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# Pre-service Science Teachers' Experiences in their Virtual Internship

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**Archie Turingan[1], Erika Joyce Silva[2], Cinderella Formoso[3], Darin Jan C. Tindowen[4*], Anjanette Batulan[5]**

[1,2,3]Department of Physical Education, School of Education, Arts and Sciences, University of Saint Louis, Tuguegarao City, Philippines

[4]University Research and Development Center, University of Saint Louis, Tuguegarao City, Philippines

[5]Teacher Education Department, School of Education, Arts and Sciences, University of Saint Louis, Tuguegarao City, Philippines
Corresponding Author: *djtindowen2015@gmail.com

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## Abstract

The emergence of the Novel Corona Virus in 2019 has been the root cause of severe disruptions in economic opportunities and educational curriculum implementation, affecting people's daily lives worldwide. The pandemic has brought about changes in the educational system. The mode of learning and teaching has shifted from face-to-face to online education. This study aimed to explore the experiences of the pre-service science teachers as well as their recommendations to improve the implementation of online teaching delivery in their virtual internship. This basic qualitative research was carried out to explore the experiences of the pre-service science teachers as well as their recommendations to improve the implementation of online teaching delivery in their virtual internship. Twenty pre-service teachers took part in this study through an online interview. The findings revealed three major recurring themes: (1) Pre-deployment experiences of pre-service science teachers in their virtual internship; (2) Deployment experiences of pre-service science teachers in their virtual internship; and (3) Post-deployment experiences of pre-service science teachers in their virtual internship. The study concludes that pre-service science teachers have both positive and negative experiences during their virtual teaching internship. The recommendations of the informants focused primarily on the implementation of virtual internship program during the pandemic.

Keywords: Pre-service Science Teachers, Virtual Internship, Online Teaching, Covid-19 Pandemic

## INTRODUCTION

The unexpected outbreak of the Covid-19 virus affected all aspects of life, particularly education. The Covid-19 pandemic transformed the educational system by shifting its learning mode to online learning. This unforeseeable event has made teaching and learning activities universally mandatory via distance education. With this education shift, students and teachers have begun finding alternative ways to cope with the new mode of learning. The reality of this pandemic challenges the quality of teaching among pre-service teachers (Flores & Swennen, 2020). On the bright side, it encouraged teachers to rethink of the necessary ways of educating the learners in these trying times.

Among part of the population who are greatly affected by this situation is the teacher education graduating students who are supposed to have their traditional On-the-Job Training or the so-called Practicum Teaching. This is asserted by Van der Spoel et al. (2020) to be an integral part of teacher education, which is highly valued by pre-service teachers, cooperating/mentor teachers, and university supervisors. Its primary goal is to provide hands-on teaching experience to pre-service teachers. Pre-service teachers enhance their teaching skills by participating in classroom instruction, reflecting on their experiences, and obtaining feedback from cooperating teachers and university supervisors (Mavuru et al., 2021). During this time, pre-service teachers will learn the skills on how instructors go about the numerous and subtle actions required in actual classroom instruction. To achieve such fundamentals, the students need to have face-to-face practice teaching.

Before the pandemic, practice teaching was a one-year experience, typically in-campus for one semester and off-campus the following semester. However, academic institutions have shifted to flexible learning modalities – pedagogical approaches that allow for time, place, and audience flexibility, including but not limited to the use of technology as mandated by the Commission on Higher Education (CHED) – due to this global health crisis. With this, pre-service teachers were barred from participating in the traditional pre-service set-up. As a result, pre-service teachers will gain experience through flexible education methods, such as online teaching demonstrations, and meet the demands of the current educational landscape.

A higher education institution in the Cagayan Valley Region, Philippines responded to the CHED's call for

flexible learning implementation. USL has employed the Learning Management System (LMS) as the primary platform of communication of teachers and students, which includes methods and tools for the submission of learning tasks, activities, and assessments assigned by the teachers. The teaching and learning process has evolved from the traditional face-to-face to online platform. All academic undertakings relied heavily on the use of online platforms including the student internship program of pre-service teachers. With that, the practice teachers also resorted to using the NEO-LMS, one of the fundamental academic platforms in the teacher education curriculum (Sarini Dewi, 2021; Ugalingan & Nino Valdez, 2021). The preparedness in flexible learning, technological circumstances, online teaching pedagogies, and most importantly, student-teacher online interaction–now considered the prevailing norm in global educational settings– has posed a challenge for pre-service teachers striving to excel in an online educational environment. In fact, with numerous K-12 public schools integrating this instructional format into their curriculum, the scarcity of learning opportunities in the field of online instruction in many teacher preparation programs remains a significant and pressing issue (Vijayan, 2021).

