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Impacts of Authentic Assessments in Biology on the Learning of Grade 11 Students

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Abstract

Authentic assessments were used during the Covid-19 lockdown but since the educational environment is returning to its usual configuration, such assessments appear to be still useful in learning biology. To prove this claim, this research aimed to determine the impacts of authentic assessments in biology on Grade 11 students as well as to determine the students' perceptions about authentic assessments. One hundred two (102) Filipino students at a public high school for SY 2022-2023 made up the participants which comprised the three (3) sections of the STEAM curriculum. This involved a qualitative design where observations were documented following the impacts identified by previous authors. On student perceptions, responses in the interview were subjected to thematic analysis. In poem writing, the impacts include cognition activation and development, vocabulary and literacy skills improvement, and self-expression. Comic strip's impact is promotion of scientific literacy. Improvement of scientific skills is the impact for brochure making, modeling, role playing, case study analysis, infographics and mind mapping. Results show that students' perceptions are favorable. With the results, teachers are encouraged to prepare more authentic assessments in biology teaching. Likewise, this study should be carried out across other academic disciplines.

Keywords: authentic assessment; biology teaching; impact; thematic analysis; opinions; views.

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1. Introduction

The Covid-19 epidemic appears to have ordered all facets of life, including the educational sphere, to undergo reconditioning. Large-scale online migrations are mandated for educational institutions. In practically all nations, there is a general movement from face-to-face learning to virtual learning. For instance, all schools in the Philippines switched from traditional learning to online learning during the first year of the pandemic (2020–2021). In light of the circumstances and characteristics of the educational unit in relation to the learning implementation in the Covid-19 outbreak, planning, execution, and evaluation of learning are revised. Teachers must incorporate a wide variety of distinct learning activities which, according to the authors in [1,2] is needed in order to suit various demands of learners as well as foster connection. Similarly, the author in [3] added considering the students' various learning preferences. Thus, for estimation of the learning objectives attained by students, teachers carefully choose the assessment methodologies especially when it comes to learning evaluation. Particularly, in order to assess students' learning development, teachers require a unique evaluation strategy that can offer thorough information. An authentic assessment is an example of a unique evaluation strategy. The author in [4] opined that because it requires students to complete exemplary activities that require the evidence of their in-depth comprehension, higher-order thinking, and advanced problem solving, this type of assessment is "a true test" of intellectual accomplishment or ability. This approach links learning to intricate, real-world situations and contexts where students reenact real-world performances as part of the evaluation process.

During the online set-up in SY 2020-2022 in the school where the teacher-researcher teaches, the teachers were given the free choice of the assessments to be implemented to the students. A few teachers chose to continue using traditional assessments, but most teachers—including the teacher-researcher—opted to adopt authentic assessments. Meanwhile, in 2022-2023, the educational system in the Philippines started to transition to the hybrid modality (face-to-face and online engagement). Where academic freedom was allowed in this school, the teacher-researcher decided to still adopt the utilization of authentic assessments. While the teacher-researcher found authentic assessments still useful in the teaching of biology, this assumption must be proven.

1.1 Theoretical Basis of Authentic Assessments

Constructivist learning theory, which holds that knowledge is acquired by students by actively interacting in real-life situations rather than by passively collecting information, provides the foundation for authentic assessment [5]. Real-world problem-solving is simulated through intricate, open-ended activities in authentic assessment, which evaluates students' application of concepts and principles, in contrast to traditional assessment methods that prioritize memorization of information. The goal of the strategy is to help students acquire lasting comprehension and transferable abilities through deeper learning and higher-order thinking. The topic of authentic assessment is extensive and necessitates methodologies and knowledge from numerous fields in order to foster a thorough understanding. Its scientific foundation is bolstered by theories and research findings from the disciplines of sociology, cognitive science, and psychology.

Psychological research on human behavior can provide essential help for comprehension, as authentic

assessment considers human behavior and cognitive processes [6]. Theoretically, challenges in authentic assessment can be explained and supported by Dewey and Piaget's classical theory of cognitive development. Genuine evaluation encompasses human cognitive and information processing mechanisms. Therefore, based on the author in [7], some mechanisms of cognition involved in this kind of assessment can be explained by the results of studies in cognitive science. Students must employ a variety of cognitive processes for authentic evaluation, such as attention, memory, metacognition and problem-solving. By giving students assessment tasks that are both relevant and meaningful, and that call for the use of problem-solving techniques and higher-order thinking skills (HOTS), teachers may help students develop these skills. Genuine evaluation encompasses an individual's social context and cultural heritage. Thus, social characteristics like group behavior and customary practices can be analyzed and understood in relation to their impact on authentic evaluation through the application of sociological theories and methods. In many authentic examinations, cooperation and group work are crucial, yet students may run into difficulties while working in groups. Students' opinions of assessments may also be influenced by traditional methods. These are the problems for which educators and scientists want to develop scientific answers.

Authentic assessment research has produced important results that support its validity. According to the author in [8], this kind of assessment improves self-efficacy, engagement and student motivation by giving the learning process a purpose and significance. Furthermore, the authors in [9] demonstrated that this kind of assessment fosters HOTS including evaluation, analysis and synthesis—skills that are essential for success in the modern workplace. It has been discovered that authentic evaluation works well to support students' learning and cognitive growth. Owing to its intricacy, there are still unanswered problems regarding this kind of assessment as applied in the dynamic teaching and learning context.

1.2 The Promises of Authentic Assessment

Giving the students a voice, a choice, and a chance to demonstrate their knowledge and proficiency depend on authentic assessments [10]. With this, it may be said that authentic assessments may have a significant and beneficial impact on students because of the increase in the students' level of preparedness for life after school. Hence, some important impacts of authentic assessments are cognition activation and development, vocabulary and literacy skills improvement, scientific literacy, self-expression and improvement of scientific skills.

Cognitive activation is one important aspect of authentic assessment as it is a prerequisite for students to create knowledge (e.g., when difficult activities are presented at a suitable pace). As cognitive activation happens, the students are applying higher order thinking skills since they are expected to justify their responses [11]. The author added that complex tasks are a necessity to develop thinking skills, thus, stimulating cognitive activation. Methods of cognitive activation include, but are not limited to, discussion, summarizing, questioning, mapping opinions and attitudes, role plays, group or partner work. Within this regard, description and reflection on the meaning and characteristics of complex tasks is of paramount importance so as to help students learn effectively and thus activate their cognition. It is also cognitive student activation when students are mentally stimulated to go further into the material within the learning setting. Thus, as the students activate cognition in doing an authentic assessment, they put their expertise into practice and provide fresh and significant ideas. Likewise,

some authors in [12] said that cognitive student activation is the term used to characterize how learners are mentally stimulated to delve further into the material within the setting of the learning environment. Tasks have frequently been employed in their study to operationalize the idea of cognitive activation, which was previously only connected to students' learning results in math classes. The authors showed how the idea of cognitive activation might be used to examine and evaluate science education. They defined quality in science classes using a content-specific framework and made a distinction between task realization and assigned task. With the assigned task particularly analyzing a learning material such as a creative output, student cognition was activated.

