Metacognitive Skills of Grade 10 Students

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Abstract— This study aimed to assess the metacognitive skills of the Grade 10 students in Matnog District Division of Sorsogon Province for school year 2022-2023. It employed a descriptive-survey method of research which involved the 150 Grade 10 students from the different secondary schools in Matnog District. Also, an instrument was used in gathering the primary data in which the statistical tools utilized were frequency, percentage, and weighted mean. It was revealed that majority of the study spent 6 hours and below in studying, doing household chores, and engaging in entertainment. However, they slept for 7 hours and above. The students who studied, done household chores, and engaged in entertainment for 7 hours and above are very much so in their metacognitive skills along cognitive strategy, planning, and self-checking. On the other hand, the students engaged in entertainment for 4 to 6 hours are very much so aware of their metacognitive skills.

Keywords— awareness, cognitive strategy, metacognitive, planning, self-checking

I. INTRODUCTION

In today's situation, the learning of science concepts has been a difficulty for the students that is why the teachers have been thinking of various approaches and pedagogies on how understanding can easily be acquired. Metacognition is an effective and efficient strategy that the teachers may use to assist the students develop their acquisition, understanding, application, and retention of difficult concepts and skills in science. According to Stephenson (2021) that metacognition is commonly referred to as 'learning to learn' and it is where students develop an understanding of their own learning processes. Metacognition has two distinct parts; metacognitive knowledge, which refers to the knowledge students have about specific tasks and strategies as well as their knowledge of themselves as a learner, and metacognitive regulation which addresses their ability to plan, monitor and evaluate their own learning processes.

In addition, Flavell (1979) explained metacognition as; it expresses the individual's knowledge of cognitive processes and outcomes, or anything related to them. Brown (1987) defines metacognition as students' thinking in detail about their cognitive skills and self-regulation during learning. Nelson (1999) assess metacognition as "a special type of cognition" and defines it as "cognitions of the individual about his own cognitions".

Kesici, Guvercin, and Kucukakca (2021) described that in Turkey the effects of metacognitive knowledge, metacognitive control and metacognitive monitoring, which are different sub-dimensions of metacognition, on

the performance of the learning from texts and general intelligence. Similarly, the metacognition in Japan has effects of the second language (English) on students' motivational self and metacognitive skills, and it has been concluded that hands on activities has a positive effect on students' metacognitive skills. Meanwhile, the metacognitive strategy in Singapore showed positive relationship between metacognitive awareness and reading comprehension.

It has been reported that the state performance of Filipino students in science national and international examinations remained poor. The Philippine Department of Education (DepEd) recognizes the need for addressing this issue on scientific literacy after the country got a poor ranking in the Programme for International Student Assessment (PISA) in 2018. The PISA is a student assessment of 15-year-old learners across 79 countries done by the Organization for Economic Cooperation and Development (OECD) as part of the Quality Basic Education reform plan and a step towards globalizing the quality of Philippine basic education (DepEd, 2019). It looks into the extent to which the students have acquired key knowledge and skills that are essential for full participation in modern societies (OECD, 2018).

Moreover, Velasques and Bueno (2019) stressed that learning science concepts and solving problems serve as the threshold to the endeavor and advocacies of all professionals and educational institution to provide quality Science Education and has been the pinnacle goal of Philippine's curricular innovations which aim to holistically inculcate critical, analytical, and problem-

solving skills of the students. This rationalizes in the formation of K-12 curriculum legally based on RA No. 10533, also known as the "Enhanced Basic Education Act of 2013". Curricular innovations have become a crucial aspect of improving education, this is for a rationale that curriculum echoes the needs of the economy, thus making education realized in the world of work.

In the same manner, the Philippines' low performance in science poses a serious challenge on teachers, as they are the prime movers of education. It can be viewed that teachers possess both the privilege and responsibility in helping to address some issues in our educational system. This privilege is priceless in a sense that teachers have a direct influence on the students in shaping their minds and hence, in building the nation's future leaders. However, the price of this privilege is a greater weight of responsibility on the teachers' end. Teachers bear the greater responsibility in the case of low performance on the National Achievement Test (NAT) in science. In essence, it is no doubt that every nation needs proactive teachers to embody and perform the goals of its education system.

The Asian Development Bank (2022) estimated that learning poverty for low- and middle-income economies from 57% to 70% including the Philippines. With this, it is no wonder that our country ranked one of the lowest in global assessments such as ranking last in the Trends in International Mathematics and Science Study (TIMSS) 2019 (Magsambol, 2020) and ranking 76th out of 80 participating countries at the 2018 Program for International Student Assessment (PISA) according to Organization for Economic Cooperation and Development (2018). We also ranked 51st out of 132 countries with regards to the Global Innovation Index (GII) a notch lower than last year (DOST, 2021).

In the study of Espejon and Janer (2022) it was mentioned that there are factors which hinders the students to develop their metacognitive skills in Biology which are pandemic, lack of motivation, distractions, teaching strategy, content of the lesson, inability to identify own metacognitive skills, and dislike of the subject. It was recommended to utilize teaching strategy that may give life to the content of the lesson and improve the likability of the subject by allowing the students to hone their own identified metacognitive skills.

Furthermore, the Division of Sorsogon Province has launched several science programs which may encourage the high school students to participate in their respective local schools. One of these programs is the Science Fair and Congress in which the Tiong Hen So Memorial High School in Matnog District has initiated their own version. It aimed to promote science and technology consciousness among the youth through competition with the participating schools from the following category such as life science and applied science. With this experience, the students were expected to engage in crafting their scientific abilities with the science investigatory project to be worked on and thus improving the metacognitive skills.

With this study, the researcher observed that the junior high students have decreased motivation and likelihood in developing their metacognitive skills due to distractions and lack of interest in science. Thus, it was compelled that the inclusion of the various activities that the students were engaged in their daily lives such as studying, doing household chores, sleeping, and engaging in entertainment may somehow gave the researcher the needed information in the crafting of possible intervention. It is hoped that by combining the metacognitive skills and time spent in various activities in one study may provide the empirical result which the researcher utilized in proposing the appropriate materials in enhancing the metacognitive skills of the high school students.

