

# Performance and Metacognitive Skills of Grade 8 Students in Biology

Elaine B. Espejon<sup>1</sup> and Susan S. Janer<sup>2</sup>

<sup>1,2</sup>Sorsogon State University, Graduate School, Sorsogon City, Philippines

E-mail: [elaine.espejon@deped.gov.ph](mailto:elaine.espejon@deped.gov.ph) and [sihjaner@sorsu.edu.ph](mailto:sihjaner@sorsu.edu.ph)

**Abstract**— Due to the pandemic, general loss of knowledge and skills have been prevalent and degrading in all parts of the world including our country. Learning poverty is gradually making its footprint on the field of education. To make things worse, scientific literacy is also downgrading. In lieu of these problems, the researchers have come up with an educational innovation with the type of assessment that can be used in remote distance learning. The use of “Metacognition” in the form of Learning Activity Sheets (LAS) in Biology was developed. These LAS uses 4 metacognitive skills namely: Awareness, Cognitive Strategy, Planning, and Self-Checking. Including in the study is a 45-item test and Self-Assessment Questionnaire, which showcased the performance and the level of Metacognitive Skills students of San Juan Bag-O High School (SJBHS) have exhibited. This has followed by a discussion about the reasons, which hinders the students to develop their metacognitive skills. Generally, the performance of Grade 8 students of SJBHS in Biology is 81.43%, which has a verbal description of Approaching Proficiency, which is moderately okay but is still near the verge of failing. Thus the proposed LAS, deems to change that fact by enhancing the metacognitive skills of the students that are innate in nature and are waiting to be developed.

**Keywords**— education, innovation, LAS, metacognition, pandemic, performance.

## I. INTRODUCTION

A lot has happened these past few years. A deadly virus, called COVID-19, swarmed and infected the human race and suddenly people’s way of living, work environment, and even the educational systems resorted to a drastic change. More than 1.6 billion learners worldwide were affected. In fact, two-thirds of countries are not fully back in school. The analysis on school closures report notes that 14 countries worldwide have remained largely closed since March 2020 to February 2021. Two thirds of those countries are in Latin America and the Caribbean, affecting 98 million schoolchildren. Globally 214 million students from pre-primary to upper secondary education in 23 countries have missed at least three-quarters of classroom instruction since March 2020 (UNICEF, 2021). Learning losses or any general loss of knowledge and skills all around the world has also been prevalent. In fact, according to Engzell (2021), learning losses reached up to 60% larger among students from less-educated homes, proving the problematic toll of the pandemic on children and families. This result showed the increase of learning crisis in a lot of countries including Netherlands especially after the pandemic.

In the Philippines, where one of the longest lockdowns in the world had ensued, its curriculum from having face-to-face educative process, to Online and Modular Distance Learning. As if adding insult to injury, the pandemic has exposed the gaps in the Philippine

educational system such as having erroneous learning modules for distance learning found evidently in the painful grammar errors, usage of wrong math equations, and texts that depicts gender stereotypes (Magsambol,2020). The Asian Development Bank (2022) cited estimated 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).

These results indeed make a great wake-up call not just for the educational sector of our country but to the future leaders that has been elected this National and Local Elections of the year 2022. Rather than considering this as a dead end, it must be seen as a stepping stone to further improve the Philippine’s educational curriculum. A low score in the previously cited standardized tests, and innovation index literally means that our students are far from becoming a scientifically literate, environmentally-woke, and great problem solvers of socio-political and cultural-civics issues. As a vanguard

of education, we can start by transforming the minds of the illiterate with the means of promoting metacognition.

According to Holbrook & Rannikmae, (2007) as well as Krajcik & Sutherland, (2010), "students should engage in practicing science to promote their scientific literacy". One of the key solutions to promote and enhance scientific literacy is through metacognition. Metacognitive instruction promotes scientific literacy by improving concept durability and the transfer of scientific knowledge from school to outside the classroom (Ormrod, 2011).

Metacognition empower students to think about their own thinking. This awareness of the learning process enhances their control over their own learning. It also enhances personal capacity for self-regulation and managing one's own motivation for learning (Victoria State Government). According to a study by Avargil, et al (2018) "metacognition is also a central feature in life-long learning in general and science education in particular, and that metacognitive engagement is key for developing deeper conceptual understanding of scientific ideas".

The San Juan Bag-o High School where the present study was conducted, is located at San Juan Bag-o, Bulan, Sorsogon with a total population of 509 students and 2 sections for Grade 8 which is divided into 5 groups based on their house's location from the school. It is accessible by land transportation which is about 5 kilometers from the poblacion and about 2 kilometers from Fabrica on the Provincial road (Guray, 2013).

