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Experiences of Filipino Secondary Science Teachers in Assessing Students in Flexible Learning during the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic changed the educational landscape in the Philippines as schools transitioned to flexible instruction delivery far from the default face-to-face platform. This calls for adjustment and recalibration in the instructional practices and, more importantly, in assessing the student's learning outcomes. The current study is a qualitative inquiry exploring the experiences of Junior High School secondary science teachers in the execution of the four facets of assessment in the context of flexible instruction: their assessment obligations; expected outcomes in assessing science learners; obstacles hindering assessment practices; and opportunities brought by the new platform of assessing science learning. Findings from this study uncovered that continuity of teaching and learning during the health crisis brought new expectations from the teachers as assessors of learning while adhering to the essential core learning outcomes. At the same time, though direct and indirect challenges were perceived to complicate the assessment process, various opportunities emerged, highlighting new practices that can be applied in the context. The results offered implications for policy, research, and practice.

Keywords: assessment practices, flexible learning, science teachers' experiences.

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I. Introduction

The field of education is one of the sectors significantly impacted by the COVID-19 pandemic. Institutions of learning were not insulated from this crisis which caused the reinvention of practices to sustain educational delivery. This virus introduced radical changes to the world, traversing unprecedented scenarios which people are not used to. The uncertainty and volatility of the situation left the educational landscape in a rush to respond to the chaos brought on by the pandemic. Hence, institutions in various parts of the world developed various solutions to continue the education progression (Basialia *et al*., 2020). Many countries have halted their mobility access to attend physical classes or other activities in school because of restrictions, thereby migrating into platforms that can cater to students' learning through flexible instructional delivery (Sufyan *et al*., 2020). From the report of the Asian Development Bank (2021), many parts of the world have been using various modes of distance learning strategies such as online classes, modular, and TV/radio lessons since the first quarter of 2020, when the pandemic started. With the emergency, several challenges were raised, such as the adjustment of the appropriate teaching methods (Huang, 2020), students' participation and engagement (Sunasee, 2020), and technological affordances (Tigaa & Sonawane, 2020; Lansangan, 2022) which emerged as a response to the demands of flexible learning.

In the Philippines, consistent with the UNESCO's (2015) mandate to ensure flexible learning in both formal and non-formal settings, including emergencies, the Department of Education introduced in May of 2020 its Basic Education Learning Continuity Plan (BE-LCP) in the time of COVID-19 as a means to continue the education of the Filipino learners amidst the threat and uncertainties while ensuring the safety of all the stakeholders (DepEd, 2020). The said plan stipulated the appropriate learning modalities and expectations from all the school stakeholders. This sudden shift redirected to the demands of flexible learning, far from the default conventional classrooms.

Without a clear precedent as to how flexible instruction works in the context, this new scenario provided implications for how educators will approach the process. Being the thread and the stitches that define the learners' learning experiences, a crucial area highlighted in the process is ensuring how learners demonstrate learning in a flexible platform through the assessment. Janjowski (2020), Lansangan (2020), and Gonzales (2023) affirmed in their works how teachers shifted their assessment practices during the crisis. Though assessment has been part of teachers' instructional duties, the new context triggered the reimagination of how it will be executed while capitalizing on learners' independence during instruction and dependence on technology. As part of the transition of assessment practices, it has been underscored as a challenge (Rajab *et al*., 2020) ranging from the utilization of technology, teachers' competence (Rahman *et al*., 2022),

and concerns with the academic integrity of assessment results (Meccawy *et al*., 2021; Mukhtar *et al*., 2020). Assessment, a socially and contextually dependent process (Willis *et al*., 2013; DeLuca *et al*., 2016; Xu & Brown, 2017), enabled teachers to recalibrate their strategies and accommodate various factors that might hinder them in the quality administration of the assessment. Hence, the transition to flexible instruction delivery brought teachers into a new space that requires them to practice assessment while responding to the needs and expectations of adapted instructional modalities (Lansangan & Gonzales, 2020).

Framed from sociocultural theory and rooted historically and philosophically in Jean Piaget's cognitive constructivism perspective, which has something to do with the construction of knowledge by individuals, and Lev Vygotsky's social constructivism, which emphasizes the social aspect as an integral part of learning (Powell *et al.*, 2009), the basic premise here is that learning, and assessment practices are permanently embedded in social contexts. These contexts afford certain rules and constraints, among others. Torrance and Pryor (2001) explain that the perspective of this theory regards assessment as a socially embedded process and that it involves social interaction among the stakeholders and the nature of learning itself (Gipps, 2002). As a sociocultural endeavor, it transpires in a social context and is influenced by existing policies, curriculum expectations, pedagogical directions, and communal expectations. Therefore, it is the crucial role of teachers to provide learners with a learning environment in which they are motivated to share their prior knowledge, think, collaborate, and actively engage in the process to enhance their current level of competence (Black & William, 2006). In other words, teachers must guide students in scaffolding their learning to support their construction process. Cross (2010) believes that teachers are social agents who act on stimuli in the educational context. They are the agents of change, ultimately influencing the policy and practice continuum (Gebril & Brown, 2014). The sociocultural framework further recognizes that teachers' cognition is dynamic and dramatically depends on historical experiences and the social context in which they work (Cross, 2010).

Teachers do not work in an isolated system. Instead, they work in a social environment and perform multifaceted responsibilities in the profession within the policy mandated by the existing curriculum and when they deliver instruction and assess student learning in the classroom. Although the responsibility for the nature of the assessment falls in the hand of the educational system, teachers are the primary designers, utilizers, and collectors of students' performance data. This unique disposition of the teachers enables them to accommodate the different purposes that assessment may serve, such as reflecting on their practice, gauging the levels of student's achievement, and making other relevant decisions. As Abulencia (2011) opined, considering assessment as a social fact, a complete understanding of how the process transpires can be done by considering how it is developed and practiced in the everyday lives of teachers and students. However, due to the changes in the implementation of policies and professional standards, it is expected that this will lead to significant variations in teachers' approaches to assessment (DeLuca *et al.*, 2016), thereby affecting teachers' assessment literacy in their ability to negotiate and enunciate classroom and cultural context to perform their instructional responsibilities in promoting students' learning (Willis *et al.*, 2013). This gives teachers different orientations and understanding, leading to diverse classroom assessment practices.