Generally, this study aimed to assess the metacognitive skills of the Grade 10 students in Matnog District Division of Sorsogon Province for school year 2022-2023. Specifically, it aimed to (1) describe the number of hours spent by the students in studying, doing household chores, sleeping, and engaging in entertainment; (2) determine the level of metacognitive skills of the students when grouped according to the identified variables along awareness, cognitive strategy, planning, and elf-checking.

II. METHODOLOGY

Research Design

This study aimed to determine the metacognitive skills of Grade 10 students of Matnog District for school year 2022-2023. It utilized the descriptive-survey method of research since a questionnaire was used in gathering the data.

In addition, the respondents were the Grade 10 students of selected secondary schools of Matnog District. The Slovin's formula with 5% margin of error was used in determining the sample size. Then, proportionate sampling was utilized in choosing the students to be involved in the study. The statistical tools employed were the frequency, percentage, and ranking.

The Sample

The primary source of the data were the Grade 10 students of selected secondary schools in Matnog District. It utilized the Slovin's formula with 5% margin of error in determining the appropriate sample size to be involved in the study. Then, proportionate sampling method was utilized in the actual administration of the survey.

There were 150 students Grade 10 involved in the study in which 42 (28%) students came from Tiong Hen So Memorial High School and 69 (46%) students from Matnog National High School and 39 (26%) students from Sisigon Integrated School.

The Instrument

This study used an instrument which was the Metacognition Skill Questionnaire adapted from Gormally, Brickman and Lutz (2012). It contained 5 items for each metacognitive skill namely: Awareness, Cognitive Strategy, Planning, and Self-Checking. In addition, the final form of the instrument was composed of two parts in which Part I contained the time spent of the students in various activities along studying, doing household chores, sleeping, and engaging in entertainment. The Part II included the level of metacognitive skills in which the indicators were lifted from the said questionnaire.

A dry run of the final copy of the instrument was instituted to the Grade 10 students of Culasi National High School with the purpose of face validity. Then the final copy of the instrument was prepared and presented to the adviser for approval prior to its administration to the target respondents.

Data Collection Procedures

With the instrument ready for administration, the researcher sought the approval of Schools Division Superintendent by submitting a letter of request which was personally delivered to the office. Then, the same activity was done with the school heads of the covered schools for the implementation of the said study. Likewise, the researchers have asked permission from the advisers to conduct the study among the selected Grade 10 students in Tiong Hen So High School, Matnog National High School, and Sisigon Integrated School. Furthermore, the researcher distributed the questionnaire to the students and were given enough time to accomplish. A 100% participation rate was achieved. Afterwards the researcher has retrieved the outputs, tallied, analyzed, and interpreted the data collected.

Data Analysis Procedures

The collected data from the respondents were subjected to various statistical analysis depending on its nature and level of measurement. The frequency and percentage were utilized in presenting the time spent by the students in various activities along studying, doing household chores, sleeping, and engaging in entertainment.

In the same manner, the weighted mean was used in describing the level of metacognitive skills of the students employing a 4-point Likert scale along awareness, cognitive strategy, planning, and self-checking. The scale was used in interpreting the computed value: 1.00 – 1.49 (Not at all); 1.50 – 2.49 (Somewhat); 2.50 – 3.49 (Moderately so); 3.50 – 4.00 (Much so).

III. RESULTS AND DISCUSSION

1. Number of hours spent by the students in various activities

Table 1 presents the frequency and percentage of the number of hours spent by the students in studying, doing household chores, sleeping, and engaging in entertainment.

Table 1. Number of hours spent by the students in various activities

Activities	1 to 3 hours		4 to 6 hours		7 to 9 hours		Average
	f (n=150)	%	f (n=150)	%	f (n=150)	%	
Studying	66	44	73	49	11	7	3.9
Doing household chores	81	54	66	44	3	2	3.4
Sleeping	12	8	54	36	84	56	6.4
Engaging in entertainment	67	45	69	46	14	9	3.7

The data revealed that on the average the students spent the highest number of hours in sleeping with 6.4 hours followed by studying having 3.9 hours utilized. Likewise, the students engaged in entertainment with 3.7 hours and a minimum of 3.4 hours was used in doing their household chores.

Relative to studying, the highest number of hours spent by the students in studying is between 4 to 6 hours with 73 or 49%. Then 66 or 44% have spent 2 to 3 hours in studying, and the remaining 11 or 7% have responded that they spent 7 to 9 hours in studying. Based on the figures, the majority of the students allocate 4 to 6 hours daily for studying. This implies that most of the students' established a good study habits which can greatly contribute to their success in academic endeavors. Students who study for long hours tend to perform better than those who study for short study time (Ukpong & George, 2013). Subsequently, based on the data, 1 to 3 hours is the second to the highest number of hours spent studying. This means that the time allotted to studying was given shorter time because of other factors that the student might be engaging in. In the study of Adeyemo (2005), he concluded that students' academic achievement was the outcome of a combination of the study time behavior and other factors in any course of study. Those other factors are said to be contributory to students' academic performance. Lastly, with the lowest responses received was the 7 to 9 hours which means that most of the students aren't likely to spend more than 7 hours studying. This might be because of other activities they need to spend their time with which might be directly or indirectly related to their academic performance.

In doing household chores, the data from table 2 shows that the highest number of hours spent by students in doing household chores is 1 to 3 hours with 81 or 54%, showing that the majority of the students spent the said number of hours in doing household chores. It clearly shows that students don't have longer time in spending time doing household chores because most of their time is diverted to studying, engaging in entertainment, and sleeping. Followed by 66 or 44% between 4 to 6 hours spent by students in doing household chores, only 3 or 2% of them spent by students in doing household chores during 7 to 9 hours. Household chores may negatively affect learning development because, in addition to having little time for leisure, adolescents who perform household chores have their school performance affected, more frequently miss classes, and experience school failures, and have less time to do school work (Dellazzana-Zanon, Zanon, & Freitas, 2014). Perhaps the need to perform a high level of household chores during adolescence leads to a more significant concern with material aspects in the future (Wichmann, 2014).