In this study, it aimed to promote metacognition by means of determining the performance and metacognitive skills of Grade 8 students in San Juan Bag-O High School and creating an activity sheet that may enhance not only their performance in Biology but also for them to become scientifically-literate individuals, preparing them for their future endeavors, be it through higher education or part of the work force. As novel as it sounds, this study is one step forward to help the educational sector to find new ways in molding the minds of the learners to become more scientifically literate individuals. Having Biology as the subject matter within the study also proves that metacognition can be brought into a new light that may allow the students to "have the ability to orchestrate one's learning: to plan, monitor success, and correct errors when appropriate—all necessary for effective

intentional learning" especially in the field of Biology. (National Research Council, 2000). It is also through the use of metacognition wherein there is hope to aspire the succeeding vision: Biology in the 21st century requires that undergraduates learn how to integrate concepts across levels of organization and complexity and to synthesize and analyze information that connects conceptual domains. (Tanner, 2017)

## II. MATERIALS AND METHODS

This study determined the performance of the students in Biology at San Juan Bag-O High School, deciphered their metacognitive skills, as well as find out what hinders them to develop their metacognitive skills which in turn affects their performance and proposed 3 sets of Learning Activity Sheets based on the results.

The study employed a Mixed Method of Quantitative and Qualitative Research where the Performance was determined through a teacher-made test and evaluated by means of a scale adapted from Deped Order No. 31 s. 2012 while the Metacognitive Skills were determined after the students answered the Self-Assessment Questionnaire where they are evaluated based on their Weighted Mean. This was followed by an interview of 6 Section A and 6 Section B students who identified several reasons of what hinders them from developing their Metacognitive Skills. And lastly the researchers created and proposed a metacognitive-based LAS that may be used as a form of assessment tool that future researchers may utilize or improve and used in Distance Learning of the students.

The primary respondents in this research are only 42 students, all of which are from the two sections of San Juan Bag-O High School, Section A and Section B. The total number of the enrollees are 91 students for the 4th quarter during last school year 2021-2022. Only 42 students were available on the day of the conduct of study due to their change in class schedule due to the pandemic and the absence of 6 students thus the respondents have been selected based on their availability. The two sections, section A and Section B, involved in the study was divided into 3 groups for Section A consisting of 23, 15, and 13 students per group and 2 groups for section B which has 25 and 15 students per group respectively.

To determine the performance and metacognitive skills of the students, the researchers have used respectively a 45-item test in Biology (Appendix B.1) and Metacognition Skill Questionnaire (Appendix C.1)

which has 5 items for each metacognitive skill namely: Awareness, Cognitive Strategy, Planning, and Self-Checking. Another research instrument utilized in the present study is the interview sheet which contained questions regarding the reason/s behind what hinders the students from developing their metacognitive skills in Biology this is followed by their explanation of why they thought these hinders the development of their metacognitive skills.

In order to collect the most accurate data, the researchers have asked the approval of the principal through the district supervisor. Likewise, the researchers have asked permission from the advisers to conduct the study among the selected Grade VIII students of San Juan Bag-O High School.

After the approval, the researchers have conducted two pilot testing of the test paper to be used in the study that has undergone item analysis and reliability test. The first pilot testing was conducted on May 16, 2022 (Monday) at 10:45 am which utilized a 60 item teacher made test and was answered by 25 students from Section A and afterwards it undergone item analysis and reliability test. On the second pilot testing the researchers removed the 15 items from the original test to create a 45-item test. It was conducted on May 25, 2022 (Wednesday) at 10:45 am where the respondents were 15 students from Section A and 13 students from Section B. Afterwards it undergone another item analysis and reliability test. Then on the actual day of the study, on June 10, 2022 (Friday) at 10:45 am-11:50 am the fourth group of students took the 45-item test and self-assessment questionnaire where 20 out of 23 students were present and in the afternoon at exactly 3:00-4:05 pm, 22 out of 25 students took the 45-item test and self-assessment questionnaire. This has been followed by an interview of selected 12 students from both sections on June 13, 2022 (Monday) at 10:45 am. Afterwards the researchers have retrieved the outputs, tallied, analyzed, and interpreted the data collected.

### III. DATA ANALYSIS PROCEDURE

In interpreting the data, the researchers have summarized and organized the collected records. The statistical tools used in the study are Item Analysis, Reliability Test, and Qualitative Research Method with the use of interview. The scale below was used to present the Performance of the student. (Deped Order No. 31 s. 2012)

Scale	Metacognitive Level
Below 75	Beginning

75 – 79	Developing
80 – 84	Approaching Proficiency
85 – 89	Proficient
90 – 100	Advanced

Then the weighted mean was calculated for each metacognitive skills that may represent the metacognitive skills of the students. The scale used for the metacognitive skills used a 4 point Likert Scale which can be seen below:

3.5 – 4.0	Very Much So
2.5 – 3.49	Moderately So
1.5 – 2.49	Somewhat
1.0 – 1.49	Not at all

On the other hand, Qualitative research method was utilized for the follow-up interview questions for the Grade 8 Students which tackled about the reasons that hinders them from developing their metacognitive skills in Biology.