Introducing flexible instruction delivery in the context is a new environment affecting teachers' assessment practices, particularly during the COVID-19 pandemic. Having these lenses, this research sought to bring out the preliminary portrait of the assessment practices of Junior High School science teachers in the transition of adapting to the flexible mode of instruction. The inquiry focused on the four facets of assessment identified by Kelting-Gibson *et al.* (2014) as a guide for teachers to strengthen their awareness, expand their understanding, reconfigure their assessment practices, and modify their outlooks when it comes to assessment, especially in the current context. These obstacles, obligations, outcomes, and opportunities encapsulate instruction and assessment. The research questions below served as the leading guide:

1) What obligations related to the assessment of learning in science must be fulfilled by teachers in the flexible instruction delivery?
2) What opportunities can science teachers incorporate into their practices to assess science learning in flexible instruction delivery?
3) What obstacles or challenges are encountered by science teachers in assessing learning in science in flexible instruction delivery?
4) What outcomes are expected to be achieved by the students from their teachers' assessment of learning in science in flexible instruction delivery?

Though the context of this exploration emerged during the onslaught of the COVID-19 pandemic, this inquiry can be extended to circumstances of disruption in the learning process, particularly beyond the pandemic context.

II. METHODS

This study was participated by Junior high school science teachers from both public and private schools in the Philippines that employed flexible instruction delivery during the data collection. A saturation mechanism was used to determine the appropriate sample size for the number of participants following the parameters set by Hennink *et al.* (2016), in which these parameters have a combined influence on the sample size of the respondents. A total of 16 participants participated in the study, seven males and nine females, coded as T1 to T16.

Qualitative in-depth semi-structured interviews were employed to capture the dynamics and diversity of the participants' experiences in assessing learners in flexible instruction. This mode of inquiry would allow participants to speak freely about their personal experiences and practices (Glonti & Hren, 2018). The conduct of the interview followed the stages employed by Mahat-Shamir *et al.* (2019), consisting of seven steps which include thematizing the contents based on the facets of assessment, designing the contents through the interview guide; interviewing;

transcribing; analyzing; verifying; and reporting.

Due to the restriction and existing protocol when the study was conducted, interviews were held virtually through the Zoom video conferencing platform. As a preliminary instruction, the researcher sought the approval of respondents to record the interview. The researcher took notes of the salient points shared by the science teachers, and member checking was done to validate the responses. The average length of the interviews lasted around 40 minutes.

Content analysis was done in the responses drawn from interviews. Creswell (2003) defines content analysis as a technique used to analyze transcribed textual data to comprehend the meaning of text, action, and/or narrative through interpreting the emergent themes. It was achieved through inductive thematic analysis followed by a discussion to develop the emerging themes from the transcript. Specifically, it used the thematic analysis protocol described by Braun and Clarke (2006) due to the flexibility of the methods. This thematic analysis comprises six stages: familiarization of data, generation of initial codes, identification of themes, defining and naming themes, and producing the report. The first stage involved iterative reading of the interview transcript and noting significant ideas. The second was the identification of the initial codes drawn line by line from the transcript, identifying both the semantic (presence of explicit content) and latent (implicit content). The qualitative data analysis software Quirkos was used to facilitate data management and analysis, where bubble maps were produced to organize the different levels of significance among the codes, themes, and categories. The final thematic analysis included 4 themes, 16 categories, and 31 codes. To communicate the connections of the different themes, categories, and codes, a thematic map using Xmind was used.

III. Results and Discussion

The thematic map in Fig. 1 summarizes the science teachers' experiences in assessing learners in flexible instruction delivery.

A. Obligations in Assessing Learners in Flexible Instruction

As part of their duties, teachers are expected to perform several tasks and responsibilities in facilitating assessment. When asked about their obligations in assessing learners in flexible instruction, the thematic analysis identified five categories of obligations perceived by the science teachers. These are (1) Assuring constructive alignment; (2) Utilizing different forms of assessment strategies based on learners' contexts; (3) Monitoring learners' progress; (4) Communicating assessment results to stakeholders; and (5) Evaluating the quality of the assessment strategies.

1) Assuring constructive alignment

The primary obligation raised was about assuring the constructive alignment of the curriculum, the learning activities, and the assessment strategies for students in flexible instruction. From the contemporary principles of curriculum and instruction, as cited from the work of Loughlin *et al.* (2020), it was expected that if students are to learn the desired outcomes, the fundamental task of teachers is to get students engaged in the different learning activities that are anchored in achieving the outcomes. Hailikari *et al.*

