



## **Experiments Gone Wrong? Lived Experience of Filipino Teachers in Remote Science Education amid COVID-19 Crisis**

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### **ABSTRACT**

The COVID-19 crisis moved teachers to engage in a sort of emergency instructional experiment to redesign how science could and should be taught. The lived experience of the teachers as implementers in the ground can be a source of practical insights in the continuous improvement of remote science education. Thus, the purpose of this phenomenology research is to analyze the lived experience of teachers in remote science education in the wake of continuing COVID-19 crisis. Through online interview procedures, eight purposively sampled secondary science teachers from public schools in Mindanao, Philippines were involved in this study. Using data analysis framework consistent with the descriptive approach in phenomenology, the responses of the participants were examined in stages. The results revealed four themes: (1) presenting difficult concepts in remote science teaching; (2) encountering challenges in the delivery of remote science teaching; (3) adjusting instructional practices in remote science teaching; and (4) drawing types of support to improve remote science teaching. These themes form the phenomenon of remote science education from the perspective of the teachers in the context of a crisis. Several practical recommendations to improve current remote science instruction are discussed at the end of this paper.

**Keywords:** lived experience, science education, remote education, COVID-19 crisis, Philippines

### **INTRODUCTION**

The COVID-19 crisis has shaken almost every corner of the world and continues to move many facets of human affairs, including the education. According to the Organization for Economic Cooperation and Development (2020), the crisis compelled education to shut down in almost 200 countries, interrupting the learning of more than 1.7 billion children. The UNICEF (2020) warned that when education is disturbed by crises like disease outbreaks, children are more likely to completely leave school, which can affect their overall development. Because of this crisis and its educational impacts, most educators, parents, and students have to quickly look for alternative ways to continue teaching and learning. This overnight phenomenon has led to a tremendous demand for structural assistance, emotional support, and practical steps to move forward.

One of these alternative ways to continue teaching and learning is the emergency remote education, a branch of distance education characterized by a temporary change in the delivery of instruction caused by the sudden occurrence of a crisis. It may include several practices such as online teaching, remote learning, blended learning, and mobile learning. Emergency remote education provides a temporary feasible alternative for education authorities and school administrators to implement instruction and provide students with necessary instructional assistance (Hodges et al., 2020). Furthermore, it makes use of the available resources including a wide range of technologies that offer capabilities for remote learning. Scholars in the field also emphasized that, in the current case, emergency remote education is the best concept to describe education during interruption (Cahapay, 2020a).

As part of its emergency remote education response amid the continuing COVID-19 crisis, the Philippines adopted distance learning to ensure education continuity. Through the Department of Education Order No. 012 series of 2020, the basic education was mandated to adopt the Basic Education Learning Continuity Plan (BELCP) to counter the impacts of COVID-19 crisis. This plan, which was developed through stakeholder collaborative process, aimed to make education accessible to all learners all over the country. Furthermore, with primary attention on the resources and capabilities of the community, the plan underscores equity considerations, urging the schools to adapt the most suited modalities based on the structural capacity of the communities (Department of Education, 2020). According to a report, of the range of remote learning modalities offered, the modular distance learning in print format has been the most preferred modality of most students this school year (Magsambol, 2020). Online distance learning is also an option.

### **Problem of Research**

One of the tool subjects in Philippine basic education that has to be delivered amid the current crisis is the science. Learning science in context is not a luxury but an inevitability. To make sense of complex issues, for one, students need to understand how scientists do science (Sibel, 2020) such as observation and experimentation, inductive and deductive reasoning, and hypothesis and theory testing (Andersen & Hepburn, 2020). However, with the COVID-19 crisis, most of these science activities traditionally implemented in a face-to-face modality have come to be halted. Some futuristic learning spaces have been proposed to emulate these activities in virtual forms, but in developing countries like the Philippines where structural problems plague the implementation of remote education (Rotas & Cahapay, 2020; Rotas & Cahapay, 2021), this can be a herculean task to accomplish.

Some discussion papers have been published to contemplate on the current situation and tackle how science in the field of education can be reshaped to attune itself to the current times (e.g. see Dillon & Avraamidou, 2020; Feldman, 2020; Ray & Srivastava, 2020; Reiss, 2020; Usak et al., 2020; Verma et al., 2020). Some studies have also been published exploring on how the current materials, methods, and activities used in remote science instruction can be

improved (e.g. see Babincáková & Bernard, 2020; Chadwick & McLoughlin, 2020; Zulirfan et al., 2020). This present paper is an extension of these scholarly works, particularly focusing on how teachers in the ground live out the phenomenon of remote science education in the face of COVID-19 crisis.