### IV. RESULTS AND DISCUSSION

This section reveals the performance of Grade 8 students in Biology. The data are presented in Table 1. It can be gleaned from the table that the overall performance of 42 respondents is 81.43 with verbal description of Approaching Proficiency. It can be observed that 33 or 79% of the respondents were under the category of Approaching Proficiency. Meanwhile only 4 or 10% were under the category of Proficient Performance in Biology similar to Developing as another category. Only 1 or 2% of the lot is considered part of the Beginning or students who are performing below their expected abilities with regards to their Biology subject.

**Table 1**  
Performance of the Students in Biology

Performance	Freq (f) (n=42)	Percentage (%)
Beginning Below 75	1	2
Developing 75 - 79	4	10
Approaching Proficiency 80 - 84	33	79
Proficient 85 - 89	4	10
<b>Mean Performance</b>	<b>81.43</b>	<b>Approaching Proficiency</b>

It is not a surprising phenomenon that the performance of the students appeared to be as such in the new normal because students were confronted with learning losses or any general loss of knowledge and skills all around the world brought about by the aftermath of the global pandemic. These challenges also include the following but are not limited to: low interest of students in

Biology, inadequate motivation from teacher, lack of adequate supply of instructional materials, lack of qualified teachers, poor incentives to Biology teachers, and the use of teacher-centered instructional strategies.

Even the Department of Science and Technology (DOST-SEI) as one of the government agencies affiliated with Department of Education and Commission on Higher Education states that the low performance in Science [including Biology] of Filipino students are caused by: quality of teachers, the teaching-learning process, the school curriculum, instructional materials, and administrative support (DOST-SEI, 2006).

Various stakeholders have already addressed these concerns one of which is the UP National Institute for Science and Mathematics Education Development (UP-NISMED) which focused its efforts on improving the science curriculum through curriculum development, training, and research in science and mathematics.

Even the results that were garnered by the Grade 8 students in the present study prove this fact which is also backed up by their answers in the follow-up interview given to them by the researchers which has been further discussed in the succeeding chapter.

#### **Metacognitive Skills of the Grade 8 Students**

This section reveals the metacognitive skills of the students in terms of awareness, cognitive strategy, planning, and self-checking. The data are presented in tables.

**Awareness.** Table 2A shows the metacognitive skills of the students along with awareness. It shows that the students exhibit Metacognitive Awareness moderately. This 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 metacognition. Since it can be considered just at the tip of the iceberg of metacognition. Awareness is a metacognitive skill which is being aware of how you think.

The following statements in Table 2A which was used in the study under the awareness category have varied weighted mean but their verbal descriptions are all the same, which is moderately so. This means that although the students have varied feelings towards each

statement, they are basically thinking the same way about their own metacognitive skill which is Awareness. Having a moderately so description also means that they are in fact aware that they are using this skill in the teacher-made test that they have taken almost often compared to other metacognitive skills.

**Table 2A**  
**Student's Metacognitive Skills on Awareness**

Indicators	WM	Description
1. I was aware of my own thinking.	2.57	Moderately so
2. I was aware of which thinking technique or strategy to use and when to use it.	2.67	Moderately so
3. I was aware of the need to plan my course of action.	2.69	Moderately so
4. I was aware of my ongoing thinking processes.	2.55	Moderately so
5. I was aware of my trying to understand the test questions before I attempted to solve them.	2.57	Moderately so
<b>Overall WM</b>	<b>2.61</b>	<b>Moderately so</b>

The first statement stated “I was aware of my own thinking”. Since most of the students are aware of the fact that they are thinking, it proves that the students capability to think and being aware of their cognitive conscience is present. In the next statement which said, “I was aware of which thinking technique or strategy to use and when to use it.” It simply shows that the students have awareness of their other cognitive skills and that they are able to reflect when and how to use them. The next statement which stated that “I was aware of the need to plan my course of action.” This statement shows that except for being aware of their own thinking, the students are also aware of why they need to consider answering the questions in the teacher-made test and what sort of course of action they need to showcase. The fourth statement which said, “I was aware of my ongoing thinking processes.” Simply shows that while the students are answering the test, they are aware of the thoughts that are processed in their minds all throughout the test. The last statement which stated that “I was aware of my trying to understand the test questions before I attempted to solve them.” Having a moderately so description, would also mean that before they attempt to solve the test questions, almost all students are already aware of the fact that they are trying to understand the test questions before they solve or answer the questions.

These facts, implicates the importance of awareness as one of the metacognitive skills that a student possess and how it can greatly affect their performance in school or even at life. An American Psychologist named Nathaniel Branden (2014) once said that “The first step towards change is awareness.” The change that was mentioned in the statement can be attributed to the teaching and learning process which is a never-ending process of change. Even studies written by

Ozcakmak(2021), Jumani (2010), Abdelrahman (2020) and the others support that awareness is one of the key skills to using metacognition as one of the newest teaching approach that students should undergo to become agents of change. And these changes, can be seen primarily through the academic success of the students as well as in their personal journey in life.