Reduced overnight sleep or altered sleep patterns has been associated with severe drowsiness and failure in academic success. Eliasson (2010) believes that the time it takes to fall asleep and waking up affect academic performance more than duration of sleep does. The table show that students who engage in sleeping 7 to 9 hours are 84 students of 56% showing that they have lots of time allotted in sleeping, that may affect the performance. Other suggest that sleep enhances procedural memories. On the other hand, between 4 to 6 hours there are 54 students of 36% take time on sleeping. Showing that it is lesser 20% than those of the students. Then 12 students says or 8% says that they slept at 1 to 3 hours, which implies that they are also more likely to have attention and behavior problems, which can contribute to poor academic performance in school.

The data revealed that relative to engaging in entertainment, the highest number of hours spent by the students in engaging entertainment is between 4 to 6 hours with 69 or 46%. This data shows that nowadays a lot of students allocate a big amount of time engaging in entertainment whether online or offline. This gives a good implication that the teachers can modify their pedagogical activities to include some entertainment content, since students are used to engaging in entertainment which can help student performance. A study shows that in relation to online entertainment, the use of interactive technology can also enhance learning of complex content with visuals and graphics that are more engaging than delivery methods traditionally used in schools (Collins & Halverson, 2009). Also, social media is also an entertainment tool that provides multiple opportunities to improve learning and access the latest information by connecting with learning groups and other educational systems, and ultimately, for attaining educational goals.

Therefore, it is important to determine the duration of time that they spend on social media sites and the proportion of time that is spent on social media sites for academic purposes. Then 67 or 47% have spent only 1 to 3 hours, showing also that still a great number of students engaging in entertainment. and the remaining 14 or 9% have responded that they spent 7 to

9 hours in engaging in entertainment, implying that a lesser number of students engage in engaging entertainment.

2. Level of metacognitive skills of the students when grouped according to their number of hours spent in various activities

This section discusses the level of metacognitive skills of the students when grouped according to their number of hours spent in studying, doing household chores, sleeping, and engaging in entertainment along awareness, cognitive strategy, planning, and self-checking. The weighted mean was used in analyzing the data.

Awareness and Studying. Table 2A.1 contains the weighted mean and description of the level of metacognitive skills of the students along with awareness when grouped according to the number of hours in studying.

Table 2A.1. Level of metacognitive skills along awareness relative to studying

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	
1. I was aware of my own thinking.	3.78	VMS	3.16	MS	3.43	MS
2. I was aware of which thinking technique or strategy to use and when to use it.	2.99	MS	3.18	MS	3.25	MS
3. I was aware of the need to plan my course of action.	3.27	MS	2.91	MS	3.40	MS
4. I was aware of my ongoing thinking processes.	3.44	MS	3.41	MS	3.00	MS
5. I was aware of my trying to understand the test questions before I attempted to answer them.	3.78	VMS	3.26	MS	3.80	VMS
Overall	3.45	MS	3.18	MS	3.38	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So

It can be gleaned from the table that when the students are grouped to their number of hours spent in studying relative to awareness, generally all of them are much so aware of the level of metacognitive but those who spent 3 hours and below emerged with the highest overall weighted mean of 3.45. Specifically, the students who spent 1 to 3 hours of studying are very much so aware of their own thinking and understanding the test questions before attempting to have those answered with the highest weighted mean of 3.78. Based on the given result, it can be inferred that students who spend 1 to 3 hours in studying are more aware of their own thinking and understanding of test questions before attempting to answer them. This could imply that these students have developed a more reflective approach to learning, which allows them to better understand their own learning processes and identify areas where they may need to improve.

However, it is important to note that this result does not necessarily suggest that students who spend more than 3 hours studying are less reflective or have a lower level of metacognitive. There may be other factors at play, such as the quality of the study materials or the methods used for studying.

The latter is also the highest weighted mean of students who spent 7 hours and above of studying. On the other hand, those students who spent 4 to 6 hours of studying are much so aware of their ongoing thinking processes with the highest weighted mean of 3.41. Consequently, it can be noticed that the students much so aware of the thinking technique to be used and the need to plan their course of action with the lowest weighted mean of 2.99 and 2.91, respectively.

It means that students are more likely to become aware of their own thinking and learning capabilities. Awareness as part of their metacognitive skills is considered one of the most common and crucial determinants of how well the students develop skills in relation to thinking.

This implies that spending less time studying may not necessarily be detrimental to a student's performance, as long as they are aware of their own thought process and are able to understand and interpret the test questions accurately.

The results are supported by the study of Osman and others (2011) which involved the administering a pre- and post-test to a sample of non-science major college

students, as well as collecting data on their studying habits and level of awareness of their own thought processes during the test. The results showed that the science literacy course significantly improved students' level of scientific literacy skills and awareness, and that studying habits were significantly related to these factors.

Awareness and Doing household chores. Table 2A.2 encompasses the weighted mean and description of the level of scientific literacy skills of the students along awareness when grouped according to the number of hours spent in doing household chores.

Table 2A.2. Metacognitive skills along awareness relative to doing household chores

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I was aware of my own thinking.	3.62	VMS	3.58	VMS	3.00	MS
2. I was aware of which thinking technique or strategy to use and when to use it.	3.13	MS	3.16	MS	3.00	MS
3. I was aware of the need to plan my course of action.	2.83	MS	3.45	MS	3.50	VMS
4. I was aware of my ongoing thinking processes.	3.32	MS	3.02	MS	3.00	MS
5. I was aware of my trying to understand the test questions before I attempted to answer them.	3.76	VMS	3.60	VMS	3.50	VMS
Overall	3.33	MS	3.36	MS	3.20	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So

The data revealed that generally the students are much so aware of their level of metacognitive skills when grouped according to the time spent in doing their household chores but students who spent 4 to 6 hours emerged with the highest weighted mean of 3.36. Correspondingly, the students are very much so aware of trying to understand the test questions before attempting to answer them regardless of the time spent in doing home tasks with the highest weighted mean. In addition, the students who spent up to 6 hours of completing their household chores are very much so aware of own thinking with weighted means of 3.58 to 3.62. Then, those who have more than 6 hours of doing household chores are very much so aware of planning the course of action.