Since vocabulary enables students to express their own ideas, it is a crucial component of learning based on the authors in [13,14,15,16]. As an authentic assessment is given to the students, vocabulary skill develops because the authentic materials can inspire, bring about cultural awareness, provide real exposure, foster creative education, and bring reality into the classroom. This assists and motivates students by bringing subjects to life for them and allowing them to make connections between the classroom and the outside world. Based on the author in [14], vocabulary skills are important, and more generally, academic language proficiency, for student learning. In analyzing a particular authentic assessment, they used the metaphor of 'words as tools' to reflect understanding that instruction in academic vocabulary must approach words as means for communicating and thinking about content [15]. Doing so therefore provides students with opportunities to use the instructed words as they are learning them [16]. Likewise, putting scientific concepts into authentic contexts is a means of cultivating and raising students' literacy skills [17]. Authentic assessment relates to literacy by allowing students to demonstrate their understanding of concepts and skills through practical applications. Thus, the students give meaning and therefore improves vocabulary as well as literacy skills.

Increasing and fostering students' scientific literacy across disciplines has emerged as an objective for science education. It is believed that scientific literacy is associated with cognition, or to be more specific, scientific cognition. According to the author in [18], to be scientifically literate is making the students become sufficiently aware of science and science related public issues. In becoming scientifically literate, teachers should prepare the students to correctly apply scientific knowledge in solving problems and making decisions. This means that scientific literacy skills are one of the skills required by the students in order to be able to apply scientific knowledge to solve problems related to science. In addition, it may be assumed that without scientific proof of literacy skills, students are more likely to make mistakes, particularly when it comes to comprehending scientific facts and discoveries. Misunderstanding scientific concepts might result in a more serious issue because scientific reasoning is very helpful for figuring out the answer to a problem and understanding causation. Likewise, [19] defines scientific literacy based on three key competencies: explaining phenomena scientifically, evaluating and designing scientific inquiry, and interpreting data and evidence scientifically. Knowledge is necessary for each of these competencies. For example, understanding the content of science is necessary to explain scientific and technical events. However, content knowledge alone is not enough for the second and third competencies. They also rely on an awareness of the methods used to establish scientific information and the level of confidence that is placed in it. Understanding the basic procedures that underpin the many techniques and practices used to produce scientific knowledge is necessary to recognize and identify the characteristics that define scientific inquiry. Thus, for explaining concepts in biology, the use of authentic

assessments involve the competency regarding scientific data interpretation where scientific literacy is evidently demonstrated by the students.

Students share their thoughts and feelings regularly and across numerous social contexts when they express themselves [20]. When they do self-expression, they allow others a glimpse into their personalities, preferences, personal styles of interacting, and ways of thinking. According to the author, with regard to personality, one's skills are the physical, concrete or material means of self-expression because these skills help students to actualize their ideas and to materialize them in the world. Without these skills, students would not be able to convey their ideas to the world. The creative energy needs definition, shape and form if there is a need to express it. That's why self-expression is associated with expressing one's personality – since there are the personality traits which give rise to primary skills enabling the students gain other skills to express themselves. With preferences, the author opined that without self-expression, there could be nothing to pride oneself over. For example, making a creative output such an art is what keeps one going and not caring about what others think of it. This means that the students have the talent that no one else has because it is their way of being individuals. Thus, it is their preference to be happy with the kind of creativity they have. According to the author, self-expression is also associated with personal styles of interaction which tells the "how" of one's behavior. The styles also involve patterns of interaction that are innate. Knowing the students' personal interaction styles locate interpersonal conflicts and provides a map for greater flexibility in making interactions with others. This means that with authentic assessments, personal styles of interactions are expected from the students as they exchange ideas and opinions. Finally, the same author explained that self-expression involves ways of thinking as it is dependent on the person. Ways of thinking involves the many forms how the students outwardly represent their thoughts, feelings, and interests. Examples of self-expression to involve different ways of thinking include dance, written works, and any form of art.

The idea by the author in [20] is supported by the author in [21] who reported that an authentic assessment enables students the opportunity for multiple means of self-expression. This means that with authentic assessments, self-expression helps the students to communicate one's thoughts, feelings, and ideas as well as it allows them to express their individuality and creativity. When students are able to express themselves freely, they are more likely to advocate for their needs and rights and they are more likely to feel confident in expressing their thoughts and opinions. Creating opportunities for self-expression such as doing authentic assessments becomes a platform for students to express themselves authentically. By incorporating creative authentic activities such as creative writing (poem, script writing), art projects (model making, infographics making etc.), music (song/jingle writing) or drama, (role playing) students can express themselves in a non-conventional manner and develop their self-expression skills. Doing these activities encourage students to explore their thoughts, feelings, and experiences without judgement as well as provide an outlet for students to express their innermost emotions. By allowing students to share their perspectives, their voices are validated, and students are empowered to express themselves confidently. Meanwhile, according to the author in [22], authentic assessment encourages students to use their scientific knowledge in the real context. This adds to the fact that authentic assessment improves scientific skills such as analytical, synthesizing, and evaluative skills as well as creative thinking and action. Moreover, the author said that an authentic instructional activity encourages students to solve a problem and stimulates their critical thinking, analytical skill, and observational skill.

Students who possess critical thinking skills can arrange data from multiple sources to reach a conclusion and make a choice. Lack of critical thinking skills prevents students from making decisions based solely on their opinions, convictions, or actions. Additionally, by self-constructing "meaning" based on self-relevance, classroom education with authentic assessment fosters self-awareness on the truth of science and nature. It is urged of students to think and act critically and creatively, to participate in the process of inquiry, to analyze and react to problems critically, and to solve problems in a realistic way [23]. Thus, this research aimed to determine the impacts of authentic assessment in biology on the learning of Grade 11 students. Likewise, students' perceptions about authentic assessments were considered.

2. Methods

2.1 Context of the Study

The study was conducted at a public high school in the Philippines' Region IVA (CALABARZON). The participants were 102 Grade 11 students which belonged to the Science, Technology, Engineering, Agriculture and Mathematics (STEAM) strand of the K-12 curriculum. As an autonomous unit, Agriculture is integrated in the curriculum, hence, the STEAM strand. Senior high school curriculum in this school has a semestral offering with SH-Sci 3 (Senior High School-Intermediate Biology) taught during the first semester. For the hybrid set-up in SY 2022–2023, there was the alternating schedule for lecture and laboratory in the 16 weeks. Weeks 1, 3, 5, 7, 9, 11, 13, and 15 (8 days), were intended for the Lecture component and weeks 2, 4, 6, 8, 10, 12 and 14 (7 days) were intended for the Laboratory component. Week 16 was the final assessment. The number of meetings per week was three days at 2 hours per meeting. The covered topics were adjusted due to the set-up which were based on the *DepEd* Most Essential Learning Competencies (*MELC*). The *DepEd MELC* involves learning competencies that are rephrased and deemed most essential in the achievement of content and performance standards. Its usage was implemented during the COVID-19 pandemic as one of the actions of DepEd through the Learning Continuity Plan. All the authentic assessments were evaluated using a rubric.

2.2 The Research Design

This study used a qualitative research method involving the determination of the impacts of authentic assessments to the students through actual observations. The other qualitative data involving students' perceptions on doing authentic assessments were obtained through interviews with a random number of students.

2.3 Data Collection and Analysis

Observations were documented for determining the impacts of authentic assessments and interviews were done for collecting data on the students' perceptions about using authentic assessments. At the start of the semester, the teacher-researcher has prepared a list of authentic assessments to be used in teaching biology. Since eight (8) weeks were intended for the lecture component, the same number of authentic assessments were prepared. Specifically, in the teaching of cell structures and functions, a poem writing was listed. Comic strip writing was listed as an assessment for discussing about cancer. Brochure making was intended for discussing about cell

transport mechanisms. Role playing, case study analysis, model making, digital infographic and mind map were listed as assessments for physiology.