This academic year, the pre-service science teachers of a higher education institution in the Cagayan Valley Region, Philippines held their internship online. Assessment of the online internship program is essential to improve educational delivery (Thiyagu & Joshith, 2021). Pre-service science teachers must reflect on significant issues and problems based on their experiences, providing helpful feedback about their teacher education program (Tindowen et al., 2019). Hence, this study was conducted to provide an analysis on the experiences of pre-service science teachers (PSTs) in their virtual internship.

## METHOD

This study utilized basic qualitative research by Merriam and Tisdell (2015) to explore the experiences of pre-service science teachers in their virtual internship. It helped interpret how individuals experience and interact with their social world and the meaning it has for them, which in this case were the pre-service science teachers (PSTs) who brought to light their varied experiences in their virtual internship, including their positive and negative experiences and recommendations to further improve the delivery of virtual internship. The study was conducted at a higher education

institution in the Cagayan Valley Region, Philippines. The informants of this study were 20 Pre-service science teachers (PSTs) deployed in the elementary to college departments. All pre-service science teachers (PSTs) were given interview questions to answer. Each of the 20 informants was interviewed online until data saturation was achieved. They were assured that anonymity and confidentiality would be maintained throughout the research process. The informants were given corresponding codes, which were designated as PST1 to PST20. The researchers utilized an open-ended interview question to collect data needed for this study. One-on-one interview was utilized to gather data for the pre-deployment and actual deployment experiences of pre-service science teachers in their internship, while focus group discussion was utilized to gather data for their post-deployment experiences. An online interview, through the use of Zoom and Google meet, was utilized in this study. The researchers read the questions one by one and wrote the corresponding answers of the respondents.

An interview protocol served as a guide during the interviews, allowing the researchers to take notes on the interviewee's responses (Creswell & Tashakkori, 2007). Interview questions that were contemplative of the specific research questions were included in the validated and pilot-tested interview protocol (Ballena & Liwag, 2019). Each of the 20 informants was interviewed online until data saturation was achieved. The interviews were transcribed using a denaturalized transcription method (Oliver, Serovich, & Mason, 2005). Fillers, pauses, and extralinguistic and paralinguistic elements were all purposefully removed. After seeking their consent to participate, the researchers conducted an interview process with each of the participants. The interviews lasted for 30 minutes to 1 hour. Further, the manual transcription has produced twenty individual verbatim transcripts.

## RESULTS AND DISCUSSION

This study explored the online teaching experiences of pre-service science teachers according to their deployment process in their virtual internship. The study revealed three major recurring themes: (1) Pre-deployment experiences of pre-service science teachers; (2) Deployment experiences of Pre-service science teachers; and (3) Post-deployment experiences of pre-service science teachers.

### *Theme 1. Pre-deployment Experiences of Pre-service Science Teachers in their Virtual Internship*

One of the experiences of pre-service science teachers was their pre-deployment preparation. It was found in the study that they have three experiences along this dimension which include: a) teaching preparation, b) in-service training-related experiences, and c) personal formal setup. The study revealed that pre-service science teachers underwent preparation programs in order for them to be prepared for their actual deployment and post-deployment.

*Teaching Preparation*

Pre-service science teachers were prepared to support student learning, but the conditions and environments have changed due to the spread of the novel corona virus. Pre-service science teachers will benefit from being prepared to collaborate with other teachers to construct activities (Abdul Kadir & Abdul Aziz, 2021). The results of this study revealed that one of the preparations of pre-service science teachers is through teaching orientation before their actual deployment as pre-service science teachers. Accordingly, pre-service teachers can have the opportunity to familiarize themselves with their profession and practice what they have learned in their teaching preparation (Aguilar-Cruz & Medina, 2021). One of the broad objectives of teaching preparation programs is to ensure that pre-service science teachers have a solid foundation to start their teaching professions. Some of the verbalizations of the informants are as follows:

PST5: *"Before deployment our supervising instructor met us via zoom meeting. She explained the guidelines to be followed during the internship, we were also given the chance to meet virtually with our cooperating teachers and they oriented us regarding the policies as well."*

PST18: *"Before deployment, we attended orientation conducted by our supervising instructors to discuss the guidelines and rules during our on-the-job training."*

PST15: *"Before our internship in the university, our department provided us an internship training or INSET for all the pre-service teachers so that we will be trained with the different teaching methodologies and techniques and also they taught us the different values, characters and attitudes in our workplace."*

The findings revealed that pre-service science teachers consider readiness as an essential aspect of the teaching-learning process. Teaching orientation helped the pre-service science teachers to further improve their knowledge regarding the guidelines, policies, and trainings that can develop their teaching skills. According to Kim (2020), teaching preparation, which is the

most important, involves teaching practices and activities toward teaching profession. Pre-service science teachers acquire skills, gain experiences, and build opinions and thoughts necessary for their training and readiness in the teaching profession. The effect of this preparation is significant on pre-service science teachers' teaching skills.