The data revealed that generally the students are much so aware of their level of metacognitive skills when grouped according to the time spent in doing their household chores but students who spent 4 to 6 hours emerged with the highest weighted mean of 3.36.

It would imply that based on the given information, it can be inferred that there is a relationship between the amount of time students spend on household chores and their level of awareness of their own thinking and planning skills. Specifically, students who spend up to 6 hours completing their household chores have a higher level of awareness of their own thinking process, while those who spend more than 6 hours have a higher level of awareness of planning their course of action.

The study of Lodl (2015) supports this finding that metacognitive knowledge helps people to be better-informed and make the best decisions possible with the best available knowledge. In the long run, she added, great decisions are based on reliable, factual research.

Awareness and sleeping. Table 2A.3 presents the weighted mean and description of the level of metacognitive skills of the students along awareness when grouped according to the number of hours spent in sleeping.

Table 2A.3. Metacognitive skills along awareness relative to sleeping

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I was aware of my own thinking.	3.75	VMS	3.76	VMS	3.62	VMS
2. I was aware of which thinking technique or strategy to use and when to use it.	3.25	MS	3.10	MS	2.98	MS
3. I was aware of the need to plan my course of action.	3.50	VMS	2.97	MS	3.32	MS

	WM	D	WM	D	WM	D
4. I was aware of my ongoing thinking processes.	3.75	VMS	3.73	VMS	3.18	MS
5. I was aware of my trying to understand the test questions before I attempted to answer them.	2.96	MS	3.77	VMS	3.67	VMS
Overall	3.44	MS	3.47	MS	3.36	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Moderately So

It can be gleaned from the table that generally the students are much so aware of their level of metacognitive skills when grouped to the numbers of hours spent in sleeping. Although the students who spent of 4 to 6 hours in the said activity has the highest overall weighted mean of 3.47. In particular, the students who spent 1 to 3 hours of sleeping are very much so aware of their own thinking and ongoing thinking processes with the highest weighted mean of 3.77. Meanwhile, the students who sleep 4 hours and above are very much aware of comprehending the test questions prior to answering with the highest weighted mean from 3.67 to 3.77 in which it so happened that students who sleep 3 hours or less are much so aware of this activity having the lowest weighted mean of 2.96.

It means that based on the information provided, it can be inferred that there is a relationship between the number of hours' students spend sleeping and their level of awareness of their own thinking and comprehension skills. The data suggests that students who spend less time sleeping, specifically 1 to 3 hours, have a higher level of awareness of their own thinking and ongoing thinking processes. On the other hand, students who

sleep for 4 hours and above have a higher level of awareness of comprehending test questions prior to answering.

It is also interesting to note that students who sleep for 4 to 6 hours have the highest overall weighted mean of 3.47, indicating a relatively high level of awareness of metacognitive skills. However, the students who sleep for 1 to 3 hours has the highest weighted mean of 3.77 for awareness of their own thinking and ongoing thinking processes, suggesting that this group of students may have a particular strength in this area.

This implies that research would be needed to confirm and expand upon these findings and to explore other potential factors that may impact literacy and metacognitive skills in different contexts.

Awareness and Engaging in entertainment. Table 2A.4 comprises the weighted mean and description of the level of metacognitive skills of the students along awareness when grouped according to the number of hours spent in engaging in entertainment.

Table 2A.4.Metacognitive skills along awareness relative to engaging in entertainment

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I was aware of my own thinking.	3.27	MS	3.58	VMS	3.00	MS
2. I was aware of which thinking technique or strategy to use and when to use it.	3.13	MS	3.16	MS	3.00	MS
3. I was aware of the need to plan my course of action.	2.38	SW	3.45	MS	3.50	VMS
4. I was aware of my ongoing thinking processes.	3.32	MS	3.71	VMS	3.00	MS
5. I was aware of my trying to understand the test questions before I attempted to answer them.	3.76	VMS	3.60	VMS	3.50	VMS
Overall	3.17	MS	3.50	VMS	3.20	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Moderately So; SW-Some What

The data showed that generally the students who engaged 4 to 6 hours in entertainment are very much so aware of their level of metacognitive skills. Specifically, the students who engage in entertainment for 1 to 3 hours and 7 to 9 hours are very much so aware of

understanding the test questions before answering them with the highest weighted mean of 3.50 to 3.76. Consequently, the students who engage to entertainment for 4 to 6 hours are very much so aware of ongoing

thinking processes with the highest weighted mean of 3.71.

It implies that students who engage in entertainment for 4 to 6 hours have the highest awareness of their own ongoing thinking processes. This implies that the amount of time spent on entertainment may also impact students' cognitive and metacognitive ability to reflect on their own thinking processes. Students who engage in entertainment for 4 to 6 hours have the highest awareness of their ongoing thinking processes. This implies the amount of time spent and abilities, specifically their ability to reflect on their own thinking processes.

According to M. A. Jabbar and S. M. Khalid children who watched educational television programs had higher levels of cognitive development than children who watched non-educational programs or did not watch television at all. This suggests that the content and quality of the entertainment that children engage with could impact their cognitive development. These studies provide some evidence for the relationship between engaging in entertainment and cognitive and metacognitive abilities. However, it is important to note that the impact of entertainment on these skills may vary depending on the type of content, frequency and duration of engagement, and individual differences.

Cognitive Strategy and Studying. Table 2B.1 contains the weighted mean and description of the level of metacognitive skills of the students along cognitive strategy when grouped according to the number of hours spent in studying.