On a more practical aspect, this paper is significant especially to science education researchers, school administrators, and teachers. By exploring the experiences of science teachers, it will present a glimpse of the instructional situation of the kind of remote science education that is currently being tested at the ground. The insights that will be drawn from these current experiences of science teachers may be used as basis toward continuous development of remote science education. It will assist the science education researchers, school administrators, and teachers on formulating relevant, appropriate, and relevant measures in areas of remote science instruction that needs to be further improved.

### **Research Focus**

This phenomenological research aimed to analyze the lived experience of teachers in remote science education amid COVID-19 crisis.

## **METHODOLOGY OF RESEARCH**

### **General Background of Research**

A phenomenology was employed as research design of this study. Dahlberg et al. (2008) proposed a descriptive approach in conducting phenomenology. The philosophical inspiration of this approach lies in the description of the complexities of the phenomenon as experienced by the participants but acknowledging a natural position without intentionally mirroring on the personal experience of the researchers. Considering the focused and objective approach this particular approach, the researcher deemed it appropriate to address the interest of this research that revolves around the lived experience of teachers in remote science education amid the COVID-19 crisis.

### **Subject of Research**

Morse (1996) advised a modest guideline for the sample size in phenomenological research, proposing at least six participants. As much as this research wanted to involve more participants, however, the COVID-19 restrictions hindered. At the end of the sampling process, this study was able to recruit a total of eight secondary science teachers from public schools in Mindanao, Philippines. This sample does not represent the population of science teachers but is considered adequate for the qualitative purpose of this research. Table 1 presents the participant information.

**Table 1.** Participant Information

Participant	Sex	Age	Teaching years	Grade assigned
01	Female	31 years old	5 years	Grade 9
02	Female	49 years old	24 years	Grade 12
03	Male	22 years old	2 years	Grade 11
04	Female	38 years old	10 years	Grade 10
05	Female	33 years old	9 years	Grade 12
06	Female	31 years old	3 years	Grade 8
07	Male	30 years old	11 years	Grade 12
08	Female	32 years old	8 years	Grade 9

### **Instrument and Procedures**

The researchers prepared an interview guide as an instrument of the study. Specifically, a section for the guide questions contained statements to reveal the lived experience of teachers in remote science education amid the COVID-19 crisis. The central question is: What does it mean to teach science in remote education amid the COVID-19 crisis? It served as the basis for the subsequent questions. The questions were reviewed by two education professors and a science teacher to ensure their suitability.

With the current situation, online modalities are increasingly used for collecting qualitative data. One of these online modalities is online interviews, a technique in which the data can be collected synchronously or asynchronously with an array of forms ranging from text messages to video calls (Salmons, 2015). A series of online interviews were conducted by the researchers in this study. The researchers initially introduced the purpose and process of the research to the target participants. The ethical considerations were also discussed, emphasizing that involvement in the study is completely anonymous, confidential, and voluntary. After securing their consent, the participants received the interview guide containing the questions either through Messenger or Gmail. Most of them answered offline. Then, the initial responses were gathered and reviewed. The researchers returned to selected participants as necessary especially when certain responses needed probes for explanation. At the end of the data collection process, all the gathered responses were organized in a master transcript for analysis.

### **Data Analysis**

Consistent with the descriptive approach in phenomenology, the data analysis framework in this study was based upon the “hermeneutic rule” and performed in an alternation between the parts and the whole (Dahlberg et al., 2008). It has three major stages. The first stage involved a continuous assessment of the data until the researchers were able to break the text into meaning units related to the phenomenon. The second stage covered the process of organizing the meaning units. A repetitive process of grouping meaning units into meaning clusters was performed. The last stage covered the process of organizing the meaning clusters into themes that constituted the lived experience of teachers in remote science education amid the COVID-19 crisis. The themes were given descriptions and discussed.

## RESULTS AND DISCUSSION

Following the three stages of data analysis framework proposed by Dahlberg et al. (2008), the responses of the participants regarding their lived experience in remote science teaching were analyzed. Table 2 presents the sample meaning units and the meaning clusters and themes that emerged in the analysis.