As the students did each of the listed authentic assessments, they were observed by the teacher-researcher. Codes made were associated with the promises of authentic assessments as described in the introduction. On the other hand, the collected data from the interviews (done during the vacant schedule of the students) were analyzed qualitatively through thematic analysis. Repeated review of the data, coding checking and seeking peer consultation were done to reduce the teacher-researcher bias. All the data collected were subjected to qualitative analysis.

3. Results

3. 1 Impacts of Authentic Assessment

The sample poems where the impacts of authentic assessment, namely, cognition activation and development were identified are indicated below. The poems were written individually by the students.

Cells are like a factory
That dates back many a century
In the nucleus lies the chromatin

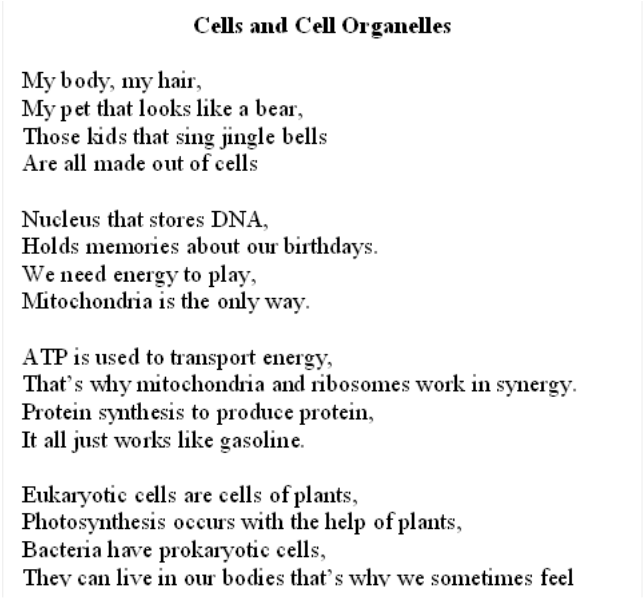
The nucleolus makes ribosomes, in a nutshell
Ribosomes, here they are made and dwell
In the rough ER they help create protein
That keeps us from feeling green

Cilia and flagella organelle
Without them, some cells become a clamshell
Both are appendages for movement
But they differ in their sum and measurement

Like us, cells die, a shame
But without riches to their name
Thy process is called autolysis
Committing seppuku and down to the abyss

Figure 1: A sample poem showing cognition activation

As the students' cognition was activated, the poem they wrote made use of metaphors and personification. Metaphors are a direct poetic comparison between two different objects or subjects. Personification is a type of metaphor used to give human characteristics to non-human beings, inanimate objects, or abstract ideas. The samples are indicated below.



Cells and Cell Organelles

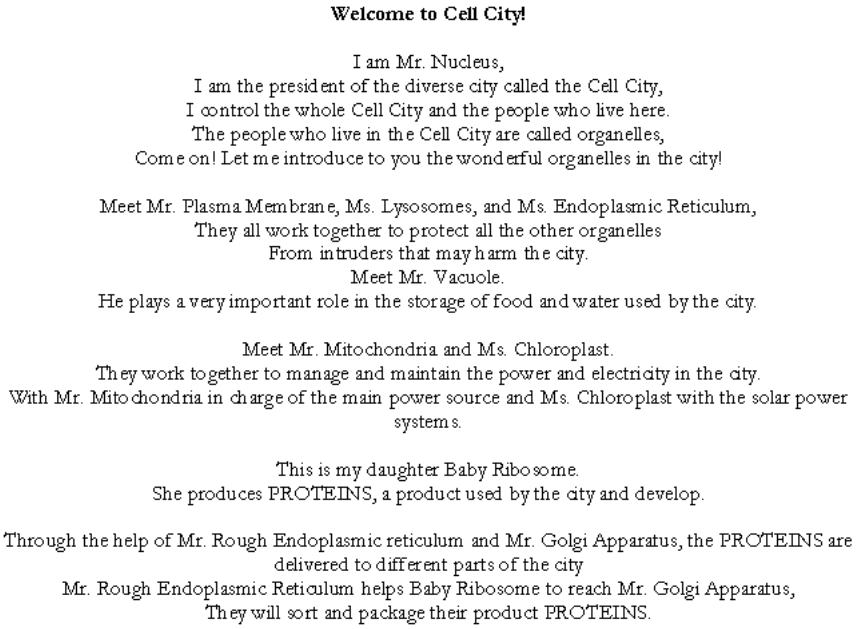
My body, my hair,
My pet that looks like a bear,
Those kids that sing jingle bells
Are all made out of cells

Nucleus that stores DNA,
Holds memories about our birthdays.
We need energy to play,
Mitochondria is the only way.

ATP is used to transport energy,
That's why mitochondria and ribosomes work in synergy.
Protein synthesis to produce protein,
It all just works like gasoline.

Eukaryotic cells are cells of plants,
Photosynthesis occurs with the help of plants,
Bacteria have prokaryotic cells,
They can live in our bodies that's why we sometimes feel

Figure 2: A sample poem showing cognition activation using metaphor



Welcome to Cell City!

I am Mr. Nucleus,
I am the president of the diverse city called the Cell City,
I control the whole Cell City and the people who live here.
The people who live in the Cell City are called organelles,
Come on! Let me introduce to you the wonderful organelles in the city!

Meet Mr. Plasma Membrane, Ms. Lysosomes, and Ms. Endoplasmic Reticulum,
They all work together to protect all the other organelles
From intruders that may harm the city.
Meet Mr. Vacuole.
He plays a very important role in the storage of food and water used by the city.

Meet Mr. Mitochondria and Ms. Chloroplast.
They work together to manage and maintain the power and electricity in the city.
With Mr. Mitochondria in charge of the main power source and Ms. Chloroplast with the solar power systems.

This is my daughter Baby Ribosome.
She produces PROTEINS, a product used by the city and develop.

Through the help of Mr. Rough Endoplasmic reticulum and Mr. Golgi Apparatus, the PROTEINS are delivered to different parts of the city
Mr. Rough Endoplasmic Reticulum helps Baby Ribosome to reach Mr. Golgi Apparatus,
They will sort and package their product PROTEINS.

Figure 3: A sample poem showing cognition activation using personification

Further, the students' writing of poems made improvement on their vocabulary and literacy skills. A sample poem showing the students' use of new vocabulary is indicated below.

The Cell

A cell so minuscule-whose vast interior so complex,
Carved out by evolution which it really does perplex,
The nucleus core that is enveloped fathomless within, transfers DNA from this generation to the next,
The nucleic acid which is the DNA- a blueprint of life- like it's some sort of sacred text,
The liquid that flows and surrounds every corner of the cell,
Is dubbed the **cytoplasm** that holds the organelles as well.

The finicky **plasma membrane's** phospholipid bilayer's permeability,
Is what gives the filter its intricate selective ability;
The iconic **mitochondria** that generate energy for the cell,
Enables the indefatigable ribosomes able to amalgamate a myriad of proteins as well,
Endoplasmic reticulum both textures smooth and rough,
The former with no ribosomes, the latter with enough.

The gritty **Golgi body** who scrupulously conglomerates and diverse proteins,
Built in with indispensable enzymes who does their duty so keen,
Acidic **lysosomes** that digest and reuse worn out organelles,
Does also those to lipids, proteins, and molecule like a task so bagatelle
Poised p**eroxisome**s that give off hydrogen peroxide, hence its name
Oxidizes molecule to make them innocuous is its game.

