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SCIENCE TEACHERS' PEDAGOGICAL EXPERIENCES IN CONDUCTING LABORATORY CLASSES IN THE NEW NORMAL

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Abstract

The COVID-19 pandemic has forced many educational institutions to shift traditional teaching methods to online platforms. Laboratory classes, which typically require in-person interaction and specialized equipment, have been particularly challenged in adapting to this new normal. The study identified the pedagogical experiences of science teachers in handling laboratory classes in this new normal. A transcendental phenomenological approach was employed to capture their lived experiences. The study used criterion sampling to identify ten public school teachers who volunteered to participate in General Santos City, Philippines. Through Thematic Analysis, science teachers' pedagogical experiences centered on eight relevant themes, like Profound passion for teaching, Motivational support to students, Challenges in isolated teaching, Intermittent internet connectivity, Teachers' resourcefulness and adaptability, Teachers' equipment and technical support, Contextualized and innovative strategies, and Supported home-laboratory learning.

Keywords: Pedagogical Experiences, Science Teachers, Laboratory Classes, New Normal.

Introduction

Conducting laboratory classes amid the new normal was challenging and tested the pedagogical prowess of science teachers. With an unprecedented virus, all levels of education institutions across the globe were forced to close and shift conventional classes to online learning. Consequently, teaching and learning delivery was enjoined to adopt e-learning under distance education. The rapid breakout of COVID-19 has forced educators to move to an online teaching style. Countries worldwide are forced to continue online education because F2F is not allowed to keep everyone away from spreading the virus. Online education is a new type of learning for learners, but only some sources investigate how educators are trained for online teaching [12; 30].

However, many believe this approach to learning is only favorable for those concept-based subjects and have challenged them to restrain subjects such as conducting chemistry, biology, and physics laboratory classes. Online learning is expanding fast to catch up with society. It has become the new normal in work, parenting, and the teaching-learning process. The more people grow in the digital age, the more need for online learning [31].

It is important to review how universities are introducing lab-based practical experiments to students, how they were introduced through online delivery in the pre-COVID - 19 period, and what

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approaches must be taken in the post-COVID-19 period to achieve learning outcomes while maintaining a high-quality educational experience. This is due to the lack of hands-on exposure to expensive, complicated instruments and machines in a laboratory setting [16].

Meanwhile, studies on teaching science and laboratory classes only looked into how to integrate service-learning for preservice teachers' science, identity development, relationships between teaching assistants and student outcomes, smartphones in laboratory classes, the benefits and drawbacks of online, remote, and distance science laboratory experiences, and the effects of the jigsaw technique based on cooperative learning, effective online replication of hands-on laboratory classes, online pre-laboratory tools, students' preferences and implications to performance, and hybrid online-flipped learning pedagogy [9, 13, 14, 8, 19, 20, 25, 32, 33, 34].

However, there is a lack of literature on the pedagogical experiences of science teachers in handling laboratory classes in the new normal. Likewise, few qualitative studies were conducted in the context of public high schools in the Philippines. Hence, the researchers are prompted to conduct a study to describe and characterize the science teachers' pedagogical experiences, difficulties, coping mechanisms, and strategies in facilitating laboratory classes in the new normal.

Methodology

This study employed transcendental phenomenology. Qualitative research describes, interprets, and observes specific participants and is a naturalistic inquiry [27]. It aims to understand concepts, opinions, experiences, or perceptions, including gathering and evaluating non-numerical data. It can collect in-depth insights into a topic or develop new research ideas [3].

This study was conducted in public institutions in General Santos City, Philippines. The 10 science teachers who held laboratory subjects volunteered to participate in the semi-structured interviews. The participants were selected based on the inclusion criteria: at least 5 years of teaching experience, at least 15 units of relevant master's degree in science, holding laboratory classes, and being willing to share pedagogical knowledge and experience. The researchers transcribed the interview records. The interview transcripts, along with their corresponding translations, were then reviewed by the selected English teachers. The researchers also returned the interview transcripts to the participants for validation and confirmation.

Thematic Analysis (TA) was employed [5]. The researchers familiarized the transcripts and identified meaningful statements. The meaningful statements were coded based on similarities between the ideas and responses. Initial themes (ITs) were formulated based on the coded data. The clustered themes (CTs) were based on similarities of data sets after formulating ITs from coded data. From the CTs, relevant themes (RTs) were identified and defined. These RTs represent and characterize the pedagogical experiences of science teachers in facilitating laboratory classes in the new normal. Various studies have employed these processes and captured substantive participants' experiences [4, 7, 15, 23, 24, 28, 29].