**Cognitive Strategy.** Table 2B shows the metacognitive skills of the students along with cognitive strategy. It shows that the students exhibit Cognitive Strategy moderately. This means that students are more likely to use different cognitive strategies in answering test questions. In comparison to the previous Metacognitive Skill which is Awareness, it is apparent that some of the statement indicators under Cognitive Strategy have lower descriptions despite its overall description which is Moderately So. But before delving into comparisons, the researchers wanted to focus on the actual Cognitive Strategy statements first and their descriptive result.

Table 2B

Student's Metacognitive Skills on Cognitive Strategy

Indicators	WM	Description
1. I attempted to discover the main ideas in the test questions.	2.45	Somewhat
2. I asked myself how the test questions related to what I already knew.	2.29	Somewhat
3. I thought through the meaning of the test questions before I began to answer them.	2.64	Moderately so
4. I used multiple thinking techniques or strategies to solve the test questions.	2.43	Somewhat
5. I selected and organized relevant information to solve the test questions.	2.69	Moderately so
<b>Overall WM</b>	<b>2.50</b>	<b>Moderately so</b>

The first statement stated “I attempted to discover the main ideas in the test questions.” Having the description somewhat, simply means that the students aren’t that sure that they have attempted to discover the main ideas in the test questions. This also means that there are many Grade 8 students who somewhat agree to this statement. Although there are plenty of students who somewhat agree, it basically shows through the weighted mean that a lot of them have attempted to discover the main ideas in the test questions but not quite often. The second statement said “I asked myself how the test questions related to what I already knew.” Similarly, since the weighted mean is low and the description is somewhat, one can say that a lot of students somewhat asked themselves the relation of the test questions to what they already know. It is important to note that when a student is asking themselves the relation of the test questions to what they already knew, learning takes place once they made a connection between their previous learning and

the present ideas they got from the test questions. But since most of them somewhat only did the 2nd statement, it can be concluded that most of the students do not ask themselves how the test questions are related to what they already knew. The third statement asserted that “I thought through the meaning of the test questions before I began to answer them.” Since it has a greater weighted mean and the verbal description is Moderately So, it means that most of the students in the study moderately thought through the meaning of the test questions before they answer them. The fourth statement said “I used multiple thinking techniques or strategies to solve the test questions.” Since the weighted mean is lower and has a verbal description of somewhat, one can say that most of the students somewhat agree to the 4th statement and does it which can be considered actually true since not all of the student are aware of the Cognitive Strategies they can use in solving or answering the test questions. This is proven through the interview I had with some of the students where I asked them if they knew different cognitive strategies in solving the test questions such as making mind maps, visualization, association, mnemonics, using clues in reading comprehension, underlining key words, scanning, self-testing, and monitoring.

For example in answering the number 1 question in the teacher made test, they have to visualize and associate which is a group of organs working together to convert food into energy and basic nutrients to feed the entire body. By means of doing so, they can answer correctly by choosing “Digestive System” for this test question. But unfortunately, there were still students who answered incorrectly and rather chose Circulatory System or Digestion. This basically shows that not all of Grade 8 students uses different Cognitive Strategies to answer test questions.

The 5th statement said “I selected and organized relevant information to solve the test questions.” Since this statement asserts a higher weighted mean and a verbal description of Moderately So, one can say that most of the students do in fact select and organize relevant information to solve the test questions. This is one of the cognitive strategy that students most often use especially in the analogy section of the teacher made test since the only clues they can find are based on the relationship of the previous analogy. For example the 31st test question has Mitosis & 2 identical cells as the first analogy, if they did understand their lesson, they can come up with the answer 4 different cells for the

analogy of Meiosis since although both Cell Division Cycle have similar processes but since Meiosis undergo twice the PMAT cycle in order to produce 4 different cells for the reproduction of sex cells. And this was in fact answered correctly by most of the students.

In comparison to the previous metacognitive skill of awareness where all 5 statements have a weighted mean that has a verbal description of Moderately So, only 2 of the statements under Cognitive Strategy has the same verbal description. But, in getting the average weighted mean, shows that the final verbal description would still be Moderately So. This asserts the fact that although the Grade 8 students are mostly aware of their thinking and their own attempts to understand the test questions before answering, the use of actual cognitive strategies are still puzzling for the students. They are not familiar with the cognitive strategies they can use in solving the test questions as Akturk et al. (2011) mentions in his paper, individuals are not aware of these processes.

Some students struggle, despite their hard work and effort, because they have deficits in executive functions, the cognitive processes that control and coordinate activities related to learning (Vanderbilt University, 2022). If only they are exposed to the use of more different Cognitive Strategies under Metacognition, their performance would greatly improve. This is proven by the following authors: Ozkubat (2021), Postrado (2019), Tod (2015) and others.