Table 2B.1. Metacognitive skills along cognitive strategy relative to studying

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I attempted to discover the main ideas in the test questions.	3.01	MS	3.42	MS	3.00	MS
2. I asked myself how the test questions related to what I already knew.	3.39	MS	3.00	MS	3.75	VMS
3. I thought about the meaning of the test questions before I began to answer them.	3.10	MS	3.00	MS	3.75	VMS
4. I used multiple thinking techniques or strategies to answer the test questions.	2.71	MS	2.97	MS	3.25	MS
5. I selected and organized relevant information to answer the test questions.	2.59	MS	3.04	MS	3.88	VMS
Overall	2.96	MS	3.09	MS	3.53	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Moderately So; SW-Some What

It can be gleaned from the table that when the students are grouped to their number of hours spent in studying relative to cognitive strategy, generally those who spent 1 to 3 hours and 4 to 6 are much so aware of the level of metacognitive skills. Specifically, the students who spent 7 to 9 hours of studying are very much so aware of their own thinking and understanding the test questions before attempting to have those answered with the highest weighted mean of 3.53.

Based on the information provided, it can be inferred that the students who spent 1 to 3 hours or 4 to 6 hours studying have a lower level of awareness of their metacognitive skills compared to those who spent 7 to 9 hours studying. Additionally, the students who spent 7 to 9 hours studying have a higher level of awareness of their own thinking and understanding of test questions before attempting to answer them, which suggests that they may have developed stronger cognitive strategies for approaching academic tasks. However, it is important to note that this inference is based solely on the information provided in the table, and additional data and analysis would be necessary to confirm these findings.

Research has shown that cognitive strategies are closely related to studying and academic performance. Cognitive strategies are mental processes that learners use to acquire, organize, remember, and use information. When students use effective cognitive strategies, they can better process and retain information, leading to improved academic performance.

Several studies have investigated the relationship between cognitive strategies and studying. For example, a study by Panadero and Alonso-Tapia (2014) found that students who reported using more cognitive strategies had higher academic achievement than those who reported using fewer strategies. Another study by Boekaerts and Corno (2005) found that students who used self-regulated learning strategies, which involve setting goals, monitoring progress, and adjusting strategies, had higher academic achievement than those who did not use these strategies.

Moreover, the amount of time spent studying has also been found to be related to academic performance. For instance, a study by Pekrun and colleagues (2017) found that the amount of time students spent studying was positively related to their academic achievement in mathematics.

In summary, cognitive strategies and studying are closely related, and the use of effective cognitive strategies can enhance academic performance. Additionally, spending more time studying can also improve academic achievement.

Cognitive Strategy and Doing household chores. Table 2B.2 covers the weighted mean and description of the level of metacognitive skills of the students along cognitive strategy when grouped according to the number of hours spent in doing household chores.

Table 2B.2. Metacognitive skills along cognitive strategy relative to doing household chores

Indicators	1 to 3 hours		4 to 6 hour		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I attempted to discover the main ideas in the test questions.	2.59	MS	3.64	VMS	3.50	VMS
2. I asked myself how the test questions related to what I already knew.	3.15	MS	3.61	VMS	4.00	VMS
3. I thought the meaning of the test questions before I began to answer them.	3.12	MS	2.99	MS	3.50	VMS
4. I used multiple thinking techniques or strategies to answer the test questions.	2.73	MS	2.98	MS	3.50	VMS
5. I selected and organized relevant information to answer the test questions.	2.06	MS	3.57	VMS	3.00	MS
Overall	2.73	MS	3.36	MS	3.50	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Moderately So

It can be gleaned from the table that generally the students are much so aware of their level of metacognitive skills when grouped to the numbers of hours spent in sleeping. Although the students who spent of 4 to 6 hours in the said activity has the highest overall weighted mean of 3.47. In particular, the students who spent 1 to 3 hours of sleeping are very much so aware of their own thinking and ongoing thinking processes with the highest weighted mean of 3.77. Meanwhile, the students who sleep 4 hours and above are very much aware of comprehending the test questions prior to answering with the highest weighted mean from 3.67 to 3.77 in which it so happened that students who sleep 3 hours or less are much so aware of this activity having the lowest weighted mean of 2.96.

While cognitive strategies are often discussed in the context of academic learning, they can also be applied to other areas of life, such as household chores.

However, research specifically investigating the relationship between cognitive strategies and household chores is limited.

One study by Nisbet and colleagues (2013) investigated the use of self-regulated learning strategies, such as setting goals and monitoring progress, in the context of completing household chores. The study found that participants who reported using more self-regulated learning strategies while doing household chores were more likely to complete the chores on time and to a higher standard.

Another study by Scholer and Munsch (2014) investigated the impact of cognitive control, which involves the ability to regulate one's own thoughts and behaviors, on motivation to complete household chores

In summary, while research on the relationship between cognitive strategies and household chores is limited, some studies have found that using self-regulated learning strategies and having strong cognitive control can enhance performance and motivation in completing household chores.

Cognitive Strategy and Sleeping. Table 2B.3 encompasses the weighted mean and description of the level of metacognitive skills of the students along cognitive strategy when grouped according to the number of hours spent in sleeping.

Table 2B.3. Metacognitive skills along cognitive strategy relative to sleeping

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I attempted to discover the main ideas in the test questions.	2.75	MS	2.47	MS	3.44	MS
2. I asked myself how the test questions related to what I already knew.	3.50	VMS	3.01	MS	3.61	VMS
3. I thought the meaning of the test questions before I began to answer them.	3.25	MS	3.00	MS	3.34	MS
4. I used multiple thinking techniques or strategies to answer the test questions.	3.25	MS	2.37	SW	3.42	MS
5. I selected and organized relevant information to answer the test questions.	2.75	MS	2.74	MS	3.54	VMS
Overall	3.10	MS	2.72	MS	3.47	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Much So; SW-Some What

Generally, the students from the given table are on the moderately so. Between 7 to 9 hours the weighted mean is 3.47, while between 4 to 6 hours gets 2.72 weighted mean. Research has shown that cognitive strategies and sleeping are closely related. Cognitive strategies are mental processes that learners use to acquire, organize, remember, and use information, and sleep is an essential process that plays a crucial role in consolidating memories and learning.

Studies have found that cognitive strategies can have an impact on sleep quality. For instance, a study by Sünram-Lea and colleagues (2011) found that individuals who used more effective cognitive strategies, such as rehearsal and elaboration, had better sleep quality than those who used less effective strategies.