The **cell-** the fundamental unit of life,
Makes life processes eliminate their strife,
For growth and repair,
Reproduction and genetic share,
The cell that is inside
With life coincides.

Figure 3: A sample poem showing use of new vocabulary

For literacy skills involving the students' demonstration of good writing skills, two sample poems are indicated below.

Endless Capacities Within a Cell

Miniscule, complex, profuse and limitless;
The cell, something so small yet so intricate,
Composes all living things and carries out life processes
How exactly does it operate?

With the plasma membrane, the outermost barrier,
Separating the interior from the outside,
It's semi-permeable, not allowing everything to enter,
A thin layer enclosing the organelles inside.

With the nucleus, the command center,
Synthesizing proteins and containing hereditary information,
Separated from the rest of the cell by a double layer,
And controlling the cell's growth and reproduction.

With the cytoplasm, extremely vital but often overlooked is its importance
Holding the organelles in place, a substance like a gel,
Would have explored more organelles if I had the chance,
But to put it simply, these are the three main sections of the cell.

Figure 5a: A sample poem showing literacy skills (good writing skills)

The World Through a Tube and Lens

So much beauty in things that live and grow
There's more to them than what our eyes behold
Take a closer look through a tube and lens
And immerse yourself in a cell's presence.

The plasma membrane is like a small protective bubble
A controlling gateway which we call semi-permeable
Inside this bubble is the jelly-like cytoplasm
Bearing other organelle, support is its specialism.

The nucleus holds our bodies' instructional manual
Those strands of DNA that help us stay functional
The mitochondrion serves as a cell's battery
It converts nutrients into what we call as ATP

Some of them facilitate growth and reproduction
Some of them generate energy and provide protection
Miniscule organelles, smaller than a speck of dust
Tiny, they may be, yet they serve a significant purpose.

Figure 5b: A sample poem showing literacy skills (good writing skills)

Finally, in poem writing, self- expression was also an identified impact as indicated in the sample below.

My Dear Friends, My Organelles

My dear friends, oh how much you mean to me!
Without you I would be blank as the sea
Unique in every aspect, as I can say
You are all compatible to me in every way.

You provide energy to keep me going,
Energy that is continuously flowing.
Your existence as priceless as a gemstone,
With your absence I would not stand on my own.

You formed connections that I could not mold.
Your sturdy membranes that uphold,
Membranes that are selectively permeable,
This permeability that shelters me from trouble.

You shaped me into what I am now,
I would have never known how.
As we cannot live as mere cells,
But possible with you my dear friends, my organelles

Figure 6a: A sample poem showing self-expression

My Dear Organelles

Inside me, there lie
Many vital organelles I can't deny
That without them I will truly die
C'mon, let's explore them as I try.

First, there's this nucleus that acts like a manager
For it controls cell activities in the center.
Inside it lies the mighty nucleolus
That makes the protein maker ribosomes, not a ruse!

With the vacuoles that store effectively
And the mitochondria that produce energy actively,
There's the cell membrane, whose layers are two,
That protects the cell from its environment, so true!

Oh yes, my dear organelles!
I thank thee for helping out the cells
Your powers are like a magic spell
That really makes me feel so well.

Figure 6b: Another sample poem showing self-expression

Promotion of scientific literacy was identified as an important impact of authentic assessment as this was demonstrated when the students made a comic strip about cancer. Individually, this assessment was pre-assigned to the students as they needed to make an interview with cancer patients. As the students assumed to be investigators, they came up with a comic strip describing the journey of a person with cancer as indicated in a sample output below.

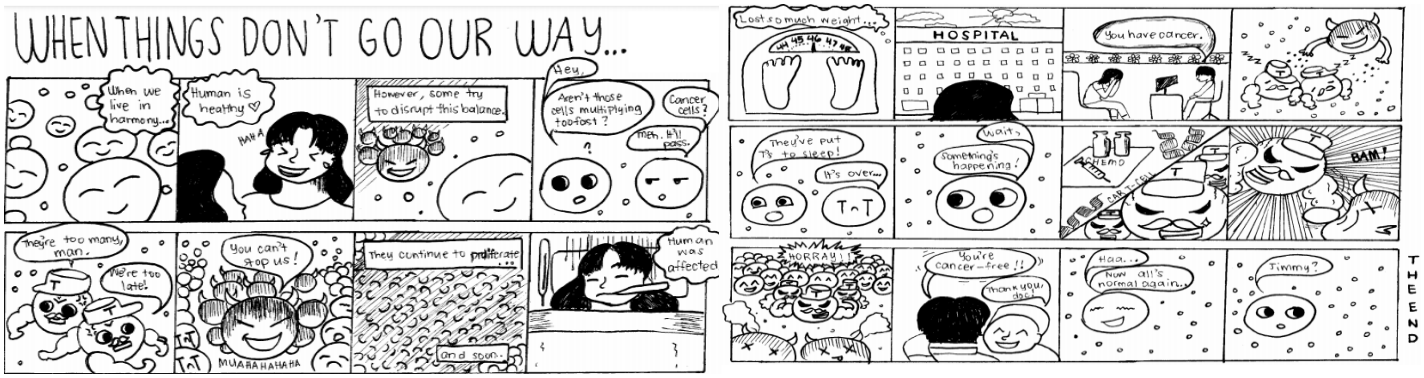


Figure 7: A sample comic strip about cancer

Figure 8: Sample brochure on lung cancer

Lastly, improvement of scientific skills were demonstrated by the students as they constructed a brochure, model, infographic and a mind map as well as when they did role playing and cases study analysis. Brochure making, infographic making, and mind mapping were done by group while model making, case study analysis

and role playing were individual tasks. The sample of these tasks are indicated below.