*In-service Training-related experiences*

In-service training allows the pre-service science teachers to be prepared before moving to their actual deployment. Due to Covid-19, traditional training shifted to distance training, which required the pre-service science teachers to adapt into another training environment. In-service training allows pre-service science teachers to participate in activities that may include webinars, workshops, orientation, and others to further improve their teaching skills and prepare them for their actual deployment. According to Bunyamin (2021), the ultimate goal of in-service training is to ensure pre-service science teachers' classroom performance and improve teacher quality. It was found in this study that pre-service science teachers attended virtual seminars related to pedagogy, online learning, and emerging technologies in education. Some of the verbalizations of the informants are as follows:

PST15: *"The University conducted a nine-day inset program for us pre-service teachers to prepare us for our On-the-Job Training. The inset program taught us professionalism, proper way to craft lesson plans and instructional materials and lot more. Indeed, the university knows very well the things that students need in order to be prepared."*

PST4: *"Prior our virtual internship, the university allowed us to have an In-service Training and orientations before the deployment in the High School department. Aside from this, we were assigned to different instructors in order for us to be guided all throughout the virtual internship."*

PST10: "*Before having the internship, we had a lot of seminars or what we called INSET. This is a series of webinars and trainings which are necessary before taking the internship or practicum and the University of Saint Louis made it possible."*

This study showed that the university conducted webinars and trainings for the pre-deployment of the pre-service science teachers. It was said that, even when the pandemic created a huge impact in the teaching practicum of the pre-service science teachers, the university made it possible to train their pre-service science teachers for their actual deployment. According to Kosar

(2021), in-service training acts as a catalyst for change that causes a substantial shift, leading to a redefinition of the teaching role. This process broadens perspectives and strengthens teacher qualities. In-service teacher training allows pre-service science teachers to become more effective, systematic, and rational.

*Personal Formal Setup*

Due to the pandemic, the pre-service science teachers were required to make their classrooms in the comfort of their homes. Pre-service science teachers take personal responsibility in preparing themselves for the actual deployment. They needed to ensure a conducive experience for the learners in the sense that even in this situation, they still need to be emotionally, physically, and mentally prepared. According to Dorsah (2021), due to the move from traditional learning to online learning, pre-service science teachers are experiencing adjustments to a new environment and personal preparation. This includes establishing their own workplace, engaging in self-directed learning, and ensuring mental and physical preparedness for this shift. Some of the verbalizations of the informants are as follows:

PST12*: "It is important to be emotionally, physically and mentally prepared. Thus, I restore my confidence and enthusiasm by communicating with people. I created new environment in my room to feel that I'm really in the classroom. I also visited different sites to come up with instructional materials for my teaching demonstration. I also watched educational videos regarding teaching strategies and lot more."*

PST4: "*It was so challenging to have a first time virtual internship, but I made sure that I will be prepared enough through thoroughly reading all the guidelines and attending the meetings with my supervising instructor and cooperating teacher. Furthermore, expecting the worst was my preparation prior our virtual internship. I also made sure that my room is clean to feel like I am really inside the classroom."*

PST10: *"I really prepared myself before the internship. Physically, I made sure that I have the proper grooming, mentally I read books and conditioned my mind, and emotionally I always calm myself and always think for the brighter side. I think these preparations helped me finished my internship successfully."*

The results suggested that being physically and mentally prepared is important in the teaching-learning process. Pre-service science teachers should prepare themselves for a good outcome in teaching their students for their actual deployment. It also revealed that good physical and mental health produce good ways in teaching, and

having a conducive classroom setup at home motivates you to teach like you are in the face-to-face setting. According to Dayagbil et al. (2021), personal preparation of pre-service science teachers in a virtual internship should be acknowledged by the university. It is imperative for the university to incorporate this experience into the training preparation of the pre-service science teachers, particularly considering that they are pioneers in experiencing a virtual internship.

*Theme 2: Deployment Experiences of Pre-service Science Teachers in their Virtual Internship*

Pre-service science teachers had a different experience about their deployment in their virtual internship. The results of the study revealed that there were eight deployment experiences of pre-service science teachers in their virtual internships as follows: a) technological difficulties; b) convenience in teaching; c) poor students' engagement in online learning; d) no exposure to traditional mode of teaching; e) not conducive teaching and learning space; and f) relationship with cooperating teachers and supervising instructors.

