performance errors. But, they perceived some areas of improvement such as their ability and strategy sequences used to process information more efficiently such as organizing, elaborating, summarizing, and selective focusing. Further, a moderate level of ability of students to analyze the effectiveness of their performance and strategy after a learning experience has been observed when their specialization was considered in the analysis.

As to specific cognitive activity expressed through their learning strategies, students learn more when they are interested in the topic, stop and reread when they get confused, evaluate self periodically if they are meeting their goals, try to use strategies that have worked in the past, understand their intellectual strengths and weaknesses, and think about what they really need to learn before they begin a task. Nonetheless, students expressed their weakness in terms of remembering information, drawing pictures or diagrams to help understand the topic or lesson while learning, organizing

information, focusing on overall meaning rather than specifics, and evaluation their own learning.

In terms of profile, gender orientation does not define what students know about themselves, strategies, and conditions under which strategies are most useful; and their knowledge about the way they plan, implement strategies, monitor, correct comprehension errors, and evaluate their learning. However, student skills as reflected in their mean scores, vary in terms of planning, goal setting, and allocating resources prior to learning; and analysis of performance and strategy effectiveness after a learning experience.

Recommendations:

Teachers who help learners develop an awareness of themselves by allowing them to reflect on what they know, care about, and are able to do, give valuable information for their instruction. Since effective instruction in the class rooms enhances students' metacognitive ability.

The study showed that gender orientation does not influence the metacognitive ability of students but specialization does. Therefore, what is needed are innovative teaching methods and learning activities in a variety of subject areas that will improve the metacognitive level of knowledge of students and other allow other processes such planning, information management, and evaluation to operate at an executive level. Students must develop the ability to manage information (information management) and evaluate the appropriateness of the strategies (evaluate) they use to learn a topic or a lesson.

Activities that encourage a reflective learning or motivate students to be familiar about their own skills, intellectual resources and abilities such as use of photographs, videos, assignments, transcripts of interviews, completed projects, etc. should be embedded in the regular activities of a classroom. When teacher helps students identify their own strengths and strategies, or identify gaps in theory own learning and areas for improvement, they can have a lasting impact on how their students learn once they leave their classrooms.

An instructional material must be developed for classroom used in areas such as Science, Physical Education, English, Mathematics, Filipino, and Social Science using metacognitive strategies through metacognitive questions to improve students' metacognitive ability in process new information by planning and evaluating. This investigation is just an initial stage of the development procedure of a learning material and was able to determine the targeted competencies such remembering information, drawing pictures or diagrams to help understand the topic or lesson while learning, organizing information, focusing on overall meaning rather than specifics, and evaluation their own learning.

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