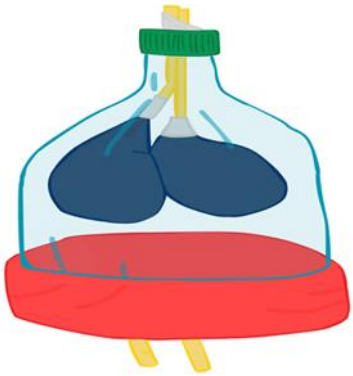


Figure 9: Sample respiration model

Figure 10: Sample poster used in Case Study Analysis

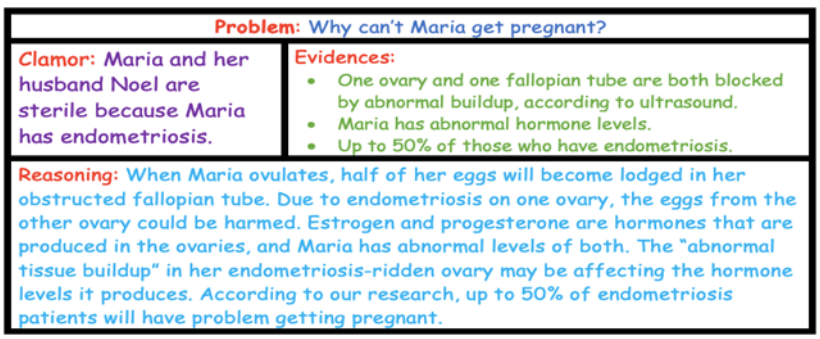


Figure 11: Sample Infographic about the Immune system

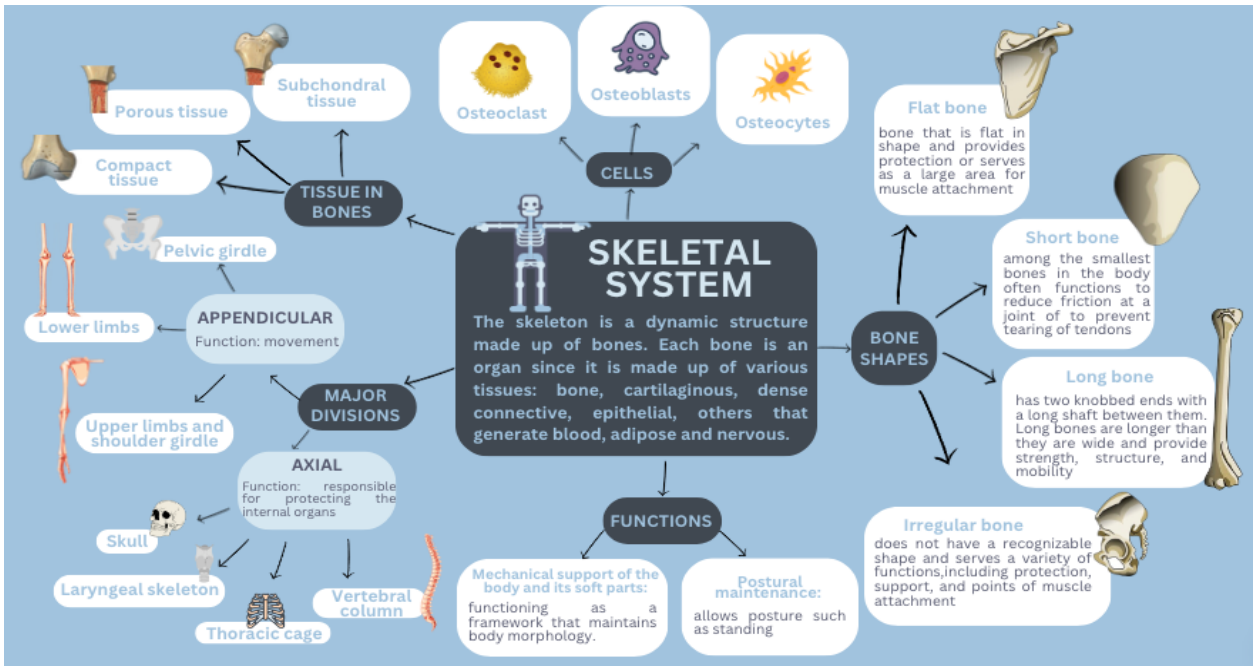


Figure 12: Sample mind map about the skeletal system

3.2 Students' Perceptions about Authentic Assessments

After 15 weeks, the teacher-researcher made an evaluation by asking the students' perceptions about the doing of authentic assessments. There were three questions prepared by the researcher which were answered by a random number of students through an interview. The students' responses are summarized below.

3.2.1 Students' Thoughts after Doing the Authentic Assessments

Unique task accomplishment. Some students highlighted the doing of authentic assessments as a way of accomplishing or performing a particular task. It is evident in the interview with the students as follows.

"When I do authentic assessments, I discover my own creativity… in performing any task." (Student 1).

"Own ideas become interesting in accomplishing an authentic task." (Student 2)

"In the accomplishment of a task that is authentic, there is the use of a variety techniques." (Student 3).

"Own manipulation of learning materials to accomplish an authentic task… it means having an alternative technique." (Student 4)

"I know when I do authentic assessments, I am able to perform practical tasks." (Student 5)

"A new method that is considered inquiry-based… you see, because we are thinking about the task critically in learning biology." (Student 6)

Easy way of learning. According to some students, the doing of assessments makes it easy for them to understand concepts as indicated in the interview below.

"For me, authentic assessments refer to a way of creating innovative motivational activities. This is to learn biology." (Student 7)

" Doing an authentic assessment is an easy way to learn about biology topics." (Student 8)

"I believe that doing an assessment is about an appreciated presentation of topics in an easy way." (Student 9)

Better than traditional assessments. Some students pointed out that there are reasons why authentic assessments are much better than the traditional ones. Such reasons made them realize to choose authentic over traditional assessments. In their words:

" I think authentic assessments provide a variety of activities… than the traditional with structured activities." (Student 10)

"I find easy assessment materials in authentic assessments than the usual memory work. This is what we do before. It's a traditional assessment." (Student 11)

"You know, there are more creative and innovative assessments than the traditional paper and pen answering… , that's why I really like authentic assessment." (Student 12)

" The assessments are motivational to learn about biology differently. Traditional assessments are the usual tests." (Student 13)

" What I see about authentic assessments is that these are new assessments learned for students. This is to love but not bore biology like in traditional assessments." (Student 14)

3.2.2 How Authentic Assessments Enrich Students' Learning

Thinking Skill Development. Some students shared that a lot of thinking skills are used when doing any authentic assessment. Whether it is simple or difficult, they believe that they do develop a lot of thinking when an authentic assessment is done. In their words:

" I think there was improvement of thinking skills… we needed to think deeply about the task. I really had a lot of thinking… when I did the brochure, though hard." (Student 1)

" As I did the role-playing, I felt that that authentic assessments are applicable to learning biology more effectively… the activity is hands-on, we learners think critically. Many of us did many thinking skills when we

did the other assessments." (Student 2)

"There was active participation because we tend to ask questions about the task without pressure. And when we ask questions, there are a lot of things we have to think about very critically and creatively." (Student 3)

"I learned more about biology creatively. Not much paper and pen test. And because we develop thinking skills, we realize that the curriculum should be modified. Include in the list of activities… authentic activities." (Student 4)

Practical Knowledge Acquisition. Few students feel that authentic assessments teach them to acquire knowledge in a practical way rather than through any traditional assessment. It is indicated in the interview below.

"Without memorizing concepts, I know, it is an authentic assessment. Doing it is very practical. It is easy to know something. And this is all about this authentic assessment. (Student 5)

"I believe that concepts are more understood in an authentic assessment. It can be applied to real-life…or practical situations. You know, you can always think of practical situations, no limit, in authentic assessments." (Student 6)

"You see, an authentic assessment is a practical approach… it is for better understanding concepts… it is better than memory work… if we do that, there is not much understanding." (Student 7)

Understanding of Concepts Differently. The students reveal that they understand biology concepts differently in doing authentic assessments. As with any authentic assessment, they believe they enhance learning and improve conceptual understanding. This is indicated in the interview below.

"As I experienced it, I can use a variety of resources… this is important to understand concepts… and it is for any assessment that is authentic. You see, if I do an output… I can make it authentic with the books, notes, web resources that I can use… as I do this, I get to understand different concepts better." (Student 8)

"I got to be exposed to the different authentic assessments in biology. I know I learn better the concepts… I feel I improve defining technical terms… because I learn them in a different way." (Student 9)

"From the different assessments I did, I learned to appreciate simple yet easy to execute assessments… I am very sure... I got to improve understanding of concepts… I feel this differently in doing any authentic assessment." (Student 10)

More Learning of Concepts. With the new and different approach, the students believe that there are more learning of concepts because there is no memory work. In their words:

"I know this is a new approach in learning biology. And I learned a lot in a different friendly approach… I know I have more learnings in biology because I learned more." (Student 11)

"I got more learning of concepts due to a different approach. I never memorize but I get to remember the concepts… it is because of the authentic activities." (Student 12)

Academic Performance Improvement. One student believes that doing authentic assessments gets to improve scores because it is graded differently as she said,

"An authentic assessment is very helpful to improve academic performance… it is better than traditional tests/exams. I used to answer multiple-choice, identification exams, etc. and results are not always okay. But you see, when I did the authentic assessments, evaluation is through a rubric and my scores are more okay." (Student 13)

Ownership in Material Manipulation. In doing an authentic assessment, one student shared that since she is the owner of the output she made, she can manipulate it freely as she said,

"Because I really did the authentic assessments, I felt the ownership…it is about in how to manipulate any material… learning materials to learn about biology. I was not shy to explain my output… when I did it... I felt to be the owner. I got to be interested to learn more using my personal work." (Student 14)

3.2.3 Students' Comments and Suggestions about the Teaching of Authentic Assessments

Share to Others. A few students felt that all of the authentic assessments they completed should be distributed to the upcoming class of students as well as the subject teachers, as shown in the interview below.