*Technological Difficulties*

Technology became a way for pre-service science teachers and students to collaborate and communicate when the face-to-face mode of teaching shifted to online teaching. However, the study revealed that pre-service science teachers experienced technological difficulties. The informants disclosed that they experienced numerous technological issues, such as unstable internet connections, lack of gadgets, sudden power interruption, lack of online educational resources, and lack of online pedagogical tools. Pre-service science teachers also mentioned that they experienced different technological difficulties, which greatly affected the flow of delivering instructions and the effectiveness of their discussion. Similar to the studies of Thiyagu & Joshith (2021) and Utami et al. (2022), most of the pre-service science teachers found online teaching to be extremely challenging due to the different technological difficulties they encountered. Generally, many of the pre-service science teachers revealed an unfavorable experience with their internet connection. Some of the verbalizations of the informants are as follows:

PST1: *"One of the problems that I encountered is the limited strategies used in my online discussion. As to the shift in education, traditional strategies are no longer used in the educational process since it is online already, so you really have to look for a perfect strategy aligned to the online discussion."*

PST10*: "The first was all about technical difficulties there were times that my internet connection was very slow and this negatively affect my teaching as well as the learning experiences of my students because when we do not have internet or slow internet connection it leads to poor quality video as well as audio downtime and connection loses among teachers and students."*

PST13: *"During the first semester, gadget shortage is the second problem I encountered in my field of specialization which is math, I needed a good and appropriate gadget especially when my topics are Cartesian product, especially in solving, algebra or when I need to draw in order for my demonstration to become smooth. I also noticed that I should not only use one gadget. It is not appropriate to use laptop alone or cellphone alone or tablet alone because sometimes when presenting examples, you need to graph, you need to show how to graph the solution or problem or equation. You can't monitor their answers or their participation or cooperation so you need to have 2 to 3 appropriate gadgets in order for teaching and learning process to be smooth."*

PS18: *"Another problem that I encountered is power interruption. There are times that I am doing my demo teaching and then power interruption suddenly occurs. This is one challenge for me because even though I am doing my demonstration smoothly, when this happened, the flow of my demonstration becomes interrupted. This is a challenge for me because it is out of my control."*

Technology is very important during online teaching as it serves as a medium of communication, educational resource, and knowledge within a class discussion. Technological-related problems such as sudden power interruption, unstable internet connection, lack of online teaching strategies, and lack of gadget availability were some of the issues experienced by the pre-service science teachers in their online teaching. This has an impact on both teachers' ability to teach and students' willingness to learn. This is also in consonance with the findings of some recent studies that poor internet connectivity poses a challenge to internet usage in schools (Ogbonnaya et al., 2020; Prastikawati, 2021).

*Development of Techno-Pedagogical Competence*

Despite the technological-related difficulties that the pre-service science teachers experienced during the virtual internship, pre-service science teachers also learned to adjust and adapt to the technological demands of virtual internship. This led them to the development of their techno-pedagogical competence. According to the informants, during their internship, they learned to adopt and integrate technology into their lesson. Similar to the claim of Ugalingan & Valdez (2021) that as the pre-service science teachers experienced

online teaching challenges, they were also able to find opportunities to adjust to the new teaching setup. Some of the verbalizations are as follows:

PST8: *"Actually, at first it is difficult because you know, we are the first batch to have an online internship and I am actually not familiar in teaching online but as time passed by when I am already teaching, I learned to adjust and adapt to the virtual teaching."*

PST17: *"I am not very knowledgeable in using different online tools which is really my weakness but I became used to it little by little. You are improving like you are exploring what will be the best; actually there is no best strategy. You just need to use appropriate tools and it should enhance the learning."*

Due to the shift from traditional mode of teaching to online teaching, the pre-service science teachers underwent their internship virtually. The results revealed that pre-service science teachers have undesirable experiences when it comes to the use of technology in teaching. Despite the undesirable experiences, they learned to adjust and adapt little by little until they learned the process of the virtual internship and delivered their discussions successfully. The result agrees with the study of Dorsah (2021) that pre-service science teachers encountered technology integration difficulties but learned to adopt technology in their discussions.