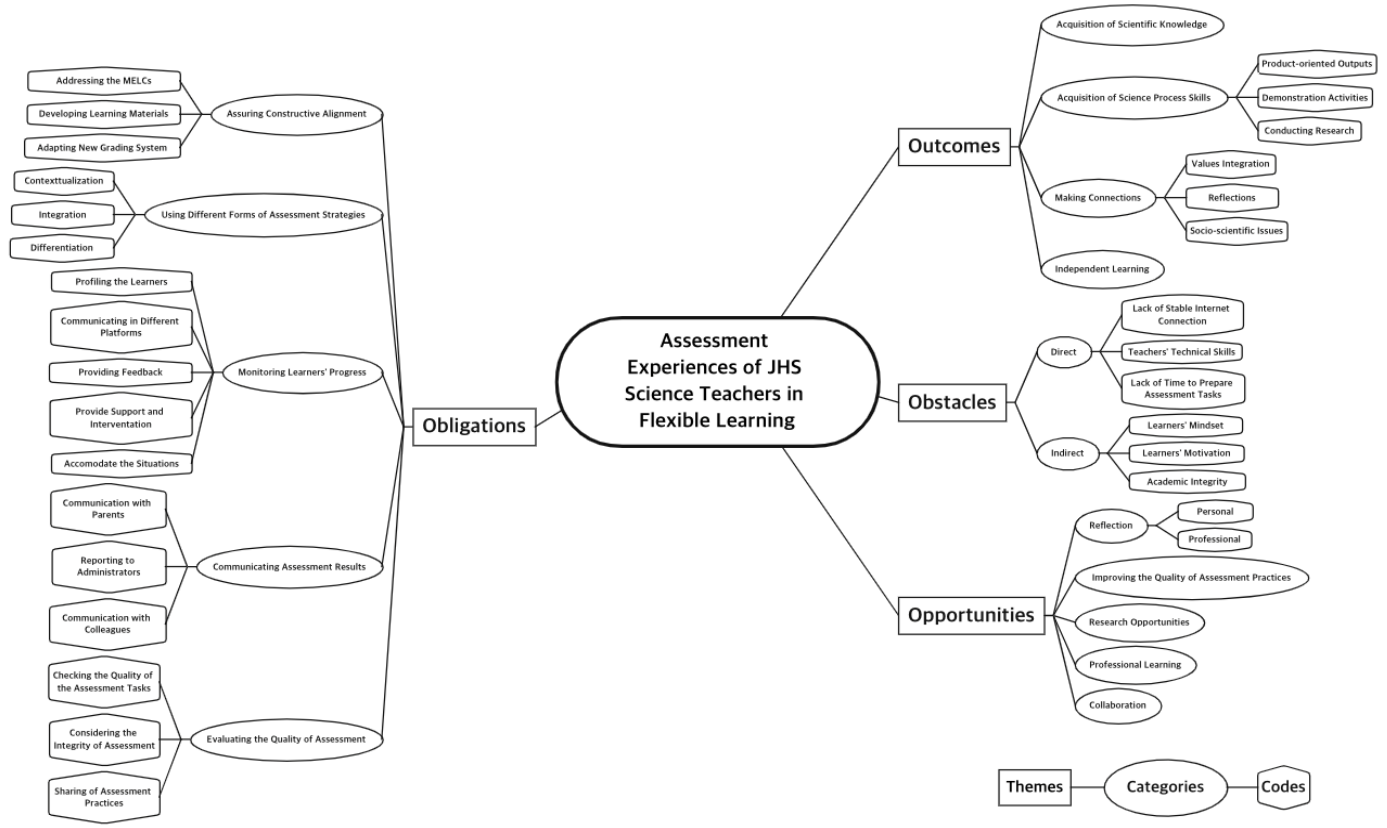

Fig. 1. Thematic map of the science teachers' experiences in assessing science learning in flexible instruction.

(2021) opine that doing such enhances the quality of learning. Science teachers facilitated this by addressing the mandated most essential learning competencies (MELCs) from the K to 12 curriculum, developing learning materials anchored to these competencies, and adopting a new grading scheme considering the context and the adapted modalities of instructional delivery.

From the science teachers' experiences, they consistently conformed to the expected delivery of the competencies through teacher-developed self-learning modules. These self-learning modules include activities, discussion, synthesis, outputs, and integration of values. These materials designed by the teachers serve as supplementary materials that assist learners, with minimal supervision from the teachers and expectations that parents will help assist their children in remote learning. The assessment activities that science teachers employ are embedded in these learning materials. They programmed the formative and summative assessment strategies based on these essential competencies. As the minimum set of learning competencies, science teachers consider it the primary consideration by unpacking them to specific learning objectives regarding their complexity. As T7 shared, "*We design assessment by following the rules and regulations prescribed by the DepEd. We depend on the MELCs. We focused on unpacking the competencies to objectives, especially the complexity of the lessons and how they can be delivered online*." Addressing these competencies also assures the mastery of the skills and consideration of the student's academic workloads. T14 elaborated, *"That's basically our obligation, to deliver the required minimum formative and summative assessment activities and assure mastery of the skills and competencies and monitor the academic workload of the learners."*

They also adopted a new grading scheme in response to the changing context and expectations of distance learning modalities that will most meaningfully support learners' development. Most participants coming from private schools have varying grading schemes resulting from their ongoing adjustment since the beginning of the school year when the pandemic started. This adjustment in terms of adapting different grade components is acknowledged by Global Education Monitoring Report (2020) on how the current crises shape assessment. The majority focused more on the performance tasks, and the least priority was objective assessment strategies.

2) Using assessment strategies based on learners' contexts

The changing demands of the context, like the adoption of flexible learning deliveries, enabled science teachers to change how they administer the assessment in terms of the available technology-based tools for instruction, maximizing engagement and active participation despite the new platforms for learning and the impact of the pandemic. The practices they employed that became part of their obligations are recalibrating the nature of their assessment of what the learners essentially need. The contextualization, integration, and differentiation emerged from their responses which were intensified in their assessment practices.

The participants emphasized the room for contextualizing the assessment activities provided to the learners because of the new instructional modalities and the diversity of learners. Contextualization refers to using the learners' context for selecting learning activities by drawing specific connections between the content being taught and an authentic environment, like the cultural backdrop, conditions of the learners, and the scenario in which the content can be relevantly applied (Giamellaro, 2014). Though the idea was not entirely new in practice, it was further intensified because of the pandemic and the virtual learning acting as a stimulus that learners' experiences should be relatable to them and that learning cascades from content to application. The typical responses of the science teachers dealt with maximizing what the learners have in the comfort of their homes. For instance, T4 shared, *"I think they appreciate science if they experience it at home. One example is taking care of plants in the topic of photosynthesis, which is the better source of light between indoor light and sunlight. I asked them to submit pictures and videos and document the process they did with corresponding reflections*". T9 had the same contention, *"With the proper supervision and instruction to parents, we allow them to perform a simple demonstration at home using available materials."*

Some science teachers employed integrative assessment tasks to maximize the interdisciplinary nature of the different subjects and affirm the connection of science to them. It is a way of integrating knowledge, skills, and modes of thinking of two or more disciplines or established areas of expertise to produce a single output with cognitive advancements, such as in terms of explaining a phenomenon, solving a problem, or creating a product (Boix Mansilla & Duraising, 2007). Aside from articulating the essential learning competencies, integration was considered part of planning assessment strategies aligned with the expected learning outcomes (Lansangan *et al*., 2021). T11 shared that *"…maximizing curricular integration is also one of our practices in the science learning area. We have this practice of conducting articulation and integration sessions where different teachers from different learning areas sit down and talk about possible points for integration on performance tasks…."* But in flexible instruction delivery, an integrative approach to assessment was also promoted to lessen the students' academic workload since they are expected to comply with the assessment requirements of all the subjects.