Planning. Table 2C shows the metacognitive skills of the students along with planning. It shows that students exhibit Metacognitive Planning moderately. Four out of five (4/5) statements shows a weighted mean that has a verbal descriptive of moderately so. Only one statement has a verbal description of somewhat. This means students have agreed moderately about the use of Planning in answering the teacher-made test and that they are more likely to use planning as a metacognitive skill compared to cognitive strategies while awareness still gets the top spot among the three metacognitive skills.

**Table 2C**  
**Student's Metacognitive Skills on Planning**

Indicators	WM	Description
1. I tried to understand the goals of the test questions before I attempted to answer	2.52	Moderately so
2. I tried to determine what the test required.	2.69	Moderately so
3. I made sure I understood just what had to be done and how to do it.	2.55	Moderately so
4. I determined how to solve the test questions.	2.40	Somewhat
5. I tried to understand the test questions before I attempted to solve them.	2.62	Moderately so
<b>Overall WM</b>	<b>2.56</b>	<b>Moderately so</b>

The first statement said “I tried to understand the goals of the test questions before I attempted to answer.” Based on the weighted mean and the verbal description of this statement, the students moderately perform such tasks. In planning, it is crucial that students understand the goal of the test questions before they attempt to answer because it guides them to what kind of course of action they must make in order to achieve that goal. The second statement said “I tried to determine what the test required.” Similar to the first statement, it has a moderate verbal description this means that there are plenty of students who moderately perform such tasks. Identifying what is required of the test question is the next step after distinguishing the goal. Since it will allow the students to weigh in what the test requires of them to do. The third statement asserted that “I made sure I understood just what had to be done and how to do it.” Similarly, it has a moderately so verbal description. This means an ample number of Grade 8 students made sure that they understood what and how to do the tasks in solving or answering the test questions. Planning involves knowing what to do and how to do it, this is the next step after identifying what is required of the test questions. As one would notice, planning involves a series of steps in order to execute and achieve the goal intended. The fourth statement on the other hand stated “I determined how to solve the test questions.” This statement shows a lower weighted mean and a verbal description of somewhat. This shows that students rarely think of determining how to solve the questions and rather choose to answer them directly. Although it is a crucial step to planning, it has been overshadowed by the previous step which was knowing what needs to be done and how to do it. Basically, this fourth step is connected to the previous statement but students rather does not pay much attention to this step since it somewhat a duplicate of the third statement’s latter task. The fifth statement stated that “I tried to understand the test questions before I attempted to solve them.” Similar to the first three statements, it has a moderately so verbal description. This is the last step of planning, where the students would delve directly to understanding the test question itself before answering. This is also a vital step in Planning since the students would then utilize his/her comprehension skills to understand the test question before answering the actual question.

Planning as a metacognitive Skill, involves a series of steps to perform in order to achieve a certain goal. The students answers shows that they value planning more than applying Cognitive Strategies in answering test

questions. Whereas Awareness of their own thinking still plays a greater role compared to Planning and Cognitive Strategies. The reason for this discrepancy is the fact that students are not aware of the different Cognitive Skills they may explore in answering the test questions. Therefore the researchers suggest that the students develop and be exposed to tasks that will enhance their cognitive strategies in order to gain higher weighted mean and verbal description similar to the other two metacognitive skills which is Awareness and Planning.

In fact, a study made by Saputri & Corebima (2020), Palennari (2016), Bahri & Corebima (2015) showed that using metacognition and cognitive skills have greatly improved the performance of students in Biology.

**Self-Checking.** Table 2D shows the metacognitive skills of the students along with self-checking. It shows that students exhibit Self-Checking moderately. Although only two statement indicators shows a verbal description of Moderately So, the average of their weighted mean shows that self-checking can still be considered a moderate type of skill exhibited by the Grade 8 students. The result of Self-Checking as a metacognitive skill of the students, can be compared similarly to Cognitive Strategy since both have three statements that has a verbal description of Somewhat and two statements that has a verbal description of Moderately So.

**Table 2D**  
Student's Metacognitive Skills on Self-Checking

Indicators	WM	Description
1. I checked my work while I was doing it.	2.93	Moderately so
2. I corrected my errors.	2.19	Somewhat
3. I almost always knew how much of the test I had left to complete.	2.57	Moderately so
4. I kept track of my progress and, if necessary, I changed my techniques or strategies.	2.43	Somewhat
5. I checked my accuracy as I progressed through the test.	2.45	Somewhat
<b>Overall WM</b>	<b>2.51</b>	<b>Moderately so</b>