*Convenience in Online Teaching*

Another experience shared by pre-service science teachers during the interview was the convenience of the virtual internship. Pre-service science teachers stated that virtual internship reduced their financial problems, lessened their physical efforts in travel, and maximized their time in doing lesson plans and instructional materials. According to Theelen et al. (2020), virtual internship is the program's main selling point. PSTs can participate remotely during their busy school or work schedule and are not required to follow the traditional office internship schedule. Some of the verbalizations of the informants are as follows:

PST5: *"In online teaching, it is also our advantage because we don't need to go to school anymore, we'll just open our laptop and teach our students."*

PST9: *"As a pre-service in distance learning it is our advantage since, we don't do so much effort like for instance, in our financial expenses. We no longer do traditional instructional materials therefore our financial expenses were lessened."*

PST19: *"Online learning makes me more convenient because I didn't need to travel from our town to our school that is why it*

*made me save some money and lessened my expenses."*

Virtual internship created a new environment for the pre-service science teachers that further enhanced their teaching skills and were able to manage and maximize their time because of distance learning. According to Imsa-ard et al. (2021), pre-service science teachers construct the delivery of teaching synchronously and asynchronously, which provides learners with a more flexible, accessible, and relatively affordable alternative for education at the comforts of their home at any time for their convenience.

*Students' Engagement in Online Learning*

Students' participation is referred to how the students engage themselves in the classroom discussion. This shows how passive or active the students are in the teaching demonstration of the pre-service teachers. In this study, it was revealed that the informants experienced challenges in encouraging the students to participate in the discussion. They also mentioned that they were not able to strictly monitor if their students were listening to them because they could not see them physically. Lim (2020) also asserted that due to the absence of the traditional classroom setting, the students feel the limited interaction and participation. This is primarily observed through group discussions conducted via video meetings and virtual chat rooms, a situation reflected in the experiences of pre-service science teachers as they engage with students during their discussions. Generally, most of the participants experienced students' lack of participation during their online demonstration teaching. Some of the verbalizations of the informants are as follows:

PST5: *"Another challenge is that how I will encourage passive students to participate in the discussion and the like. Since it is virtual, it's really difficult to encourage them to participate because we cannot see them physically. And also, some of them are not attending, I have a 7:30 class in the morning and only 3-5 students are attending."*

PST9: "*One challenge that I encountered is the engagement or the participation of my students during my discussion. Whenever I ask questions and call someone to recite, most often students leave in the Google meet or our zoom meeting."*

PST15: *"I am not hundred percent sure if my students are really participating or listening during our discussion because they are not mandated to open their cameras."*

It was revealed in this study that pre-service science teachers experienced lapses in terms of the participation of students during their virtual internship.

The participants mentioned that it was not easy for them to monitor their students. Moreover, they said that it was difficult for them to encourage their students to engage in the discussion because they could not see them physically. They also mentioned that some students leave the online classroom every time they are called to recite. This is similar to the study of Nambiar (2020) and Artha et al. (2022), stating that lack of students' interest and involvement is a major problem for teachers. During online classes, students make a lot of excuses regarding not being able to participate or attend the discussion. This eventually led to pre-service teachers thinking that students were not interested and no one was listening in the discussion due to the passive engagement of students during the discussion.

*No Exposure to Traditional Mode of Teaching*

The transition of teaching from face-to-face to online can be challenging to create a sense of social presence so that the online students can still feel that they are part of the learning community (Conklin & Dikkers, 2021). This also resulted for the pre-service science teachers not to experience the real classroom setting during their internship. The results showed that some pre-service science teachers complained about their lack of experience in the traditional classroom and lack of physical interaction with their students and colleagues. Mirke and Tzivian (2021) claimed that one of the disruptions in the online educational setting that pre-service science teachers experienced in their practice teaching was the fact that they did not have actual classroom experience. Thus, they were not able to meet the students personally and to observe their behaviors and attitudes. Generally, many of the informants revealed complaints regarding their no exposure to the traditional mode of teaching. Some of the verbalizations of the informants are as follows:

PST4: *"The interaction between the teacher and the students inside the classroom was virtual, so I was not able to see my students face to-face, unlike in the real setting. Interaction with your student takes place on-site; you can see them and interact with them from anywhere in the school. Moreover, I was not able to practice classroom management because it is different from face to face so, it's like; I feel I'm not that good at classroom management. However, I also want to experience doing traditional instructional materials because it is hard to utilize different instructional technology in online or virtual set up."*

PST9: *"Definitely yes, I feel like we missed the real classroom scenario maybe because we haven't experienced face-to-face training, on how the classroom setting scenario is done, like speaking in front of your students*

*face-to-face not virtually because in the field of teaching, it's more on public speaking in front of your students. Unlike in virtual setting where you still practice public speaking in front of your students but you teach differently and most often you only see the profile pictures of your students in the Google meeting. So, I feel like I missed the opportunity to be trained in the real classroom setting scenarios and the experience to teach in the other schools like the public school."*

PST17: *"I didn't experience teaching in a traditional classroom. I feel like I still have many things to learn in the face-to-face setting. Experiencing the face-to-face environment is one of the things that I missed out. So, it's like I can't connect to my students because there is no personal communication and perhaps, the pressure and excitement are really different when you will be teaching in a face-to-face environment compared to online teaching."*