Due to inequities and different paces of students in distance learning, and perceived challenge of consistently engaging learners, and the failure to demonstrate the expected learning outcomes as mediated by technical affordances, science teachers also ventured to conceptualize differentiated assessments to accommodate their learners. The idea of differentiation allows teachers to recalibrate instruction and assessments that are responsive to the diverse needs of the learners (Tomlinson, 2005). Wesley (2017) opines that teachers with the mindset of differentiating instruction build critical dialogue and offer engaging learning environments where the subject content and skills are being scaffolded to assist students in different learning paces. Though T5 acknowledged the idea, "*I also believe that assessment in the case of flexible learning should be differentiated because students have different paces, skills, etc."* Science teachers shared several ways of differentiating the utilization of technology to accommodate their students. Some use online applications for formative assessments, such as what T13

shared, *"During synchronous session, I give them differentiated activities. I utilize different applications such as wizer, jam board. Sometimes I use peer deck and slido. It depends on the topic."*

3) Monitoring learners' progress

With the demands of flexible learning for maximizing students' engagement, participants highlighted the various ways of monitoring them and assisting them in the flexible learning environment. It has been underscored that this obligation of science teachers as part of their assessment practices poses a challenge to them. Aside from conceptualizing appropriate and constructively aligned assessment strategies, burden follows when the students do the assessment tasks. As science teachers want students to demonstrate their understanding of the content and show evidence of learning through compliance with assessment tasks, they must find mechanisms to monitor submission and compliance. Science teachers identified several strategies in doing the monitoring: (1) Having awareness about the profile of the learners; (2) Providing multiple platforms of communication where they can reach out to students' concerns; (3) Providing means of monitoring the actual performance in the class; (4) Providing feedback; (5) Providing supports and interventions; and (6) Accommodating learners situations, especially in difficult circumstances.

Communication with learners was maximized in flexible instruction delivery. Science teachers affirmed that reaching out to students regarding academic and non-academic matters is essential in building connections with learners, especially during disruptions. Misra and Mazelfi (2021) highlighted the critical role of communication that impacts students' learning outcomes. An added responsibility is how all the learning requirements will be communicated to the learners so they can access the learning materials and the teachers can retrieve the results of assessment activities. Science teachers utilize multiple communication channels to perform such obligations depending on the platforms used. These communications are practices not only for the students but also for parents. As T12 shared, *"We have group chats with students and also group chats with parents."* This mechanism will enable teachers to let students and parents be updated with the learning episodes and be followed up with the requirements to be submitted. The adapted Learning Management System (LMS), with the provision of communication, and different social media, is also being maximized as T10 mentioned, *"I regularly check the google classroom. I also have group chats for my students. I maximize the use of social media as a means of communicating to them if there are concerns about their performance. Social media is the easiest platform to use. Communication is really important." The same* experiences regarding the shift in maximizing the use of social media were discussed in the work of Jogezai *et al.* (2021) and what Anderson *et al.* (2020) affirmed to be helpful in the organization's educational process during times of disruption.

T1 underscored the importance of providing feedback on learners' assessment performance, "*I am expected to give feedback to students after each assessment. I need to figure out and pinpoint where the students made mistakes, especially in problem-solving. But very rare that students look at it*." Herwin *et al.* (2021) pointed to using multiple mechanisms mediated by technology for teachers to provide feedback on students' work to strengthen their understanding of the contents and motivate them. Halawa *et al.* (2017) contended that students mostly need feedback as support without direct interaction in distance learning. However, even though they considered the provision of feedback timely and relevant, they acknowledge that students are not yet used to such practice and that only a few students respond constructively. T4 mentioned, *"…but very rare students look at it…*" and teachers opt to ask for the assistance of the parents in reminding the students. Though crucial in the given platform, this is also challenging for science teachers. T2 shared that giving feedback is *"…quite challenging unlike in the face-to-face where it is easier to assess the progress of the students…"* This was supported by T13, emphasizing the difficulty of providing feedback because of the number of students, *"Imagine if you have 100 students, you have to check all of them. You will give feedback and communicate it to parents. That's very difficult."*

Since the context occurs during the time of the pandemic, the learning performance of the students is not just the concern of the teachers. An added factor is in terms of considering the condition of the students amidst the health crisis. Some of the accommodations given include holding a series of conferences for students who are not performing well, like T3's sharing, "*If they are not performing well, we refer the concern to the adviser and parents. We have series of conferences…again, we extend a lot of consideration…"* Not giving failing grades also became a practice of T3's school, *"As much as possible, we don't give failing grades. If they will not submit, we don't give grades. We will just leave it blank. We'll wait for another quarter for the students to comply".* T13's way of accommodating the learner is in terms of regulating the academic workload of the students, "*…feedback of the learners and parents is they are doing a lot of performance tasks and written works. Like in our case, imagine our students have 10 subjects. Say they have 2 to 4 performance tasks per subject, so times 10. That's very tasky for them. This makes it worse if students don't have a stable internet connection. For the next quarters, we are adjusting."* T14 affirmed that learners also request academic ease and that teachers in their school must limit all assessment activities. Gonzales-Garcia *et al.* (2021) account for this as a compassionate intervention and a feasible way to promote mental health among students during the lockdown. This further implies that regardless of the context, learners are still the heart of the educational process despite the ongoing crisis. Fisher *et al*. (2021) identified the necessary factors: connection, voice, social-emotional, and academic knowledge.

4) Communicating assessment to stakeholders

Communication in various means is one of science teachers' vital obligations. Teachers acknowledged that communication in a flexible platform was heightened, specifically in building connections with the learners when they participated in the given modality. The straightforward way of communicating assessment results to stakeholders is

an essential aspect of assessment validity (Tannenbaum, 2019). It is an ongoing commitment to students' self-learning, especially during difficult circumstances. These involve communication with parents, colleagues, and administrators depending on the concerns or areas of assessment.