"I suggest to keep the authentic assessment materials… These can be shared to the next batch of students even without the pandemic." (Student 1)

"The new teaching approach is innovative… this can be shared as guide to other subjects." (Student 2)

Modify the Curriculum. Since the other students had hands-on experience with authentic assessments, they recommended curriculum modification, as shown in the following interview.

" This is what I think…I believe that there should be curriculum modification… it is something about adding the authentic assessments… at least in the teachers' lesson plan." (Student 3)

" I think there should be more authentic and interesting assessments in the teachers' lessons. Any types of assessment are welcome." (Student 4)

" I suggest to include authentic activities in every lesson plan of a teacher." (Student 5)

A New Approach to be Thankful for. The students displayed positive words about doing and being introduced to authentic assessments. They noted the usefulness of the assessment as well as how it fosters student creativity. In the interview that follows, the evidence is mentioned. In their words:

" It is nice to know to have less lecture… instead do practical and hands-on activities. Now I am introduced to many authentic assessments, and I like it." (Student 6)

" It is really a great job of making us exposed to good authentic activities." (Student 7)

" It's a good approach, good materials, from too many traditional works to more authentic tests. (Student 8)

" I am very thankful for this creative approach." (Student 9)

"Thanks, our dear teacher for spending time to prepare authentic assessments." (Student 10)

" It's the teacher's effort being thanked and appreciated." (Student 11)

" I enjoy doing self-understood procedure to make the task. Thank you to my teacher for the authentic procedures and assessment." (Student 12)

4. Discussion

4.1 Impacts of Authentic Assessment

Cognition Activation and Development. In the classroom, when the students were tasked to write a poem, they were observed to be very excited. Working individually and independently, they got their paper and pen and started to think about what to write. As they started to recall about what they learned on cell parts and functions so that they could translate it to the content of the poem they were writing, they posed questions which were answered either by their classmates or by the teacher-researcher. For example, one student had to stand and asked the researcher a question; another student had to go to a classmate to clarify something; few students were discussing as a group asking some questions to one another and other students were standing so that they could go from one classmate to another to ask questions. When the students' queries were answered, they settled down in their respective seats and continued to write their poem. As the teacher-researcher roamed around to observe, she assumed that student cognition activated. For example, when the students started to write each line of the poem, they were observed to do thinking as they followed a pattern. They used rhythmic words and short, snappy sentences that have been known to activate parts of the brain that had been in 'daydreaming' mode. According to the author in [12], in order to encourage students to think critically about the material they are learning, students' cognition was activated. More thinking was observed in the students as they completed the poem seamlessly. In this case, cognition did not only activate but also developed. Cognition development refers to the growth of an individual's activity to think [24]. The students were also noted to look for connections between sentences or phrases as well as ideas that were hidden in the text and to highlight them as indicated in the sample poem (Figure 1).

Specifically, the student-writer linked "*factory and century*," to mean something about historical background of cells and "*chromatin and protein*," and "*nutshell and dwell*," to mean something about cell functions. The poem writing activity also exposed the students to literary device such as metaphors and personification. In "Cells and

Cell Organelles," the student-writer used metaphors and personification as indicated in Figures 2 and 3, respectively.

Particularly in the first stanza (Figure 2), "*My body, my hair / My pet that looks like a bear / Those kids that sing jingle bells/All are made out of cells*," the student-writer emphasized vivid imagery that goes beyond literal interpretations and produced an image that is simpler to understand and react to. The use of "*body, bear*, and *kids*" gave the meaning that all living things are composed of cells. As the student continued to the second, third and fourth stanzas, her imagination was activated and she was more able to convey emotions and impressions through metaphor. Based on the author in [25], metaphor serves not only as decoration but also as a mental and cognitive tool for the poet. It is also the foundational element of poetry and the poet's claim to fame.

Meanwhile, the poem, "Welcome to Cell City" (Figure 3) is an example of personification. Through the presentation of students' personification poem, they developed narratives to visualize how the individual parts of the cell work as a whole to sustain the cell's life as the writer personifies to be the "nucleus." This is supported by the authors in [26] who opined that personification is one of poetry's most exquisite rhetorical devices, and it is how the poet imbues inanimate objects with life and vitality. The authors added that personification is the process of decorating mental things with human and animistic states, actions, and behaviors. This creative writing made the students appreciate the functions of cell organelles and learn about them more critically.

Vocabulary and Literacy Skills Improvement. The students were also observed to build new vocabulary as they started to write their poem. They learned how to incorporate new words when writing and understand their meanings. According to the author in [27], incorporating poetry into the classroom gives students a sincere chance to improve their language skills in terms of vocabulary and grammar. Additionally, they learn how to select particular phrases or use them in new circumstances in order to rhyme or match a meter. Some of the students' poems used rhyme to insert more difficult vocabulary that some of the students would already be familiar with. In the poem in Figure 4, rhyming "*complex*" with "*perplex*" is a connection made between a well-known term and the new vocabulary. As previously said, these words were frequently much simpler to remember, therefore learning vocabulary in these circumstances increased the likelihood that the student would use the new words in his own writing. The student learned new ways to communicate his ideas and thoughts, which helped him become more inventive in his writing. This whole poem written by the student created many new vocabulary making good understanding on the functions of the different cell parts. In general, the students' ability to explore language that was crucial to their comprehension allowed them to find new linkages between words and uncover rhyme and rhythm in their poetry.

Poem writing also helped students improve their literacy. As noted, the students had a good practice for strengthening their writing skills. The students also gained command of language and cultivated a robust vocabulary. According to the author in [28], it is essential for students to be able to produce narratives in a variety of categories. Students have more options to express themselves and show their understanding when they venture beyond the confines of paper and pen. Readers are better able to understand the content of the writing when students can incorporate a variety of words into a poem. As their literacy in writing improved, it

was also observed that the students showed much interest in writing a poem. This is supported by the author in [29] who reasoned out that student excitement and the learning method both have an impact on how they learn to write a poem and the learning process. Some examples of poem showing the good writing skills of the students are indicated in Figure 5 (a & b):

Self-expression. Poem writing also allows the students to express their emotions and connect to those emotions. Exploring one's beliefs, expressing one's principles, or sharing experiences can all be exercises in self-expression. As observed when the students were writing their poems, they shared values. Since the students had previously learned the significance of cell parts and their roles so that the cell, as the fundamental unit, may carry out all cell activities and processes, they imbibed the cell parts and functions in their poems. Valuing the cell involves the students' use of words such as "*my dear friends*," "*you shaped me into what I am now*," and "*I thank you for helping out the cells*" indicating the students' expression of emotions about how they feel about the cell (Figure 6, a & b).