Due to the shift from traditional mode of teaching to online teaching, pre-service science teachers had to undergo internship virtually. As a result, the pre-service science teachers had no exposure to traditional mode of teaching and this made them feel missed out on the real classroom teaching experience, like discussing in the face-to-face classroom setting and preparing traditional instructional materials. This study also showed that one of the negative experiences of pre-service science teachers was that they did not experience and practice the real classroom management. They also mentioned that the lack of presence in an online setup made them mere student-teachers. With that, the participants are looking forward to having concrete experience in the traditional way of teaching and are also longing for face-to-face interaction with their students and co-workers (Nawanidbumrung et al., 2022).

*Not Conducive Teaching and Learning Space at Home*

Despite the personal readiness of pre-service science teachers, there are still limitations in terms of the conduciveness of their teaching and learning space at home. Not conducive teaching and learning space at home was one of the challenges that the pre-service science teachers encountered during their virtual internship. In this study, a larger number of informants expressed their undesirable experiences regarding unconducive teaching and learning space at home. Many of them experienced different environmental noise and lack of teaching space that made them deliver their instructions ineffectively and inefficiently. This is similar to the claim of Mavuru et al. (2022) when they said that having an unconducive teaching and learning space of pre-service science teachers at home hindered them from managing their discussions effectively

and motivating and engaging their students in the teaching and learning process. Generally, many of the informants revealed an unfavorable experience towards inconvenience in teaching virtually. Some of the verbalizations of the informants are as follows:

PST9: *"What I also encountered during my internship virtually is the inevitable noise that distracts me during our meeting such as rooster crowing, dog barking, and the children crying while I'm doing my online discussion so it was a challenge for me to handle that situation."*

PST13: *"I do not have a conducive place for teaching. Since, I am living in rural areas here in Alcala, Cagayan, it is expected that we have an unstable internet connection. There is only one specific spot that have a strong internet. So, I still need to go outside our home to have an internet connection and this is a challenge for me because I am encountering inevitable noise outside."*

PST15: *"Sometimes, it is difficult for me to deliver my lessons online because I do not have my own space for teaching. I am being distracted due to different noises such as dog barks, vehicles' sound and neighbors' noise and also due to our home is overcrowded."*

With the environmental noise and lack of space for teaching, pre-service science teachers were being distracted and could not deliver their lessons well during their demonstrations. Consequently, excessive and inevitable noise reduced the pre-service science teachers' ability to think and impart lessons clearly. Similar to the studies of Mavuru et al. (2021) and Zhang et al. (2020), an unconducive learning environment prevents students and teachers from productively engaging in teaching and learning due to distractions, lack of learning space, and lack of privacy due to overcrowded households.

*Relationship with Cooperating Teachers and Supervising Instructors*

Online teaching practicum is guided and monitored by pre-service science teachers' supervising instructors during their online teaching practicum. Learning opportunities provided the pre-service science teachers with the necessary coaching and mentoring required to deal with questions from their students (Mavuru & Pila, 2021). In this study, it was revealed that the pre-service science teachers have favorable relationship with their cooperating teachers and supervising instructors during their virtual internship through constant monitoring, efficient feedbacking, interactive and extensive mentoring, and providing constructive criticisms during their demonstration teaching. Some of the verbalizations are as follows:

PST9: *"During my internship my cooperating teacher and supervising instructor guide me on how to be more professional as an educator and train me throughout my demo teaching."*

PST13: *"I experience difficulties in teaching my students when some of them can't attend in synchronous learning but with the help of my cooperating teacher, we came up with a solution and that is to conduct a remedial class for those students who can't catch up during the scheduled teleconferencing."*

PS20: *"As a BEEd major, pupils nowadays can learn basic information from their parents. As their teachers, we need to broaden their knowledge by relating the lessons with real-life experiences. My cooperating teacher and supervising teacher taught me how important it is to be knowledgeable about the lessons you are teaching."*

The findings revealed how critical the roles of cooperating teachers and supervising instructors are in the successful implementation of online practice teaching among pre-service science teachers during the Covid-19 pandemic. According to Coman et al. (2020), a traditional student teaching experience model assigns student-teachers to cooperating teachers who supervise them throughout the practicum. In addition, the pre-service teachers were supervised by their cooperating teachers and supervising instructors. In online learning, both the supervising instructor and the cooperating teacher act as mentors to the student-teachers, assisting them in acquiring the necessary professional knowledge and skills.