T4 mentioned that monitoring the student's performance is a struggle considering the context. Collaboration and coordination with their colleagues, such as the class advisers and subject teachers, became essential to their obligations. T1 affirmed, *"We need to highlight the strong partnership of teachers and parents in terms of communication in understanding where they are coming from."* Özkan and Yılmaz (2021) opined that teachers view this mechanism affirmatively by involving parents in the assessment process. From Wibowo *et al.* (2021), this mechanism of cooperation and communication between parents and teachers optimizes home learning. Especially with concerns about noncompliance and poor performance, they typically relay it to the concerned individuals. Conferences are also held to discuss the matter and accommodate the contexts of the students and parents. Relaying these concerns became easier for science teachers because of multiple means of communication, such as those embedded in the LMS, emails, and even social media. But challenges arise when they are unresponsive because teachers cannot do home visitation considering the pandemic. Abante *et al.* (2021) and their co-researchers documented the same observation about having unresponsive parents regarding their children's academic concerns.

5) Evaluating the quality of assessment strategies

In ensuring the suitability of the assessment strategies to the adapted modalities, quality assurance of the assessment is also one of the obligations of the teachers, especially in evaluating how the intended learning outcomes are addressed. Some mechanisms raised by the participants to consider the quality of the assessment include assuring the quality of the assessment tasks, considering the integrity of the assessment tasks, curating the appropriate assessment tasks, and sharing practices among science teachers.

The quality assurance of the assessment tasks is a primary concern in the preparatory stage of making assessment activities. From the teacher-made assessment tasks, science teachers identified a specific hierarchy to ensure that the content and design of the assessment material have been checked and validated. This mechanism includes submission to the area coordinator (T3, T9, T13); quarterly evaluation of the administered assessment (T4, T6); inclusion of students in giving feedback about their assessment experiences; and continuous collaboration among teachers (T6, T9). These mechanisms were identified to improve the assessment policy and provide ongoing intervention both on the sides of students and teachers. Highlighted in the conversation with several science teachers is the consideration of academic ease, where students clamor about lessening their academic workloads. A distinct practice was raised by T11 in terms of presenting the planned assessment tasks for the quarter, "*We submit PETA proposal to our learning area coordinator every quarter."* The said document includes all the details of the assessment strategies, such as its constructive alignment with the curriculum; the possibility of having integrative outputs; anchoring it to the core values of the institution, managing the time of administering it; and clarity of the alignment of the rubrics to be used in checking the output.

Considering academic integrity in assessing learners in a distance learning platform, science teachers identified it as a factor in conceptualizing appropriate assessment tasks. This concern about the issues in online learning has also been identified in the works of Harton *et al.* (2019) and Lederman (2020). T1 and T6 pointed to refocusing on performance-based and authentic outputs as strategies to address this concern. T1 shared, "*We try to shy away from a long test or purely objective tests, so we leaned towards performance based as summative because of the consideration of the integrity of the test."* Similarly, T6 focused on the types of items to be given, *"…we decided to focus more on increasing the percentage of understanding component of the assessment. We focused more on authentic assessments."* Warnock (2013) also affirmed this strategy to focus more on low-stake assessment tasks, which rely on students' personal learning experiences as evidence of learning.

Often, the outputs of the students are limited to digital submission. Monitoring the originality of the students' output includes video-based submission to ensure that the students are completing the task (T2, T5) and maximizing the plagiarism checker of the used LMS and the use of the camera during test administration (T4, T6). A mechanism employed by Rusak and Yan (2021) is similar to this. A few deviations in terms of the creation of tests, administration, and the manner of grading were adapted to provide a layer of security in assuring the reliability of the assessment. Though some practices, like using cameras during examinations, are also employed to lessen the possibility of cheating, some teachers described their students as anxious while taking the tests. Gudiño Paredes *et al.* (2021) identified concerns about privacy and anxiety among learners.

B. Outcomes in Assessing Science Learning in Flexible Instruction

This second theme of science teachers' assessment experiences deals with the outcomes they expect their students to produce. This theme is rooted in the idea of Chappuis *et al.* (2010) that one important aspect of assessing learning is its connection to the expected outcomes. Clarity of outcomes from the teacher's perspective gives a sound assessment plan aligned to the content and context and may lead to learning identity. In the context of flexible learning, digital space, and the pandemic, science teachers identified essential learning as the primary outcome of flexible instruction. This revolves around highlighting the relevance of the kind of science in the students' lives, even if the learning platform is different, and establishing the possibility of what the students can do with their science learning. Consistently, from the description enumerated by the Department of Education regarding the characteristics of these essential learning outcomes, these should be aligned to national standards, connected to higher concepts, applicable to real-life situations, necessary for students after leaving school, and only expected to be learned formally (DepEd, 2020). In addressing the demands of the curriculum and the expected outcomes, science teachers identified acquiring scientific knowledge, science process skills, and scientific

values and attitudes as the primary consideration. Consistent with the core domains of the K to 12 curriculum, science teachers employ various assessment strategies to bring out the said domains among the learners.

1) Acquisition of scientific knowledge and process skills

Acquiring scientific knowledge among learners is the primary outcome in assessing learners. For science teachers, this serves as a solid foundation to further develop the skills and connections of science in the students' lives. This was attested by T11 sharing that assessing first the scientific knowledge of learners allows students to find connections about the science concepts, theories, and facts that they can learn from the class, *"I often assess scientific knowledge by engaging my students to what I mentioned opportunity session. I can simply let them feel that it is just a bonding moment at first. I give them a situation where they will share their perspectives. Questions will start with very practical questions. Where do you live? How's Tondo? What do you see outside your window now? Then I will integrate science and the concept of ECQ, for example."* Scientific knowledge is also assessed through the formative assessments embedded in the learning materials, such as module learning guides, and through questioning and probing during synchronous instruction.