Writing a poem allows one to express language and communication in particular utilizing the skillful mix of words to make a point and appeal to the readers' aesthetic enjoyment [30,31,32]. It enables students to express their ideas, feelings, and opinions, share information, and broaden their perspectives on both the world and mankind in general [33].

Promotion of Scientific Literacy. Before the students did their comic strip, the teacher-researcher told them to consider visiting a relative, a family friend or a family member who are cancer patients. With this task, the students came to the room prepared on the next meeting. The teacher-researcher made a recall about cancer and the concepts associated with this. With the readiness, the students started to prepare a comic strip. Working individually, the students were observed to enjoy writing their comic strip about cancer as they explored the individual memories of cancer patients (friends, relatives, family members). Equipped with the information on cancer, scientific literacy was promoted. Particularly, the students were observed to think, talk, and write about science in comic strips, enhancing their science literacy and making the material more approachable to them. According to the author in [34], scientific literacy is characterized by a variety of abilities, including "knowledge of scientific vocabulary, understanding the nature of scientific inquiry, being able to use scientific concepts in everyday life, and being able to read and interpret scientific information in the popular press" (p. 901). With its combination of dialogue and graphics, the comic strip writing genre enables students to learn and analyze material in a distinctive and approachable way. Moreover, by telling stories about real people, a comic strip provides a window into our culture. The author in [35] supports that the comic is an important authentic assessment because it sheds light on issues of feelings, emotions, and thoughts that are present in a person suffering from cancer.

With a limited time, the comic strip was not done completely in just one meeting, instead, it was considered an assignment. An example of a completed comic strip written by one student is indicated in Figure 7.

Improvement of Scientific Skills. When the students were tasked to do brochure making, model making, role playing, case study analysis, digital infographic making and mind map, they were observed to use scientific

skills. The fact that the students were able to conceptualize in completing the mentioned authentic assessments would imply a more improved use of scientific skills. Scientific thinking abilities include things like observing, asking questions, speculating, testing hypotheses, recording facts, and expressing ideas or communicating thoughts.

A concrete example of expressing ideas or communicating thoughts is through **brochure making** as the students communicated a specific disease under the topic on cell transport. This assessment was assigned to the students individually in two parts. During the first part (first meeting), the guidelines as well as the format and how it is evaluated were discussed. Conceptualization was also done under the supervision of the researcher. While the students did the conceptualization, they were observed to talk silently with seatmates. The author in [36] supports that the brochures serve as an educational tool for communicating thoughts, in this case, a specific disease that is associated with cell transport. The authors added that the purpose of doing the brochure, in the context of diseases, is for awareness. Additionally, brochures are frequently used to provide health information to readers of all ages [37].

Another authentic assessment that promotes scientific skills, is **modeling**. The author in [38] said that modeling, or the process of building models, is a crucial step in the formation of scientific ideas for scientists using scientific thinking abilities. By modeling complex events and creating appropriate explanations, scientists can simplify them. Modeling is also the act of developing, analyzing, and revising models to produce models that accurately depict scientific ideas [39,40]. On the day of the model construction by group, the students were observed to use a number of scientific thinking skills. Some students had some predictions on how their model would work. Few students were observed to think critically as each member of the group discussed how Boyle's law (pressure-volume gas law) is related to gas exchange. Other groups were observed to exchange ideas and discussed reflectively on the kind of model they would construct. True enough, such observations prove that since models are examples of explanations, they play a significant role in the scientific method [41]. As the students finished their model, the group had to show to the teacher how the model would work and explain how Boyle's law is applied to gas exchange using the materials they used. A sample model is indicated in Figure 9.

The leader of each group was asked by the teacher-researcher to pick randomly a kind of disease- diabetes, Cushing's disease, goiter, cancer of the endocrine gland and lymphoma. With the picked disease, the five (5) groups were instructed to research on what the disease is all about, its symptoms and treatment and present a scenario about it in a **role play** for 5 minutes. The teacher-researcher allowed the students to use their mobile data to research and discuss on the picked disease for 30 minutes. As the students discussed in small groups, they were very participative to share ideas. After 30 minutes, the students were given 15 minutes to practice. As the groups practiced, the teacher-researcher observed that the students were able to collaborate with the other group members exhibiting favorable social behaviors. Moreover, the teacher-researcher observed a sense of duty and caring that fostered empathy among the students in the group. Likewise, the students were encouraged to have an extensive comprehension of content along with the development of communication skills as each student talked and communicated their opinions. As they became ready, each group was randomly called by the teacher-researcher to present in front. With good role playing presentation, the teacher-researcher commended everyone for a job well done. As presented, role playing provides better learning outcomes. This observation is

supported by the author in [42] who conducted a research and concluded that using the role playing can make students more engaging in the learning process. The authors found that the students' quality in terms of knowledge, experience, and scientific thinking abilities significantly improved. Role playing is considered a teaching method designed by the author in [43] n order to assist students in studying and considering their social ideals. It aids students in gathering and organizing data about social issues, cultivating empathy for others, and making an effort to advance their social skills. Moreover, students learn to synthesis and summarize, write and organize information, and employ problem-solving techniques as the method requires them to "act out" issues, learn to assume different roles, and watch social interaction [44].

In the group **case study analysis**, the teacher-researcher prepared a case study divided into two parts. In part 1, the students were given the issue, chose their role and made a quick review on the female and male reproductive systems. As the students finished, each group was provided with the clues including some hypothetical results such as ultrasound; hormone levels, etc. With all the clues provided, the teacher-researcher emphasized that a definite answer is not final. Students were asked to take their time as they assessed the data and made a diagnosis, highlighting the supporting data and justification for their findings. Furthermore, the hints did not point to a single, obvious explanation for the couple's infertility. The students continuously altered their hypotheses as they examined the case further and gained more empirical information. Much of thinking skills were observed as the students discussed within the members of their group. They formulated hypothesis, critically thought of their claim, analyzed the evidences and reflected on the reasoning as they discussed, exchanged ideas and opinions, and pointed out some views. On the other hand, in part 2, each group produced a poster outlining and arguing their final infertility assessment for the couple.

Case study analysis is another authentic assessment used for the lesson on reproduction. This type of study describes and analyzes a particular situation in which students are actively involved both at the cognitive and social levels through problem solving and systematic inquiry. As an extension of active learning to support key ideas and subjects being studied, case studies are thus an excellent approach to interest students in a subject. In the context of active engagement on analyzing a case or issue, case study analysis is quite similar to argumentation. According to the author in [45], a critical-thinking technique known as scientific argumentation aids students in developing, justifying, and defending their viewpoints on issues (p. 19). The author in [46] reported that to demonstrate what a student has learned and retained in class, case study analysis is frequently used. The author added that when analyzing a case study, students will have an opportunity to learn about the issue or problem. This challenges students' problem-solving abilities and enables them to participate in stimulating debates with their peers and teachers. A sample poster is indicated in Figure 10.