*Theme 3: Post-Deployment Experiences of Pre-service Science Teachers*

This theme explores the post-deployment experiences of pre-service science teachers in their virtual internship. It was revealed in the study that there were positive experiences among pre-service science teachers in their post-deployment process: a) enhancement of 21st century skills and competencies, b) improvement of technological skills in the teaching and learning process, c) conduct of face-to-face demonstration, d) proficient in using technology in the teaching and learning process, and e) on-going professional development and support programs. The five major themes revealed in the study were supported by the study of Caena (2020). Improving deployment practices can have important implications for teacher retention as teachers perform professional responsibilities efficiently.

*Enhancement of 21st Century Skills and Competencies*

The Covid-19 pandemic has forced academics in different universities to integrate technology into the curriculum more than before. Technology integration is unavoidable in today's educational environment as it

improves the teaching and learning process and increases pre-service teachers' knowledge and skills (Shinta & Aprilia, 2020). Results of the study revealed that the pre-service science teachers' 21st century skills were enhanced because of their virtual internship. Accordingly, 21st century skills and competencies encompass communication, collaboration, creativity, and critical thinking. Through the virtual internship program, pre-service teachers became more creative in making instructional materials online. Some of the verbalizations of the informants are as follows:

PST1: *"During my internship, I became more creative in doing the instructional materials I needed in my online demonstration such as doing power points. By utilizing technologies in the teaching process, I became a better communicator, I develop more my communication skills in teaching since we know that whenever we do demo teaching in distance learning it is more on talking or communicating with your students."*

PST8*: "Because of integrating technologies in teaching, I developed more my technology knowledge by being more creative in utilizing it like in doing my powerpoint presentation and integrating online platform that is suitable to my students' needs like quizziz and padlet."*

PST19*: "I became more flexible since online learning encouraged me by offering a variety of schedules and times for asynchronous and synchronous learning. I learned how to manage my time and when there is a problem like technological difficulties, I always have a plan B in teaching my students."*

Pre-service science teachers became more innovative in incorporating such skills aligned in the teaching and learning process. Through the utilization of virtual teacher internship as a substitute for traditional face-to-face practice teaching program, the 21st century skills were developed. The results of the study confirmed the findings of a recent study on the development and enhancement of 21st century skills among pre-service science teachers in their virtual internship (Kosar, 2021). Pre-service science teachers who are exposed to online learning are more likely to integrate technology into their teaching practice and have the option to participate in virtual activities (Kim, 2020). Even when the current Covid-19 pandemic has passed, online education is likely to persist since many institutions are moving toward a comprehensive online or blended learning modality in instruction responsive to the demands of modern times (Flores & Swennen, 2020).

*Improvement of Technological Skills in the Teaching and Learning Process*

Another positive experience of pre-service science teachers in their

online teaching practicum is that it improved their technological skills in the teaching and learning process. Pre-service science teachers are obliged to learn and take advantage of utilizing various computer programs and applications to produce livelier discussions and virtual interactions. Pre-service science teachers claimed that using technological resources helped them better understand the topics. During their virtual internship, the pre-service science teachers used various technologies and game-based applications to teach students. Teachers with technological expertise are able to enhance their teaching methods and personalize learning. Schools can benefit from technology by lowering the cost of physical teaching materials, improving program efficiency, and maximizing teacher time. Generally, the informants revealed favorable responses in using educational applications and software in doing their activities. Some of the verbalizations of the informants are as follows:

PST4: *"It is important to venture into the world of technology, where you can find other resources that you can apply to your future demonstrations."*

PST8*: "Being computer literate gives me a better understanding of how to use technology and how to incorporate strategies into my online demonstrations effectively."*

PST18: *"I applied what I've learned in our EdTech subject especially so, that I will incorporate the use technology in teaching. With that, I know how to get the attention and interest of my pupils since I practiced how to handle the students to be attentive in the class discussion."*

Some pre-service science teachers admire online teaching because this gives them the opportunity to excel and have sufficient knowledge in utilizing technology in their teaching process. Thus, exposing pre-service science teachers to the virtual internship encourages them to incorporate technology as a practice and provides them with hands-on virtual experiences. According to Lim (2020), appealing characteristics of the online classroom include ease of participation, flexibility, convenience, and exposure to different educational and emerging technologies in teaching and learning. Furthermore, Almonacid-Fierro et al. (2021) identified a set of competencies required to teach online courses. This includes pedagogical skills, content skills, design skills, management and institutional skills, social and communication skills, and most importantly, technological skills.