Scientific knowledge is the foundation of concepts, theories, and principles that learners must acquire before developing more complicated skills. It is the gateway before science teachers open new learning opportunities that learners may explore. However, this requires an appropriate approach. Arrieta *et al.* (2021) underscored in their work about science teachers' experiences that online modality made this approach more challenging because of the perceived limitations and requirements of preparation involving technology. Resourceful as they are, science teachers explored different platforms for assessing scientific knowledge.

Despite the acknowledged difficulty in developing students' science process skills through practical experimentation, which is commonly done in the default face-to-face platform, science teachers still ventured into alternative ways of administering them. T2 reasoned out access and availability of materials, *"It is hard to give experiments to develop the skills because we consider the access of the students and the availability of the materials just in case experiment requires it."* But T14 believed there are ways to sustain it, *"...we are trying our best for them to become critical thinkers despite the circumstances. I really need to have some alternatives. It still must go on."* Some alternative strategies shared include giving product-oriented outputs, conducting demonstration activities, and conducting research.

Safaah *et al.* (2017) noted that these kinds of science learning opportunities could improve learners' science process skills if the learning space is arranged in such a way that they can engage in it. Product-oriented outputs are mostly digital and are being documented by the students through pictures and videos. Alternative experiments were also employed but were limited to pre-made virtual experiments, video-based experiment procedures, and simple home-based experiments. Some participants also shared the use of ePortfolio to document all these outputs. A study by Lehman *et al.* (2021) recognized ePortfolio to engage students in self-directed learning and reflection. Demonstration activities on teachers' resources and availability of the materials based on the competencies to be delivered. Conducting research is limited to write-ups without actual experimentations, utilization of secondary data, and restricted laboratory procedures in consideration of the safety of the students.

2) Making connections

Science teachers believed that despite the difficult circumstances, the science subject for Junior High School is still responsible not only for developing some scientific attitudes and values among learners but also for molding the learners to become independent while realizing the connections of their learning to reality. However, developing such values and attitudes requires first resolving the learners' attitudes towards the new learning modality. Some participants shared that aside from the learners' competencies, there is a need first to develop attitudes among students, especially in the new learning platform. T1 mentioned, *"I want to develop first the motivation of students in this platform as a very important attitude. Also, self-discipline, in the same effect."* T2 has the same intent, *"I focus more on the attitude. Students need to be more diligent and responsible in whatever platforms. Regarding the relevance of my subject, biology, I want them to realize to become flexible. They need to learn how to adapt to changes around them."* Having a scientific attitude and values as one of the foci of assessing science learning, integrating it in flexible instruction was facilitated through reflections and integrating socio-scientific issues in the assessment strategies.

In assessing the affective aspect of learning, reflections are the participants' common mechanism. They are given as part of the learning materials, such as modules, during class interaction and presentation of performance tasks. T5 disclosed the model being followed to ensure that reflection is part of the learning cycle, *"It is important for me that aside from teaching the concepts, there should be values formation. This can be done through reflection writing and journal writing. It is part of the 7Rs, the reflection. These reflections come in different forms. It can be during recitation, during activities, or through the performance tasks."* It is a reflective way of learning that gears toward independent learning, which is needed in the online learning platform. In addition, this allows students to personalize their learning while boosting their motivation and sense of independence (Bovermann *et al.*, 2018). T15 mentioned, *"The kind of students that we have in this kind of platform needs those who are capable of exercising agency, being accountable, being responsible in their own learning."*

Integrating socio-scientific issues in the assessment tasks is also one of the ways to develop scientific attitudes and values among science learners. It promotes scientific literacy, where learners find connections to their everyday lives and societal issues. For science teachers, students must be informed and exposed to the different scientific issues in the community to broaden their understanding of science. This notion was affirmed by T13, *"The incorporation of the real-life situations that tackle issues in our environment where*

students are familiar is also good to be part of the assessment strategies. I am sure that they heard it from different media and that they have something to say about it." Situational analysis is the common assessment strategy being employed, just like what T7 narrated, *"…critical analysis and situational analysis are the most common skills that are integrated into the materials that I provide to students."* Suryawati and Osman (2018) cited contextualized teaching and learning as appropriate in achieving the development of scientific attitudes and values. Genç and Evran Acar (2021) unveiled that learners with high scientific attitudes have heightened awareness and opinions on socio-scientific topics.

C. Obstacles in Assessing Learners in Flexible Instruction

This third theme of science teachers' assessment experiences deals with the obstacles or challenges associated with assessing science learners in flexible instruction. These aspects hinder them from fully maximizing the application and appreciation of classroom assessments considering the contexts. When asked about the obstacles they encountered regarding assessment in the flexible learning context, science teachers' perceived challenges can be categorized as direct or indirect. Direct obstacles will be defined in this paper as those challenges with immediate impact or effect on the administration of the assessment strategies. In contrast, indirect obstacles are implicit and behavioral and do not immediately impact the administration of assessment tasks to science students.

1) Direct

Two codes emerged for the direct obstacles. These are the lack of stable internet connections and teachers' competence to migrate assessment practices to a flexible platform. All the participants highlighted the lack of stable internet connectivity as the primary obstacle preventing them from fully maximizing their assessment practices. Aside from several who have experienced poor internet connections, they pose it as a reason for students to have unequal assessment opportunities since most of their assessment strategies depend on the internet. In addition, the lack of appropriate gadgets and tools that learners may use was also raised. T5 pointed out, *"The first thing that I consider as a challenge is an unequal opportunity among students, especially in terms of learning environment brought by problems on internet connectivity."* To know more about the affordances of the learners when it comes to internet connections, surveys are conducted at the beginning of the school year to give teachers the idea of how to redirect their assessment tasks in consideration of the students' internet access. Data that they usually ask learners to provide are the area of residence of the students, internet service provider, type of internet connection (broadband, fiber, data), internet speed, fee for monthly internet service, number of people sharing the internet connection, gadgets being used, and the student's general perception about the speed of the internet connection during synchronous classes. They use these data to program their instructional activities and, at the same time, group students based on the modalities that are appropriate to them. But despite the challenge, they find ways to look for alternative mechanisms in administering the assessment, such as considering the bandwidth required of the platform to submit the outputs. In the context of the participants, especially for the public schools, support from the local government units was also evident as T9 shared, *"…based on my observations, some of the students from the printed transferred to online already because the LGUs provided the students with the gadgets and mobile data. So in my estimation, around 60% of increase among online learners. Parents have probably observed that their children are more engaged..."*