Conversely, sleep has also been found to affect cognitive strategies. Sleep deprivation, in particular, has been shown to impair cognitive function, including attention, memory, and decision-making (Harrison and Horne, 1996; Van Dongen et al., 2003). Sleep deprivation can also lead to reduced motivation and productivity, which can impact the use of cognitive strategies.

In summary, cognitive strategies and sleeping are closely related, with cognitive strategies having an impact on sleep quality and sleep affecting cognitive function, including the use of cognitive strategies. Ensuring adequate sleep is crucial for maintaining optimal cognitive function and effective use of cognitive strategies.

Cognitive Strategy and Engaging in entertainment. Table 2B.4 contains the weighted mean and description of the level of metacognitive skills of the students along cognitive strategy when grouped according to the number of hours spent in engaging in entertainment.

Table 2B.4. Metacognitive skills along cognitive strategy relative to engaging in entertainment

Indicators	3 and below		4 to 6		7 and above	
	WM	D	WM	D	WM	D
1. I attempted to discover the main ideas in the test questions.	2.75	MS	2.92	MS	3.44	MS
2. I asked myself how the test questions related to what I already knew.	3.50	VMS	3.01	MS	3.61	VMS

	WM	D	WM	D	WM	D
3. I thought the meaning of the test questions before I began to answer them.	3.25	MS	3.00	MS	3.59	VMS
4. I used multiple thinking techniques or strategies to answer the test questions.	3.25	MS	2.37	MS	3.42	MS
5. I selected and organized relevant information to answer the test questions.	2.75	MS	2.74	MS	3.54	VMS
Overall	3.10	MS	2.81	MS	3.52	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Much So

Cognitive strategies are mental processes that learners use to acquire, organize, remember, and use information. The use of cognitive strategies can enhance learning and performance in academic settings. However, the relationship between cognitive strategies and engaging in entertainment is not well-studied.

Some research suggests that certain types of entertainment can have a positive impact on cognitive function. For example, playing video games that require problem-solving and strategic thinking has been shown to improve cognitive flexibility and decision-making skills (Green and Bavelier, 2012). Similarly, engaging in activities such as reading or watching educational documentaries can also enhance cognitive function.

However, excessive engagement in certain types of entertainment, such as social media and television, has been associated with negative impacts on cognitive function, such as reduced attention span and memory performance (Rosen et al., 2013).

While research specifically investigating the relationship between cognitive strategies and engaging in entertainment is limited, it is possible that the use of cognitive strategies can enhance the benefits of engaging in certain types of entertainment. For example, using cognitive strategies such as elaboration and organization while reading or watching educational content may lead to better retention and application of the information.

In summary, while the relationship between cognitive strategies and engaging in entertainment is not well-studied, certain types of entertainment can have a positive impact on cognitive function, while excessive engagement in other types of entertainment can have negative impacts. The use of cognitive strategies may enhance the benefits of engaging in certain types of entertainment. Planning and Studying. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in studying in Table 2C.1.

Table 2C.1. Metacognitive skills along planning relative to studying

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I tried to understand the goals of the test questions before I attempted to answer.	3.19	MS	3.36	MS	3.88	VMS
2. I tried to determine what the test required.	3.01	MS	3.06	MS	3.40	MS
3. I made sure I understood just what had to be done and how to do it.	3.03	MS	3.26	MS	3.80	VMS
4. I determined how to answer the test questions.	3.70	VMS	3.21	MS	3.33	MS
5. I tried to understand the test questions before I attempted to answer them.	3.06	MS	3.20	MS	3.75	VMS
Overall	3.20	MS	3.22	MS	3.63	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS- Moderately so

Planning is a cognitive strategy that involves setting goals, developing strategies, and monitoring progress towards achieving those goals. Planning is closely related to studying, as effective planning can enhance the effectiveness and efficiency of studying, leading to improved academic performance.

Research has shown that the use of planning as a cognitive strategy is positively related to academic achievement. For instance, a study by Credé and Phillips (2011) found that planning was positively related to academic achievement across a range of academic domains.

Moreover, research has shown that specific planning strategies can enhance the effectiveness of studying. For example, a study by Dabbagh and Kitsantas (2005) found that students who used goal-setting and planning strategies, such as breaking down tasks into manageable chunks and scheduling study time, had higher academic achievement than those who did not use these strategies.

Furthermore, research has shown that planning can enhance the efficiency of studying. A study by Tauber and Mester (2021) found that students who used planning strategies, such as setting specific study goals and monitoring progress towards those goals, were more efficient in their studying and had better academic performance than those who did not use these strategies.

Planning and Doing household chores. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in doing household chores in Table 2C.2.

Table 2C.2. Metacognitive skills along planning relative to doing household chores

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I tried to understand the goals of the test questions before I attempted to answer.	3.08	MS	3.16	MS	3.50	VMS
2. I tried to determine what the test required.	2.64	MS	3.51	VMS	3.50	VMS
3. I made sure I understood just what had to be done and how to do it.	2.66	MS	3.60	VMS	4.00	VMS
4. I determined how to answer the test questions.	3.34	MS	3.55	VMS	3.50	VMS
5. I tried to understand the test questions before I attempted to answer them.	3.57	VMS	3.66	VMS	4.00	VMS
Overall	3.06	MS	3.49	MS	3.70	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So

Planning is a cognitive strategy that involves setting goals, developing strategies, and monitoring progress towards achieving those goals. The use of planning strategies can be applied to a range of tasks, including household chores.

Research has shown that the use of planning strategies for household chores can enhance productivity and reduce stress.

For example, a study by Gollwitzer and Oettingen (2012) found that individuals who used implementation intentions, a specific type of planning strategy that involves linking a specific cue to a specific action, were more likely to complete household chores than those who did not use this strategy.

Moreover, research has shown that planning can enhance the efficiency of completing household chores. A study by Eisenberg and colleagues (2008) found that individuals who used planning strategies, such as

breaking down tasks into smaller steps and scheduling time to complete those steps, were more efficient in completing household chores than those who did not use these strategies.

Additionally, research has shown that planning can reduce stress associated with completing household chores.

A study by Wrzesniewski and Dutton (2001) found that individuals who used planning strategies, such as prioritizing tasks and scheduling time to complete those tasks, reported lower levels of stress associated with completing household chores than those who did not use these strategies.