Results and Discussion

The following presents the study findings. The RTs were formulated by analyzing and interpreting the 10 interview transcripts using TA. The following 8 RTs were described and synthesized from 45 formulated meanings, 21 initial themes, and 16 clustered themes. The RTs are Profound passion for teaching, Motivational support to students, Challenges in isolated teaching, Intermittent internet connectivity, Teachers' resourcefulness and adaptability, Teachers' equipment and technical support, Contextualized and innovative strategies, and Supported home-laboratory learning.

RT1: Profound passion for teaching

This theme focuses on the teachers' experiences with their duties. They showed dedication in serving and motivating their students to continue learning in the new normal. The participants followed up with students' progress doing laboratory assignments, dedicated and committed themselves to teaching online, and provided encouragement and positivity to their respective students. The following are the shared responses of the participants:

"It is difficult because I cannot reach all of them. I was forced to contact and do home visits. I monitor them through Facebook, messenger, and other means that we could use." (P6)

"We suffered as a teacher. It was risky. I was once a COVID-19 victim because of my work, my responsibility and commitment to serve and to reach out to my students. It was, indeed, challenging." (P8)

Truly, what teachers had been through during this period made them believe that they could still help the students, whether required or not. Likewise, teachers' positivity helped them despite the challenges they experienced. Passion for teaching, building relationships, and fulfilling their duty are among their positive experiences. In these shared experiences, it is evident that teachers are true to their duty, teaching is exhausting, but by focusing on passion, teachers will be energized [2, 26].

RT 2: Motivational support to students

RT 2 centers on motivating students by telling them that doing experiments and laboratory activities are fun and applicable to real-life situations. The following are the participants' sentiments:

"With the aid of apparatuses and laboratory facilities, teaching is fun and interesting." (P3) "*I would explain that doing these experiments would also apply to real life and doing this activity is enjoyable and not boring as what they think."* (P6)

"So, to motivate our students, I have to appreciate them for what they are doing. I have to remind them that conducting experiments at home is challenging. Teachers' guidance is important. Encouragement, appreciation, and motivational advice propel students to learn in these trying times." (P4)

In connection, motivation is very significant in predicting learning and achievement. Motivated learners will likely undertake challenging activities, enjoy, adapt, and show enhanced performance and creativity [8].

RT 3: Challenges in isolated teaching

This theme focuses on the obstacles that hinder and obstruct teachers from sharing knowledge and skills with their students. The difficulties they had experienced comprised the COVID-19 virus, no physical presence, unstable internet connectivity, problems in assessing students' experiments or laboratory outputs, and difficulty in identifying performance reliability. The following are the participants' statements:

"Oh my God, challenges are unavoidable. So, I encountered many challenges in the new normal classroom setting. Learners have real difficulties comprehending the lessons. We need to innovate and provide strategies that can aid students in understanding the lessons and activities efficiently. Otherwise, we are halted, and everything is stopped." (P10)

"…the difficulties is how are we going to implement or conduct a certain topic in teaching laboratory subject, especially in this new normal we have no interaction within that day with the students." (P9)

"One of the difficulties that I encountered is pandemic, so students are not allowed to have F2F classes and physical manipulation of the laboratory apparatus." (P7)

Shifting to remote or distance online learning is forced due to the pandemic. It has affected teaching modality, especially teaching laboratory courses [22].

RT 4: Intermittent internet connectivity

Another challenge is internet connectivity. It affects learning, especially those with online distance classes and blended learning. Even those students under modular learning modality were no exemption. Most students have no gadgets, limited data connection, and lack access to internet providers in the locality.

"I only communicated through GC (FB group chat). Most students have no cell phones and no internet connection. I do not demand too much. Hence, they are not obliged to have an internet connection. Only those with internet connections can be updated in the GC." (P8)

"At first, it was different. It was hard not to handle classes in the new normal. I feel worried about the students' situation. Sometimes, I cannot attend to the loop because of internet connectivity. I viewed this as our number one problem." (P1)

Hence, the implementation of online distance learning challenged teachers to upgrade the digital instructions to be more suitable and the unstable connectivity; thus, connectivity plays an important role for teachers and students [17].