Another obstacle directly affecting the practice of assessment in flexible learning is the competencies of some science teachers to migrate their assessment practices that conform to the demand of given modalities. T1 contends, *"Assessment in flexible learning is necessary, but teachers are not that equipped with the skills in navigating the platform in administering it. That is a consideration not only for the teachers but also for students."* De Villa and Manalo (2020) underscored that as education migrates to the new learning platform, teachers make necessary adjustments and preparations to equip themselves with the demands of distance learning. Science teachers identified challenges regarding the time needed to prepare assessment tasks; familiarity with the platform where the assessment will be deployed; checking digital outputs; and providing feedback in very large class sizes. For most participants who are not adept at using digital platforms, this requires a new set of skills and approaches in which all the practices depend on technology integration. Adov *et al.* (2021) posit the importance of considering and understanding the variation in the possible obstacles that emerge in using technology in education for teachers with different levels of experience. Challenging it may be, most teacher participants shared their resiliency and open-mindedness in learning new things about assessing learners. T12 mentioned, *"I have a wide gap from students. I am trying to cope. I have no choice but to embrace this new normal. I don't have any plans to retire. Of course, I cannot do what the young teachers can do, but I am trying my best to cope up and conform to the demands of modern education."*

Science teachers also mentioned continuous professional learning in their respective schools to capacitate teachers with appropriate assessment practices in the different learning modalities. Citing the work of Seema *et al.* (2021), teachers have views about assessment practices that though they have the command of the subject matter and skills in teaching, coping with the new way of teaching, such as the context of flexible learning requires the need to be equipped with innovative skills for them to see the productive worth of assessing learners.

2) Indirect

For the indirect obstacles, three codes were identified: the learners' mindset, motivation, and the academic integrity of the assessment. Science teachers shared these aspects that indirectly hinder the effectiveness of the different assessment strategies, especially in assuring that the required competencies are constructively aligned with the assessments administered. The primary obstacle on the learners' side is recalibrating their mindset on the new learning platform. T8 mentioned, *"Another is the mindset of the students. Their personality and inner motivations. They are not used to this kind of platform. That is something that is needed to explore how to prepare students to learn online."* For the participants,

this is an added responsibility for the teachers to trace the root cause of students' problems that hinder them from performing well in class. They considered these as nonacademic factors like family support which weakens learners' motivation. Some participants also observed that most of their learners are becoming less motivated as the school year progresses and are still adjusting to the new learning setup. Sanchez-Santillan *et al.* (2016) identify this in their previous work about students who are not adequately prepared for the demands of distance learning. Further, Santos *et al.* (2021) correlate learners' attitudes toward the modality with its positive benefits.

Another indirect obstacle is in guaranteeing the credibility and integrity of the assessment compared to the setup of the face-to-face because the administration of the assessment can be easily supervised and monitored. T11 has this contention, *"…the authenticity of the responses unlike in face to face before where you can see how they arrive with their answers. Information is available online. They might have got it from there."* T7 had the same inference, *"…you cannot be ensured of the validity of the assessment such as the tests. It's very difficult. Part of me sometimes is to think if the student is really the one who made the output."* Often, teachers only rely on the final output, like videos and written outputs, which are the basis for assigning grades. Some science teachers also mentioned the possibility of cheating on this platform. In resolving the issue, they complement the assessment with an extended task requiring explanations and validations. T7 has this experience, *"Second is cheating. I have seen it in the outputs of my students. Really, integrity is a challenge. If I am doubtful with their outputs, I ask them to explain."*

D. Opportunities in Assessing Science Learners in Flexible Instruction

The last theme deals with the opportunities that science teachers can incorporate into their practice in assessing learners. These opportunities complement the compromises they make to resolve the challenges that hinder their assessment practices. It is also equally important to point out that these opportunities are brought about by the existing context in which they practice assessment, such as the platform, which is very new to them, and the pandemic, which significantly impacts their learners' engagement in the subject matter. Four codes were identified as opportunities for teachers: an opportunity for reflection, collaboration, research opportunities, and professional learning.

1) Reflection

The migration of assessment practices into a new instructional delivery platform enabled teachers to become more reflective about their tasks as assessors of learning. Far from what they have been doing for so long, science teachers acknowledge that this new mechanism of assessing their learners requires much preparation, acquisition of skills, and recalibrating mindset as they move away from mimicking the traditional assessment in the face-to-face mode. This tested their resiliency and required them to commit more to their professional responsibilities. T11 affirmed that being more reflective became one of the opportunities given by the experience, *"I became more reflective now because the new platform is really different, and I became more conscious of how my learners will learn from me."* T14's reflection, on the other hand, allowed her to see the other things that she can do as a teacher amidst the challenging task brought by the transition, *"Another opportunity is personal. I am not used to this kind of platform before. It's difficult if you are seasoned. But now, I was able to learn it! I need to become on top of the situation since learners are advanced when it comes to the use of technology-related activities. In the beginning, I'm afraid to click some icons. Now, I am using Kahoot, quizzes, and other apps!"* The current situation made teachers more open-minded amidst the challenges by considering it as a learning and professional growth as they were immersed in new roles and responsibilities.