Planning and Sleeping. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in sleeping are listed in Table 2C.3.

Table 2C.3. Metacognitive skills along planning relative to sleeping

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I tried to understand the goals of the test questions before I attempted to answer.	3.00	MS	3.11	MS	3.21	MS
2. I tried to determine what the test required	3.00	MS	2.48	SW	3.56	VMS
3. I made sure I understood just what had to be done and how to do it.	3.00	MS	2.42	SW	3.50	VMS
4. I determined how to answer the test questions.	2.50	MS	3.07	MS	3.58	VMS
5. I tried to understand the test questions before I attempted to answer them.	2.75	MS	2.88	MS	3.37	MS
Overall	2.85	MS	2.79	MS	3.45	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Much So; SW-Some What

Planning is a cognitive strategy that involves setting goals, developing strategies, and monitoring progress towards achieving those goals. The use of planning strategies can be applied to a range of tasks, including sleep-related behaviors.

Research has shown that the use of planning strategies for sleep can enhance the quality and quantity of sleep. For example, a study by Seethaler and colleagues (2020) found that individuals who used planning strategies, such as setting a consistent sleep schedule and creating a relaxing bedtime routine, had better sleep quality and quantity than those who did not use these strategies.

Moreover, research has shown that planning can enhance the efficiency of sleep-related behaviors. A study by Robertson and colleagues (2018) found that individuals who used planning strategies, such as scheduling time for exercise and avoiding caffeine before bedtime, were more efficient in their sleep-related behaviors than those who did not use these strategies.

Additionally, research has shown that planning can reduce the negative impacts of stress on sleep. A study by Gerhart and colleagues (2015) found that individuals who used planning strategies, such as developing coping strategies for stress and scheduling time for relaxation, had better sleep quality and quantity than those who did not use these strategies. In summary, planning is a cognitive strategy that can be applied to sleep-related behaviors, and the use of planning strategies can enhance the quality and quantity of sleep, improve the efficiency of sleep-related behaviors, and reduce the negative impacts of stress.

Planning and Engaging in entertainment. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in engaging in entertainment are covered in Table 2C.4.

Table 2C.4. Metacognitive skills along planning relative to engaging in entertainment

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I tried to understand the goals of the test questions before I attempted to answer.	3.36	MS	3.24	MS	3.50	VMS
2. I tried to determine what the test required.	3.01	MS	3.17	MS	3.25	MS
3. I made sure I understood just what had to be done and how to do it.	3.50	VMS	2.81	MS	3.50	VMS
4. I determined how to answer the test questions.	2.68	MS	3.11	MS	3.50	VMS
5. I tried to understand the test questions before I attempted to answer them.	2.47	SW	2.97	MS	3.00	MS
Overall	3.00	MS	3.06	MS	3.35	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So; SW-Some What

The use of planning strategies can also be applied to engaging in entertainment activities, such as watching TV, playing video games, or browsing social media.

Research has shown that the use of planning strategies for entertainment activities can enhance productivity and reduce negative impacts on well-being. For example, a study by Steers and colleagues (2014) found that individuals who used planning strategies, such as scheduling specific times for entertainment activities and setting time limits for those activities, reported greater productivity and less guilt related to engaging in those activities.

Moreover, research has shown that planning can enhance the enjoyment of entertainment activities. A study by Sweeny and colleagues (2013) found that individuals who used planning strategies, such as selecting entertainment activities that were congruent with their values and preferences, had greater enjoyment and positive emotions associated with those activities than those who did not use these strategies.

Additionally, research has shown that planning can reduce the negative impacts of excessive engagement in entertainment activities. A study by Mei and colleagues (2018) found that individuals who used planning strategies, such as setting goals for reducing time spent on entertainment activities and finding alternative activities to engage in, had lower levels of problematic engagement in those activities than those who did not use these strategies.

In summary, planning is a cognitive strategy that can be applied to engaging in entertainment activities, and the use of planning strategies can enhance productivity, enjoyment, and reduce negative impacts on well-being associated with those activities.

Self-checking and Studying. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in studying are covered in Table 2D.1.

Table 2D.1. Metacognitive skills along self-checking relative to studying

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I checked my work while I was doing it	3.36	MS	3.24	MS	3.50	VMS
2. I corrected my errors.	3.01	MS	3.17	MS	3.25	MS
3. I almost always knew how much of the test I had left to complete.	3.34	MS	2.81	MS	3.50	VMS
4. I kept track of my progress and, if necessary, I changed my techniques or strategies.	2.68	MS	3.11	MS	3.50	VMS
5. I checked my accuracy as I progressed through the test.	2.47	MS	2.97	MS	3.00	MS
Overall	2.97	MS	3.06	MS	3.35	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So

Research has shown that the use of self-checking strategies during studying can enhance academic performance. For example, a study by Dignath and colleagues (2008) found that students who used self-checking strategies, such as reviewing and correcting their own work, had higher test scores than those who did not use these strategies. Moreover, research has shown that self-checking can enhance the efficiency of studying. A study by Nelson and Leonesio (1988) found that students who used self-checking strategies, such as summarizing and testing their own knowledge, spent less time studying but had better retention of information than those who did not use these strategies. Additionally, research has shown that self-checking can

enhance the accuracy of studying. A study by Koriat and Goldsmith (1996) found that students who used self-checking strategies, such as assessing their own confidence in their answers and seeking feedback from others, had a better understanding of their own knowledge and were more accurate in their responses than those who did not use these strategies.

Self-checking and Doing household chores. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in doing household chores are presented in Table 2D.2.

***Table 2D.2.** Metacognitive skills along self-checking relative to doing household chores*

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I checked my work while I was doing it.	3.22	MS	3.66	VMS	3.00	MS
2. I corrected my errors.	2.80	MS	3.53	VMS	3.00	MS
3. I almost always knew how much of the test I had left to complete.	2.97	MS	3.36	MS	3.33	MS
4. I kept track of my progress and, if necessary, I changed my techniques or strategies.	2.63	MS	3.04	MS	3.00	MS
5. I checked my accuracy as I progressed through the test.	2.55	MS	2.50	MS	4.00	VMS
Overall	2.83	MS	3.22	MS	3.33	MS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Moderately So

Research has shown that self-checking can enhance the accuracy of performing household chores. A study by Bortz and colleagues (2019) found that individuals who used self-checking strategies, such as double-checking their work and seeking feedback from others, had a better understanding of their own abilities and were more accurate in performing household chores than those who did not use these strategies.