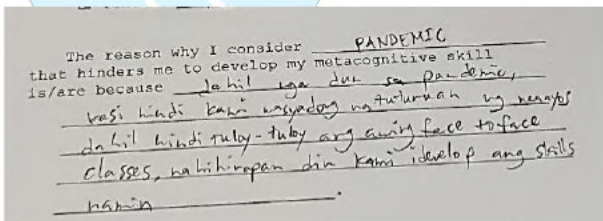
The first statement stated that "I checked my work while I was doing it." This statement has a Moderately So verbal description meaning there are planet of students who have agreed to perform this task throughout the course of answering the teacher-made test. The second statement stated that "I corrected my errors." This statement has a lower weighted mean and a verbal description of somewhat. One can imply that the students rarely correct their errors. The reason behind this is the fact that the school curriculum does not teach the students how to improve themselves by correcting their errors but rather they promote perfectionism within a competitive environment. The researchers argues that

for the students to have a successful introspection of their own skills and abilities, they must be given an avenue for making errors and correcting them to learn from their mistakes without the fear of being made fun of. In fact according to UC Berkeley professor Martin Covington (2017), the fear of failure is directly linked to self-worth, or the belief that you are valuable as a person. Covington found that students usually put themselves through unbelievable psychological machinations to avoid failure and maintain the sense that they are worthy. This fact simply shows what type of kids our curriculum is currently breeding. But it doesn't mean that our educational sector have made a mistake in upbringing the kids. It really does take a village to educate a child. Working together with the family, community, and different sectors that hone and develop the child could make a complete 360 degrees not just for our educational stature but as a country. Although this vision is yet to be manifested, we as teachers can start our own undertaking by changing the way we teach. Thus the importance of metacognition as a new teaching approach to help students to become aware, use their cognitive skills, plan a course of action, and be reflective of their own mistakes as well as keep them accountable for their progress. The third statement stated "I almost always knew how much of the test I had left to complete." This statement has a rather moderately so verbal description. Meaning there are plenty of Grade 8 students who do know how much of the test they have left to complete. It shows how accountable the students are of their progress. The fourth statement said "I kept track of my progress and, if necessary, I changed my techniques or strategies" This statement was given the verbal description of somewhat meaning the students does not often perform this task. Although they are accountable of their progress, changing their techniques and strategies in answering the test questions in line with their progress seems a bit tiresome to do for them so they either answer directly without thinking much of the question or they do not change their techniques or strategies in answering. This fact was apparent to me based on the interview I made with some of the students. The last statement asserted that "I checked my accuracy as I progressed through the test." Since this statement also has a lower weighted mean and a verbal description of somewhat, this means that only a few of the students care about the accuracy of their answers in relation to their progress throughout the test. Why this usually happens is either because of the fact that students are trying to finish answering the test early or they still have many questions to answer with only limited time left.

And this has been the case with a lot of the students I've interviewed. These results mainly proves that Self-Checking is one of the lowest metacognitive skills that students rarely use or develop. Mainly because 3 statement indicators have lower weighted mean and a somewhat verbal description. Similar to Cognitive Strategy, there is a need for the students to improve this type of metacognitive skill in order for their performance to also increase.

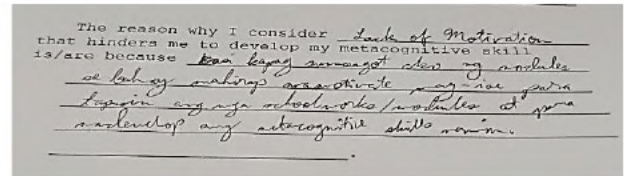
**The reasons, which hindered the students to develop their metacognitive skills in Biology**

The researchers identified the following factors which hindered the students to develop their metacognitive skills in Biology: Pandemic, Lack of Motivation, Distractions, Teaching Strategy, Content of the Lesson, Inability to Identify own Metacognitive Skills, and Dislike of the Subject; which can be summarized into two themes Extrinsic and Intrinsic factors. The first five covers the former factors and the last two is the latter factors. Twelve Grade 8 students were interviewed regarding the reasons which hindered them to develop their metacognitive skills in Biology. Half of them were from Section A and the rest were part of Section B. The researchers will tackle the Extrinsic factors first. It is also important to note that some of the answers of the students are translated from Filipino to English language since they are more comfortable expressing their answers in the Filipino language.



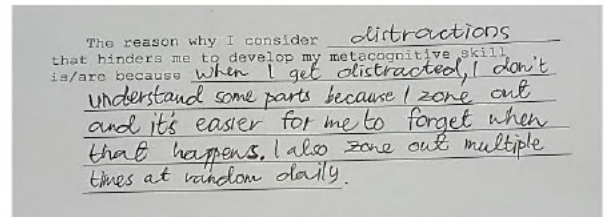
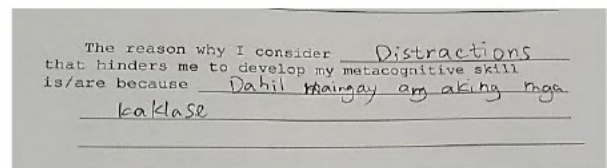
**Plate 1:** Student's interview answer: Pandemic

A student who considered that the pandemic caused them to under-develop their metacognitive skills also stated that it became harder for their teacher to teach them Biology, because the class schedules were changed thus they meet their teacher less often compared to when they were being taught face to face and it became difficult for them to develop their metacognitive skills which lead them to not grasp the lesson well.