RT 5: Teachers' resourcefulness and adaptability

Teachers in this new normal respond to the changes by being resourceful; whatever they can use, they do it to help the students with their learning. Learning ICT allows teachers to make simplified science self-learning modules, providing videos, pictures, and other materials. The following are the participants' responses:

"…of course, as a teacher, I need to be resourceful, right? So, I provided videos, especially those experiments, that show how the learners can follow and will be able to understand the lessons effectively and what they are all about. Those were the mechanisms aside from the PowerPoint. I have the audio during the online classes. I need to exert extra miles in lesson preparation so learners can cope and grasp the lessons well." (P3)

"I did not close my heart and mind to pursue whatever the trend today is having. I need to educate myself; I am learning from the millennials coaching me. I learned that once you desire to do it, it can give you a positive outcome. (P8)

"Online learning education was quite challenging. It challenged us, teachers, to adapt to the situation and respond to the challenges. I realized that I need to adapt to this new normal, especially when dealing with gadgets and technology." (P4)

The virtual laboratory experiences could supplement traditional hands-on laboratories. It can also save time and money for hands-on laboratory

apparatuses, a major investment in money and time. The alternative ways to the problems regarding e-learning are done to cope with technological stress [1, 10].

RT6: Teachers' equipment and technical support

In any laboratory, the main ingredient in teaching is the available equipment. Using the proper equipment will result in effective and efficient teaching and learning. According to the participants, the administrators of the DepEd had provided laboratory equipment. The participants expressed their happiness, gratitude, and appreciation for receiving the necessary laboratory materials. The following are the participants' statements:

"Whenever there is a need, we always tell the administration. In senior high school, the administrator asked DepEd National Central Office to support sending all these needed materials to the laboratory. We are more than happy because we are provided. We brought the steel cabinets, apparatuses, and materials provided to us. It was great!" (P3)

"I am very grateful to our school administration here in General Santos City High School since we were in the new normal setting of education. Here in our school, we have complete equipment needed in conducting laboratory classes, and the DepEd has been very supportive of us." (P4)

Most teachers were new to the system and the institutions. Schools shifted to online and blended learning; hence, they adjusted their learned ICT skills and strategies to suit the new normal setting class. Hence, the need for more strategy and distance learning readiness is noted. They immediately cope by using the intervention by capacitating their teachers. One of the suggestions for supporting teachers is the government's funding support for science laboratories [11].

RT7: Contextualized and innovative strategies

This theme focuses on employing innovative strategies by teachers to support the continuity of learning in the surge of a pandemic. Improvising the visual aids from the videos from youtube, creating FB live presentations, sending pictures, making them colorful to attract the student's attention, and taking samples from the surroundings or available in the community to show to students are done by the participants showing their innovative skills. The following are participants' shared experiences:

"I conducted blended lessons for the students. I provided the instruction and guidance online and by experimenting with certain topics. Hence, the teacher's direction in achieving certain laboratory subjects was online. The students performed this at home individually or in groups." (P4)

"…, I use learning applications. They need to interact through their gadgets, wherein they can answer them. There was a specific feature in the learning application. Then they answered it on their own. Then, it is easy to assess their learning if they understand the lesson." (P7)

Science videos from YouTube and other sites have become effective and practical learning resources during the new normal [6]. Hence, videos help illustrate important content areas and are readily available.

RT8: Supported home-laboratory learning

The participants conducted online laboratory classes, and for those with blended learning, they observed students' participation. Since the teachers guided them virtually, students became independent. Though at first, they were afraid as first timers in handling experiments at home. They interact through their gadgets. Even if expectations were not met, it is helpful for learners to personally engage in the learning process. The following are the participants' responses:

"The advantage of having lab experiments in the new normal is to train students to conduct laboratory experiments independently without the teacher's physical help. The teachers were only there to guide them virtually, so they were forced to do works in their ways." (P6)

"*The online class made it difficult for us to conduct science classes that require laboratory experiments, but with the help of YouTube video courses and other sites that they can learn, they were able to, the students were able to come up with the laboratory experiments or laboratory activities that they are required to do."* (P10)

A virtual laboratory enables an environment that promotes effective individualized learning, making learners work independently [21]. Hence, conducting online laboratory classes requires creativity, adaptability, and patience. By combining simulation software, laboratory kits, and video conferencing, instructors can provide students rich and engaging laboratory experiences in the new normal.

Conclusion

The science-teacher participants showed their passion for teaching by extending effort to communicating and getting in touch with the students and motivating their students to continue their studies. They stipulated that some could not do the laboratory activities and needed to meet the desirable output. However, teachers could cope with these difficulties with innovative and relevant strategies, especially in laboratory activities at home. Though conducting and handling online

laboratory learning was challenging, triggered by an unstable internet connection and no physical presence allowed, the participants addressed the challenges by maximizing resources, adapting to the changes and demands of the new normal teaching, providing motivational support to students, and in managing science teachers' effectiveness, and resiliency as a whole.

Conflict of Interest

The authors declare no conflict of interest in the conduct of this research.

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