**Table 2.** Lived Experience in Remote Science Teaching

Stage 1: Sample meaning unit	Stage 2: Meaning cluster	Stage 3: Theme
The parts of the cell is difficult to present in remote teaching. The students need microscope to see the real cell.	Presenting difficult practical concepts	Presenting difficult concepts in remote science teaching.
Electricity in physics is hard to teach. If I ask students to conduct an experiment on electricity, it is dangerous.		
The students cannot easily visualize the electron if where it came from without any further explanation and elaboration.	Presenting difficult abstract concepts	
Not all students can easily catch up concepts like mechanics. Unlike teaching it face-to-face, it is easy to address their difficulties on the spot.		
The poor internet connectivity and lack of gadgets for both teacher and student make it hard to communicate.	Encountering structural resources challenges	Encountering challenges in the delivery of remote science teaching
Among the barriers are unavailability of materials and equipment for printing modules during the first months.		
Challenges in managing and collecting the outputs like activity sheets are some of the greatest ones that I encountered.	Encountering instructional management challenges	
As what I observed, some students are not motivated enough to answer their printed modules and that is a challenge.		
I revised the performance tasks. I individualized them to be achievable to some students given their resources and capacity.	Adjusting performance expectations	Adjusting instructional practices in remote science teaching
I adjust the activities. They cannot fully perform or answer the experiments because they are not sure if they are doing the right thing.		
I consider the validity of observations of the students. I expect less if the modules are completely answered.	Adjusting assessment practices	
I am flexible in my grading system. I am aware that not all of my students have siblings or parents who can help them in studying well.		
We practice the buddy system kind of teaching per cell group. We can discuss in there the problem and how to handle it properly.	Drawing instructional support	Drawing types of support to improve remote science teaching
I also ask help from the neighboring schools and from other schools even from other regions on the availability of the materials.		

We seek the assistance of the barangay and purok officials to deliver the modules of the student living in their areas.	Drawing community support	
I ask the support of parents. They follow up the performance of their children at home. Even though they have work, I ask them to supervise their children from time to time.		

### **Theme 1: Presenting Difficult Concepts in Remote Science Teaching.**

The participants find it hard to present particular science concepts in remote teaching. Some of these science concepts, especially those that are practical in nature, notably demand the conduct of experiments and use of instruments to improve the understanding of the students. According further to the participants, other science concepts that are too abstract need direct instruction methods like discussion, demonstration, and illustration, in which teachers can directly respond to the difficulties of the students. This difficult experience of presenting the science concepts in modular distance learning was recalled by the participants:

*“The parts of the cell is difficult to present in remote teaching. The students need microscope to see the real cell. Within the process, it is also necessary to teach them how to manipulate the microscope and other instruments” -Participant 04.*

*“The science concept which was difficult to teach remotely is the electronic matter. The students cannot easily visualize the electron if where it came from without any further explanation and elaboration” Participant 02.*

### **Theme 2: Encountering Challenges in the Delivery of Remote Science Teaching.**

The participants also expressed different challenges that they faced in the implementation of remote science teaching in print form of modular distance learning. One challenge pertained to the scarcity of structural resources that are required for the effective and efficient delivery of the lessons. Another challenge was about concerns on management during the course of instructional implementation. These challenges exacerbate the already difficult nature of some science concepts when unpacked in print form of modular distance learning. Relative to these structural and management challenges, the participants shared that:

*“The technological access is a major concern in the modular distance classes that I handle. The poor internet connectivity and lack of gadgets for both teacher and student make it hard to communicate” -Participant 03.*

*“Challenges in managing and collecting the outputs like activity sheets are some of the greatest ones that I encountered. Even if there are set deadlines, some students submit late due to many reasons” -Participant 08.*

### **Theme 3: Adjusting Instructional Practices in Remote Science Teaching.**

The participants further reflected several adjustments they made as regards their instructional practices in remote science teaching. For one, the participants tailored selected

performance expectations, bearing in mind the conditions of the students. Also considering the difficult situation, the teachers modified their assessment practices. It is an inevitable occurrence that certain components of instruction need to be adjusted in virulent times greatly straining educational practices. This phenomenon of transforming instructional practices in science teaching was recounted by the participants:

*“I revised the performance tasks. I individualized them to be achievable to some students given their resources and capacity. But I make sure that the target learning goals are still achieved” -Participant 07.*

*“Yes, I adjust some of my expectations of my students in learning science. I consider the validity of observations of the students. I expect less if the modules are completely answered -Participant 01.*

#### **Theme 4: Drawing Types of Support to Improve Remote Science Teaching.**

Finally, the participants shared that they seek different types of support in improving the quality of remote science teaching. Within the professional world, they find assistance from peers in their schools and other schools. They also enjoin the participation of the community stakeholders, including parents and village officials, especially in the monitoring of student performance and delivery of materials. Having access to a support system is an important enabling factor in the effective and efficient delivery of remote science teaching. Relative to this view, the participants narrated that:

*“Aside from my colleagues, especially my fellow science teachers, I also ask help from the neighboring schools and from other schools even from other regions on the availability of the materials” -Participant 05.*

*“I ask the support of parents. They follow up the performance of their children at home. Even though they have work, I ask them to supervise their children from time to time” -Participant 06.*

This phenomenological research was hinged on the purpose to analyze the lived experience of teachers in remote science education amid COVID-19 crisis. Based on the results, four themes underlie the phenomenon of interest in this research. They are discussed as follows.