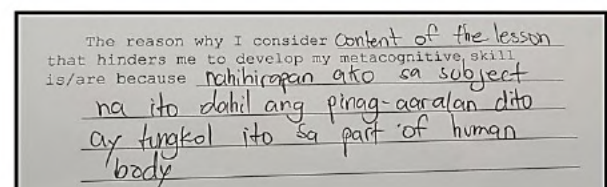
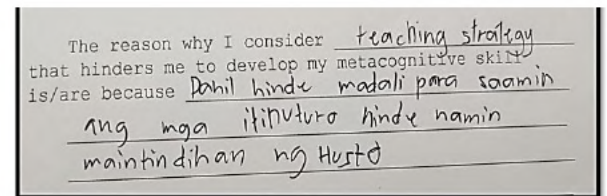
**Plate 2:** Student's interview answer: Lack of Motivation

The second reason which was mentioned by one student was due to Lack of Motivation. When they answer modules alone at home, it is even harder for them to motivate themselves compared to when they have their classmates to motivate them to finish their school works as well as develop their metacognitive skills.



**Plates 3 & 4:** Student's interview answer: Distractions

Some of the students correlated distractions to their inability to develop metacognitive skills, such as the noisiness of their classmates while another student tends to zone out thus they tend to forget the lessons and gets distracted easily. It's a bit alarming that the student said that he zones out multiple times at random daily which may be cause of being cooped up in their homes for a lengthy period of time or because of other reasons.

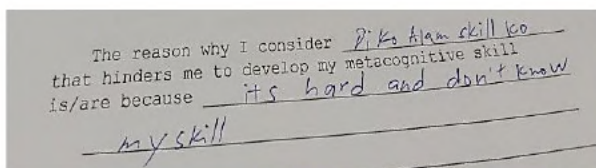


**Plates 5 & 6:** Student's interview answer: Teaching strategy and content of the lesson



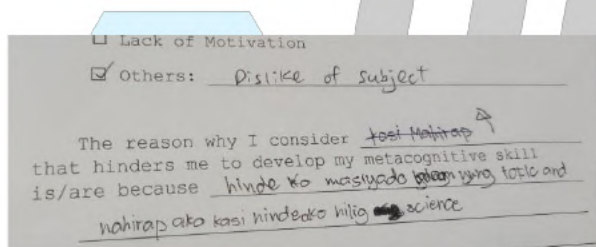
Teaching strategy and Content of the Lesson follows. Since their teacher uses a lecture-based teacher-centered approach, it became harder for the students to grasp their lesson and develop their metacognitive skills. This type of teaching approach together with the content of the lesson where there are too many facts to memorize, and scientific terms to recall, it became even harder for them to understand the lesson and develop their metacognitive skills.

Next, the researchers will tackle about the intrinsic factors that students experience in line with their development of metacognitive skills.



**Plate 7:** Student's interview answer: Inability to identify metacognitive skills

There was a student who stated that his inability to identify his metacognitive skills made it harder for him to develop them since he/she doesn't know what they are and how to develop them.



**Plate 8:** Student's interview answer: Dislike of subject

There were also students who were vocal for disliking the subject itself that's why it became harder for them to understand the lesson and develop their metacognitive skills in Biology. Some even verbally admit such facts.

**Proposed Learning Activity Sheets (LAS) for Grade 8 Students in Biology.**

Based on the findings of the study, the researchers came up with the proposed learning activity sheets in Biology for Grade 8 students.

The succeeding LAS 1-3, uses the metacognitive skills of the students for them to answer the succeeding questions in the activities. The questions and activities are based on metacognitive approach thus allowing the

students to have better performance in their Grade 8 Biology subject.

For the first LAS entitled "Digestive System", the following set of activities will be done: review of previously learnt knowledge, in-depth discussion of topic, Activity 1 - Fill in the blanks of the different parts of the digestive system, Activity 2 - Answering guide questions, Activity 3 - Researches about nutrient deficiency diseases (causes, symptoms, treatment), Recall or summary of topic and knowledge, Answering fill in the blank by completing the paragraph about Digestive System, Objective type of test, and lastly Reflection.

For the second LAS entitled "Mitosis and Meiosis", the following sets of activities will be performed: review of previously learnt knowledge, in-depth discussion of topic, Activity 1 - Identification of Different Stages of Mitosis and Meiosis, Activity 2 - Venn Diagram showing similarities and differences of Mitosis and Meiosis as a Cell Division Cycle, Activity 3 - Answering guide questions, Recall or summary of topic and knowledge, Analogy between Mitosis and Meiosis and other biology concepts, Essay-type of test, and lastly Reflection.