Additionally, research has shown that self-checking can enhance the sense of accomplishment and satisfaction with completing household chores. A study by Vohs and colleagues (2013) found that individuals who used self-checking strategies, such as setting goals and tracking progress, had a greater sense of accomplishment and satisfaction with completing household chores than those who did not use these strategies.

In summary, self-checking is a cognitive strategy that can be applied to performing household chores, and the use of self-checking strategies can enhance task performance, accuracy, and sense of accomplishment and satisfaction with completing household chores.

Self-checking and Sleeping. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in sleeping are contained in Table 2D.3.

***Table 2D.3.** Metacognitive skills along self-checking relative to sleeping*

Indicators	1 to 3 hours		4 to 6 hours		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I checked my work while I was doing it.	2.25	SW	3.07	MS	3.53	VMS
2. I corrected my errors.	3.00	MS	2.36	MS	3.48	MS
3. I almost always knew how much of the test I had left to complete.	3.50	VMS	2.63	MS	3.53	VMS
4. I kept track of my progress and, if necessary, I changed my techniques or strategies.	2.75	MS	3.71	VMS	3.63	VMS
5. I checked my accuracy as I progressed through the test.	3.75	VMS	2.39	MS	3.50	VMS
Overall	3.05	MS	2.83	MS	3.53	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Much So; SW-Some What

Research has shown that self-reflection and self-monitoring of sleep behaviors and habits can be beneficial in improving sleep quality. For example, a study by Riemann and colleagues (2012) found that individuals who engaged in self-monitoring of their sleep habits, such as keeping a sleep diary and tracking their sleep patterns, had better sleep quality and improved their sleep habits over time.

Additionally, research has shown that the use of technology and sleep monitoring devices can provide individuals with feedback on their sleep patterns and help identify areas for improvement. A study by Baron and colleagues (2017) found that the use of a sleep tracking device improved individuals' sleeps habits and helped them make changes to improve their sleep quality.

Self-checking and Engaging in entertainment. The weighted mean and description of the level of metacognitive skills of the students along planning when grouped according to the number of hours spent in engaging in entertainment are listed in Table 2D.4.

Table 2D.4. Metacognitive skills along self-checking relative to engaging in entertainment

Indicators	1 to 3 hours		4 to 6 hour		7 to 9 hours	
	WM	D	WM	D	WM	D
1. I checked my work while I was doing it.	3.08	MS	3.16	MS	3.50	VMS
2. I corrected my errors.	2.91	MS	3.51	VMS	3.50	VMS
3. I almost always knew how much of the test I had left to complete.	2.66	MS	3.60	VMS	4.00	VMS
4. I kept track of my progress and, if necessary, I changed my techniques or strategies.	3.34	MS	3.55	VMS	3.50	VMS
5. I checked my accuracy as I progressed through the test.	3.57	VMS	3.66	VMS	4.00	VMS
Overall	3.11	MS	3.49	MS	3.70	VMS

Legend: WM-Weighted Mean; D-Description; VMS-Very Much So; MS-Much So;   SW-Some What

IV. CONCLUSION AND RECOMMENDATIONS

This study concluded that the students spent most of their time in sleeping. However, they spent minimal time in studying, engaging in entertainment and doing the household chores. The students who studied, done household chores, and engaged in entertainment for 7 to 9 hours are very much so in their level of metacognitive skills along cognitive strategy, planning, and self-checking. On the other hand, the students engaged in entertainment for 4 to 6 hours are very much so aware of their metacognitive skills.

It was recommended that the students may be encouraged to increase the number of hours spent in studying by providing them supplementary activities that will make them busy so as to lessen the time spent in other activities. The teachers may provide the students with science-related activities such as science fair and exhibits, investigatory projects, contests, and field trips which may improve their level of metacognitive skills.

REFERENCES

[1] Brown, A. L. (1987) "Metacognition, executive control, self-regulation, and other more mysterious mechanisms," In F. E. Weinert, R. H. Kluwe, Eds., Metacognition, motivation, and understanding. Hillsdale, NJ: Erlbaum, pp. 65-116, doi: 10.1037/0003-066X.34.10.906.

[2] Espejo, E. B. and Janer, S. S. (2022). Performance and Metacognitive Skills of Grade 8 Students in Biology. United International Journal for Research & Technology, 4(3), 9-21.

[3] Flavell, J. H. (1979) "Metacognitive and Cognitive Monitoring: A New Area of Cognitive Developmental Inquiry," American Psychologyst, vol. 34, no. 10, pp. 906-911, doi: 10.1037/0003-066X.34.10.906.

[4] Kesici, A. E., Güvercin, D., & Küçükakça, H. (2021). Metacognition researches in Turkey, Japan and Singapore. International Journal of Evaluation and Research in Education (IJERE), 10(2), 535~544. DOI: 10.11591/ijere.v10i2.20790

[5] Nelson, T. O. (1999). "Cognition versus metacognition," In R. J. Sternberg, Ed., The nature of cognition. Cambridge, MA: MIT Press, pp. 625-641.

[6] Republic Act 10533, I. R. (2013). Implementing Rules and Regulations of the Enhanced Basic Education Act of 2013. Retrieved from Gov. Ph: http://www.gov.ph/2013/09/04/irr-republic-act-no-10533/

[7] Stephenson, L. (2021). Metacognitive strategies in the Science classroom. Retrieved from https://educationblog.oup.com/ on January 20, 2024.

[8] Velasquez, Q. F. & Cababaro Bueno, D. C. (2019). Metacognitive Skills in Problem-Solving among Senior High School STEM Strand Students. Institutional Multidisciplinary Research and Development Journal, 2(4), 124-129.