2) Collaboration

The development of a sense of collaboration is also one of the opportunities. T1 highlighted the important role of collaboration in the practice of assessment in the given context, *"The team effort in our grade level added a very good opportunity for as to display common practices in terms of assessment. Our coordination helped us resolve some dilemmas concerning our assessment practices. Yes, collaboration is very important."* These opportunities allowed them to exchange practices, explore new assessment strategies, lessen the burden in the preparation stage, and learn new things they can incorporate into their practice. It also became an avenue for mentoring those not confident in utilizing technology, such as what T2 shared, "*Collaboration and mentoring was also an opportunity, especially to those seasoned teachers who are not used to using technology."*

In addition, a community of practice was maximized through the initiated activities of the science learning area, such as the conduct of a "marketplace" where teachers showcase their effective assessment practices (T3); regular weekly meetings for giving feedback (T5); conduct of peer observation (T6); conduct of learning action cell (T9, T13); and even collaboration with an external partner institution in doing research (T14). This mode of collaboration among teachers to learn the platforms, especially during the time of the pandemic, was also seen in the works of Honigsfeld *et al.* (2020), Aliyyah *et al.* (2020), and Hollweck *et al.* (2020).

3) Research Opportunities

In improving the practices and resolving the challenges encountered in the current context, it also became an opportunity for some science teachers to conduct further inquiry through research. This allowed them to revisit their practices and identify the gaps in their policies. T4 affirmed it as the best opportunity to study what is happening in teaching and learning, *"I think the conduct of field study now is a good opportunity to learn more about how we can best practice assessment in the online setup."* Another participant even shared that their school adopted a framework that was a result of research conducted during the emergency online teaching in the latter part of the school year 2019–2020, *"…there was research done about the community of inquiry (CoI) to direct all our practices on how to assist our learners in distance learning. The said CoI is comprehensive in looking into the different aspects of online learning such as teaching presence, cognitive and social presence. It empowers us on how to accommodate learners in these trying times. Having a research-based approach is really good."*

4) Professional Learning

Like one of the common mechanisms of teachers' professional development, science teachers were also exposed to several professional learning activities that can help them be guided about the different expectations of flexible instruction. Several activities were mentioned, such as attending webinars, in-service training, and attending short courses focusing on various learning modalities that focus primarily on how to engage students in a flexible way of learning. T9 gives credit to these activities in improving the practices, *"In the beginning of the school year, there are many uncertainties and doubts such as how to teach, how to assess them, etc. For me, all the trainings that we had helped us a lot…we learned a lot especially in terms of technology integration and material development and production. And I believe that all these things are anchored to the achievement of the learners which rely on assessment activities."* As they participate in these professional learning activities, they become more innovative and creative in thinking of appropriate assessment strategies that suit their adapted modality. As T3 mentioned, *"We became more creative and innovative in navigating the digital platform and think of effective ways to assess learners."*

IV. Conclusions and Implications

In assessing learners in the context of flexible instruction through the lens of the practices of science teachers during the COVID-19 pandemic, the following were uncovered:

1) For the obligations or expectations from the teachers, identified are the following assessment responsibilities: assuring constructive alignment, utilizing different forms of assessment strategies based on learners' contexts; monitoring learners' progress; communicating assessment results, and evaluating the quality of the assessment practices. Though the mentioned responsibilities are typical dynamics in the traditional setup, some compromises were identified to respond to flexible learning modalities.
2) For outcomes expected to be demonstrated as evidence of learning in the context of flexible learning, science teachers identified essential learning as the core. In delivering such and, at the same time, addressing the demands of the curriculum, these expected outcomes are specifically dwelling on learners' acquisition of scientific knowledge, science process skills, and making connections. Science teachers employ various assessment strategies to address these domains among the learners.
3) For the obstacles or perceived challenges, it can be categorized as direct or indirect. These obstacles are perceived to distort the effective execution of assessment. Direct obstacles include a lack of stable internet connection and teachers' capacity to migrate assessment practices to a flexible platform. Indirect obstacles identified are the mindset of the learners, the motivation of the learners, and the compromise on the academic integrity of the assessment.
4) For the opportunities that contribute to student growth, teacher development, and institutional improvement, science teachers identified reflection, collaboration, conducting further inquiry in terms of research, and new professional learning development as a support mechanism that guides them in improving their assessment practices.

The description of the experiences of science teachers in the context of flexible instruction delivery revolved around their perceived obligations, outcomes, obstacles, and opportunities that are contextualized to the setting. These areas support the typical assessment cycle vis a vis the accommodation of the demands of the flexible mode of instructional delivery. Teachers became adaptive to the scenario, and emerging practices were highlighted while resolving the perceived assessment dilemmas brought by the new context. This inquiry supports the notion that the assessment practices of teachers are socially and contextually dependent processes (Willis *et al*., 2013, DeLuca *et al*., 2016; Xu & Brown, 2017) and that it is neither a static dimension nor an idealized skill (DeLuca, 2012; Willis *et al*., 2013).

These results provide a new face for assessing learners that can serve as a preliminary platform for developing more responsive and sustainable assessment systems in flexible instruction delivery. This preliminary portrait can serve as an opportunity for the education sector to identify effective competencies teachers must have in assessing learners in an alternative mode of instruction.

One of the goals of the K to 12 Science Curriculum in the Philippines is to provide Filipino learners with a repertoire of competencies in the world of work and knowledge-based society by developing the domains of scientific knowledge, skills, and values. In attaining such, science teachers employ appropriate instructional episodes to provide the learners with a space that leads to optimum science learning. However, the approaches to the curriculum and instruction in any discipline are integrally linked and driven by the assessment practices of its key players, the teachers. As the limitations of the traditional mode of the school system to accommodate the diverse contexts of the learners become evident, the role of flexibility in the mode of learning increases in importance and urgency. In this case, the assessment must adapt to the context.

The present research results seemed to support the existing curriculum by highlighting the teachers' role in articulating the curriculum vis-à-vis their assessment practices in the context of flexible learning, which is new in the landscape of Philippine basic education. Since some literature points out that the existing science curriculum needs improvement (Argote, 2016; Ressurrecion & Aldanza, 2015), the current study provides a snapshot of the assessment practices to complement what is written in the curriculum, which can be used for its continuous improvement. That said, the researcher upholds the need for a framework for assessment to establish a shared understanding and promote critical reflection for the science teachers and policymakers in reshaping the face of assessment based on the needs of the context. With the intent to contribute to the ongoing improvement of the existing K to 12 Science Curriculum, this research outlines what else can be considered to support and improve the assessment practices of science teachers in

accordance with the authentic attainment of the Most Essential Learning Competencies (MELCs).

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