For the third LAS entitled, "Mendelian Pattern of Inheritance: Punnett Square", they will execute the following sets of activities: review of previously learnt knowledge, Recalling about the Law of Segregation and Punnett Square, in-depth discussion of topic, Activity 1 - Describing Family Characteristics, Activity 2 - Tossing Coin Probability, Activity 3 - Answering guide questions, Recall or summary of topic and knowledge, Objective-type of test, Punnett Square, and lastly Reflection.

Some of the activities related to each of the following metacognitive skills are as follows, for example for Awareness, it is describing family characteristics, since awareness involves being aware of what you already know and what you can do in this activity, the students will be able to relate their knowledge about physical characteristics of their family based on the picture to answering the guide questions to be followed.

It is through awareness where the students can answer questions related to physical characteristics since they must recall, connect previously learnt knowledge to newfound knowledge, and by doing so they can create

or predict future phenomenon based on what they have already learnt.

In addition, an example of activity which involves the use of Cognitive Strategy are the following: Answering Guide Questions, Answering Fill in the Blank, Answering Complete the Paragraph, Essay-type, Venn-Diagram, Research, Analogy and the like. Different activities involve different cognitive strategies in order for the students to hone this metacognitive skill.

On the other hand, an example for Planning would be Answering Punnett Square since it requires the knowledge of the step-by-step process of how to perform the task at hand.

Furthermore an example of activity which involves Self-Checking is reflection, since the students will try to be contemplative of their work, they will indicate what they have realized in the lesson, what activities they may have found difficult to answer, what relation is their present topic to other previous lessons, etc.

## **V. CONCLUSION AND RECOMMENDATION**

### **1. Performance of Grade 8 Students in Biology**

The over-all performance of the students in San Juan Bag-o High School is 81.43% with a verbal description of Approaching Proficiency.

### **2. Metacognitive Skills of Grade 8 Students in Biology**

Each of the four Metacognitive Skills are possessed by the students in varying degree. The metacognitive Skills of the students based on weighted mean are the following: Awareness with 2.61 average, Cognitive Strategy with 2.50 average, Planning with 2.56 average, and Self-Checking with 2.51 average.

The Metacognitive skill with the highest weighted mean is Awareness while the lowest is Cognitive Strategy. All of which has a Moderately So verbal description which means almost often do the students use each of those metacognitive skills in answering the questions in the test.

### **3. Reasons which Hinders the Students to Develop their Metacognitive Skills in Biology**

The factors which hinders the students to develop their metacognitive skills in Biology are the following: Pandemic, Lack of Motivation, Distractions, Teaching Strategy, Content of the Lesson, Inability to Identify own Metacognitive Skills, and Dislike of the Subject.

### **4. Proposed LAS in Biology**

The researchers made a proposition of 3 LAS for each Biology topic namely: Digestive System, Mitosis & Meiosis, and lastly. Mendelian Pattern of Inheritance: Punnett Square. These LAS are metacognitive-based in nature so that the students can hone their metacognitive skills as well as improve their performance in their Biology subject.

## **RECOMMENDATIONS**

### **1. Performance of Grade 8 Students in Biology**

The researchers deems a better performance for future Grade 8 Students in Biology with the help of the use of proposed LAS in this present study.

### **2. Metacognitive Skills of Grade 8 Students in Biology**

The researchers believes that the metacognitive skills of the students can be honed using the proposed LAS in the present study.

### **3. Reasons which Hinders the Students to Develop their Metacognitive Skills in Biology**

The researchers heeds to lessen the effect of the reasons which hinders the students to develop their metacognitive skills in Biology by means of using the proposed LAS in the present study not just as a form of assessment but also a teaching strategy amidst the effects of the pandemic. For easier and better consumption of learning, this teaching strategy 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.

### **4. Proposed LAS in Biology**

The researchers seeks to create a better learning environment for the students by means of the proposed LAS in Biology. She recommends the use of these LAS as a form of assessment as well as another teaching strategy or approach to help improve the performance of Grade 8 Students in Biology.

### **5. Replication of the Study**

The researchers recommends to improve the proposed LAS written by the author through the use of other activities that may hone the four metacognitive skills of the students. The researchers would also recommend the evaluation of the 3 LAS in order to support its reliability and validity.

Metacognition enables one to be a successful learner, Metacognition refers to higher order thinking which

involves active control over the cognitive processes engaged in learning. Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task are metacognitive in nature. Because metacognition plays a critical role in successful learning, it is important to develop metacognition in students, and to do these teachers, parents and the students themselves should play their respective roles to develop the metacognitive environment, be it in school or at home, by encouraging more metacognitive activities for each of them and they can start with the use of the proposed LAS of the researchers.

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