The next authentic assessment used for enriching knowledge about the immune system is a digital **infographic**. This assessment is the graphical or pictorial representation of the concepts about the immune system. Given as an assignment, the teacher-researcher provided the guidelines as well as assigned each student to prepare an infographic on what was learned about the immune system. As the students brought their infographic on the day of the presentation, the teacher-researcher asked the students for a short sharing of their experiences in doing their infographic. One student shared that she got to readily understand the immune system as the general concept is presented in a visual manner in the infographic. Similarly, another student shared that he was able to

comprehend visual information quickly. Another student added that as she did the infographic, she became reflective and creative. The authors in [47] stressed that infographics are a tool to encourage connection-making rather than merely a collection of images. Students strengthen their critical thinking abilities by making connections between symbols, themes, visuals, numbers, and text. Infographics challenge students to view the information through several perspectives and exercise various mental muscles by engaging multiple brain areas. Despite their complexity, infographics, according to the author in [48], "possess the special capacity to draw interest, provide information, and promote data retention." This means that infographics can be the best tool for explaining the fundamentals of challenging procedures to a wide range of audiences. A sample science infographic is provided in Figure11.

The last authentic assessment is **mind mapping** about the musculoskeletal system where the links between different data areas are displayed. On the first meeting, the teacher-researcher urged the students to find colored images of the musculoskeletal and save them on their laptops/any gadget which they should bring on the next meeting. As the students brought this on the next meeting, the teacher-researcher tasked the students individually to create a mind map. Showing a sample, the teacher-researcher instructed the students to start their own mind map creation. While the students started, the students were observed to employ analytical and critical thinking as they made connections between concepts. According to several researches, mind maps improve presentations, memory, creativity, thought organization, and the writing process. Moreover, the emphasis on using mind maps is on organizing the wealth of knowledge from the workbooks, videos, and lectures. The author in [49] Speri emphasized that creating a mind map involves writing down a core thought and conceiving of other, connected concepts that stem from it. In a mind map, information is arranged in a way that completely mimics how the brain functions [50]. Guided by the teacher-researcher, the students were able to make their mind map capturing their creativity and knowledge of the concepts needed. A sample mind map is provided in Figure 12.

4.2 Students' Perceptions about Authentic Assessments

The students' perceptions on doing authentic assessment as a way of accomplishing or performing a particular task, that doing authentic assessments makes it easy for the students to understand concepts and the reasons why authentic assessments are much better than the traditional ones are supported by the criteria involved in doing authentic assessments. The authors in [51, 52] identified seven criteria for authentic assessment: (1) Authentic assessment is "realistic". If a student's knowledge, skills and/or tendencies are assessed in the real-life context, this means that they should be assessed in authentic tasks. (2) Authentic tasks require students to make good decisions and to be creative and innovative in solving complex and non-routine problems or performing a task in new situations. (3) An authentic assessment or task enables students to participate in a subject or discipline through critical thinking and inquiry. (4) In authentic assessment, students are given the opportunity to repetition, practice, find useful resources and receive timely feedback to improve performance or product quality. (5) Authentic tasks seek multiple evidence of student performance and the reasons or explanations behind the success and failure of a performance. (6) A multiple scoring system is used, and the scoring criteria must be transparent. Clearly sharing the scoring criteria with the students will enable them to understand and internalize the criteria for success. (7) Students' self-assessments should play a very important role in authentic

assessment.

With authentic assessments, thinking skills are developed as perceived by the students. Particularly, the authors in [53] pointed out that traditional forms of assessment such as paper and pencil examinations (multiple-choice, true-false, matching, and others item formats) which test students on rote learning are not suitable to foster deep surface learning. The authors added that conventional tests and examinations tend to measure lower order thinking skills. Thus, authentic assessment is the one which relates the students learning with real world environment and this assessment determines the level of mastery of students on a defined skill. The authors in [54] added that through critical thinking and problem-solving, authentic assessment empowers students to address "real-world" difficulties because authentic assessment plays a significant role in instilling critical thinking and problem-solving skills. The students' perception that authentic assessments involve practical acquisition of knowledge is supported by the authors in [55] who opined that an authentic assessment task requires applying particular abilities and competencies in a novel setting creating new or unique situations or scenarios. This calls for the students' practical application of knowledge and skills. The authors in [56] make a similar claim stating that authentic assessment allows students to build abilities that help them apply the practical knowledge they acquire in the classroom. The authors added that one crucial aspect of authentic assessment is the use of real-world tasks where students can demonstrate their knowledge and abilities. Performance-based assessments include tasks that require students to create or display practical behaviors that appropriately reflect the range of knowledge and skills they have learned.

The students' perception that authentic assessments allow understanding of concepts and learning of concepts differently is supported by the author in [57] who underscored that authentic assessment helps students become more competent in their learning. Additionally, using authentic assessments to improve student learning by learning new and more knowledge can significantly contribute to students becoming more aware and skilled. Thus, it is assumed that as more concepts and knowledge that are acquired by the students differently through authentic assessments, students become more confident about what they know.

The author in [58] showed that in his study, students who participated in scenario-based learning showed consistently higher averages (one to two letter grades higher) than students who did not receive scenario-based learning. It is because an authentic assessment directly examines student performance on worthy intellectual tasks as compared with a traditional assessment, which relies on indirect or proxy 'items'. The author added that a move toward more authentic tasks and outcomes thus improves learning: students have greater clarity about important concepts leading to good achievement scores since rubrics are used to evaluate the authentic tasks instead of numerical scores.

The student's perception of ownership in material manipulation has something to do with how the students evaluate their progress, self-assess their product or performance, and reflect on their thought processes and learning experiences during the doing of an authentic assessment [59].

As the students were asked to make comments and suggestions about the teaching of authentic assessments, their responses include "share to others," "modify the curriculum" and "a new approach to be thankful for.' The

author in [10] asserts that communication with the students in the form of an evaluation (asking comments and suggestions) is crucial and should be carried out while implementing authentic assessment. This way, the students will be able to drive the job at hand and meaningfully contribute to it. This will help the students understand what and how the assessment will be directed at them.

5. Conclusion

Generally, it can be concluded that authentic assessments can still be used effectively in biology even after the pandemic as results indicate that authentic assessments provide a variety of positive impacts on students' learning biology in high school. The fact that these assessments are still in use enhances students' critical thinking abilities. Specifically, for poem writing, the impacts include cognition activation and development, vocabulary and literacy skills improvement, and self-expression. The impact of comic strip is promotion of scientific literacy. Improvement of scientific skills is the impact for brochure making, modeling, role-playing, case study analysis, infographics and mind mapping. Finally, positive perceptions are noted among the students in doing authentic assessments.

6. Recommendation

With the findings, teachers should continuously attend in-service trainings on preparing additional authentic assessments in biology. Although tedious on the part of the teachers, they should always be encouraged to prepare and use authentic assessments since a variety of skills are developed in the students. This research maybe be done in other science-related courses and across other disciplines. Moreover, there should be modification in the curriculum of high school biology offered by the Philippines' education agency involving the incorporation of specific authentic assessments. Likewise, the list of authentic assessments presented in the study may be utilized by the country's high school biology teachers for their own teaching. Finally, the use of authentic assessments in teaching high school biology should be sustainable to produce students who are able to use self-regulated skills in achieving high learning goals.

7. Limitations of the Study

The study's sample size of 102 out of 125 grade 11 students (with 23 students under the GAS track not participating) limits the representativeness of the findings. Since only students from the STEAM track are included, the results may not fully reflect the perspectives, experiences, or outcomes of students in the GAS track, leading to potential biases or an incomplete understanding of the wider student population.

Conducting the study in only one public school introduces a geographical and institutional limitation. The findings may not be generalizable to other schools, especially those with different resources, student demographics, or educational practices. This restricts the ability to apply the results to a broader context or draw conclusions about trends across multiple schools or regions. However, the results may be used as baseline data for future researches on authentic assessments. In addition, since the current study is qualitative, a quantitative method may be used in similar researches in order to make more accurate generalizations.

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