Theme 1 explicates the lived experience of the participants as “presenting difficult concepts in remote science teaching.” Experiments and other experiential and practical activities play an essential role in unpacking science concepts (Innova, 2015). With the onset of COVID-19 crisis, however, these activities have to be translated to virtual formats, making it challenging for many educators (Babincáková & Bernard, 2020). While science education scholars have long proposed how experiments can be introduced in distance learning forms (e.g. Jacobs & McKenney, 2001), however, this can be a problem in developing countries where technology has not been fully integrated as an instructional practice. This reality makes it difficult for many science concepts to be taught especially in the contexts where modular distance learning in print format is the only most viable flexible option

for many students (Magsambol, 2020). Removed from personal types of interaction, students taking subjects through print copies of lessons at home find it hard, for example, to solve problems without direct explanations and concrete examples provided during the learning process (Dangle & Sumaoang, 2020).

Moreover, theme 2 reveals the essence of remote science teaching as “encountering challenges in the delivery of remote science teaching.” Structural problems in implementing the remote education in the country has been a problem since the start of the school year amid the COVID-19 crisis. Garcia (2020) reported that, especially in places that do not have stable internet connection, adequate power supply, and up-to-date learning devices, teachers struggle a lot. Nazario (2020) also cited concerns on the timely printing of materials due to scarcity of bond papers, working printers, and ink; late delivery of master copies from higher offices; inadequate time to write the modules. These scenarios hampers the efficient production and delivery of the materials to the students. Dangle and Sumaoang (2020) added that particularly in modular distance learning, more administrative resources are desired to monitor students and operate multiple modules. This notion is affirmed in this study in which teachers find it challenging to motivate students to learn and collect module outputs of the students.

Theme 3 further characterizes this phenomenon as “adjusting instructional practices in remote science teaching.” An educational implementation amid unusual circumstances caused by the COVID-19 crisis and resulting to physical distancing measures has created a need for considerations in the components of the curriculum (Cahapay, 2020b; Cahapay, 2021a) posited that a. Rajhans et al. (2020) asserted that the development of modules particular to defined component of learning goals along with detailed planning of another component of learning activities is needed. Moreover, assessment is another important component of instruction especially within the changed instructional situations today (Lieberman et al., 2020). Several adaptations when it comes to assessment have been suggested. For instance, as some disruptions to learning in remote situations should be anticipated, teachers will need to be open in their deadlines for outputs to be submitted. When students also have not yet demonstrated learning by the deadline, schools should consider employing lighter assessment practices (Wormeli, 2011). As Cahapay (2021b) stressed, “there is no single best assessment tool for all situations; problems are inevitable. The key is to be proactive” (p. 8).

Lastly, theme 4 illuminates the meaning of remote science teaching as “drawing types of support to improve remote science teaching.” These types of support that teachers seek include from their peers, the parents, and community. With the COVID-19 pandemic, peer support is the way that educators support each other whether inside or outside the school. This type of support may include how teachers collaborate, network, socialize, share, and help each other in times of need (Gallagher, 2020). Moreover, parents are important partners in the successful implementation of remote science teaching. By getting involved in the studies of the students, parents do not only in provide academic assistance but also become a source of security in easing the negative psychological impacts of the crisis (Wang et al., 2020). The community also serves as potent support system that teachers ask assistance especially in the delivery of remote science teaching to the doorsteps of the students. As an approach to lessen the negative results of the crisis on education, governments and stakeholders are

encouraged to make steps that quicken the required changes in the modalities of delivering instruction (Ferri et al., 2020).

## CONCLUSIONS

The COVID-19 crisis has underlined the issue of overnight transfer to remote education of all school subjects. The science is one of these subjects in this regard. With the continuing search for alternatives that work better in particular contexts, it is important to explore the instructional practices that are being implemented from the experiences of the teachers themselves. The results of this study revealed four themes: 1.) presenting difficult concepts in remote science teaching; 2.) encountering challenges in the delivery of remote science teaching; 3.) adjusting instructional practices in remote science teaching; and 4.) drawing types of support to improve remote science teaching. These themes constitute the phenomenon of remote science education from the perspective of the teachers in the context of a crisis. Practical insights that may be drawn from this study in support to improving the quality of remote science education include developing more effective materials for science lessons that tend to be difficult when delivered in print format of modular distance learning and strengthening measures to address the teaching and learning needs at the school and community levels.

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