*Conduct of Face-to-Face Demonstration*

The transition of teaching from face-to-face to online can be challenging. It is challenging to create a sense of social presence so that the online students can still feel that they are part of the learning community. However, the university provided the pre-service science teachers the opportunity to conduct their final demonstration in a face-to-face setting. This also allowed the pre-service science teachers to experience a real classroom setting during their internship. This study showed that some pre-service science teachers were exposed to the reality of teaching during their final demonstration, which helped them maximize their teaching skills from online to traditional demonstration for the last time. The findings of the study revealed that pre-service science teachers gained experience-based training in their post-deployment process. The participation of pre-service science teachers in their demonstrations would improve their skills in delivering lessons and prepare them to become effective instructors (Greefrath et al. 2022). Generally, many of the informants revealed desirable experiences during their face-to-face final demonstrations. Some of the verbalizations of the informants are as follows:

PST4: "*We got the chance to finally have our face-to-face final demonstrations. I really wanted to experience this set up especially that things are going better and face-to-face classes will be back sooner. This action of the department is relevant because this is a big opportunity for us to really know, feel and taste how it is like to be on a face-to-face teaching set-up."*

PST9: *"Even in the now normal, the Teacher Education Program never fails to offer us utmost experiences as we were deployed in the college department. After dealing with numerous individuals with different backgrounds and diverse learning styles online, we are grateful enough to cater them as they crave towards knowledge in a face-to-face set-up. Given the opportunity to conduct our final demonstration in the classroom by the limited students is an experience that I will treasure the most despite of the situation that we have right now."*

After experiencing challenges in their virtual internship, the pre-service science teachers finally conducted their face-to-face final demonstration traditionally. This is a great manifestation that the school provides opportunities for pre-service science teachers to apply their skills in a real classroom setting. The pre-service science teachers were exposed to the traditional mode of teaching, which made them feel that they are not missed out on the real classroom teaching experience,

like discussing in the face-to-face classroom setting and preparing traditional instructional materials. As a result, a teaching internship allows student-teachers to work full-time in schools under the supervision of a cooperating teacher/trainer, improving pre-service teachers' skills in an actual teaching setup (Dorsah, 2021).

*Proficient in using Technology in the Teaching and Learning Process*

Another experience of pre-service science teachers in their virtual internship is that it improved their technological skills in the teaching and learning process. This involved their proactive learning and utilization of diverse computer programs and applications, aimed at fostering dynamic discussions and virtual interactions. Pre-service science teachers recommend using technological resources to help students better understand the topics. This is why they used various technologies and game-based applications to gauge students' attention in the virtual classroom. Teachers with technological expertise can enhance their teaching methods and personalize learning. Schools can benefit from technology by lowering the cost of physical teaching materials, improving program efficiency, and maximizing teacher time.

Generally, the informants revealed favorable feedback about using applications in doing their activities after their virtual internship. Some of the verbalizations of the informants are as follows:

PST4*: "Because of our subject- educational technology, I was able to utilize the use of technology tools in my internship process. This made my internship livelier and exciting by using interactive game-based applications and other resources in the lesson."*

PST8: *"Being computer literate gives me a better understanding of how to use technology and how to incorporate strategies into my online demonstration effectively."*

PST18: *"Apply what you've learned in your EdTech subject especially that you will use technology in teaching. Know how to get the attention and interest of your pupils for them to be attentive in your class discussion."*

*On-going Professional Development and Support Programs*

Pre-service science teachers' teaching skills are developed during their internship and should be applied outside the school environment. This includes holding specific training workshops for pre-service science teachers and allowing mentors and beginning teachers to have adequate time to participate in a full range of instructional support activities, such as proctoring during exams, job interview, and other extensive programs that could help them establish continuous professional development. Professional

development helps pre-service science teachers learn the more complex and analytical skills they need for 21st century teaching (Mavuru & Pila, 2021). Teachers must teach in ways that foster higher-order thinking skills and elevate the performance of their students. They must be provided with more effective professional learning in order to develop the sophisticated teaching required for this mission. Some of the verbalizations of the informants are as follows:

PST8: *"We pre-service teachers experienced proctoring which gave us the opportunity to witness how to handle different students during the exams. Finally, we were allowed to check test papers and we were taught how to input grades which are very relevant for us as future teachers."*

PS11: *"The University gave us the opportunity to join mock interview and job fair. As a future educator who wants to apply after graduation, the activity helped me to assess my weaknesses and strengths. Moreover, it helped me to gain confidence with the chance to reflect on my non-verbal and verbal communication abilities."*

PS15: *"After our virtual internship, I realized that we really had the best internship program in the city. The teacher education department had provided us the best training experience and that is something we will forever be proud of. The internship did not only expand our knowledge, but it was also an opportunity for us to build a strong sense of professionalism that will definitely help us in our jobs later on."*

According to the findings, pre-service science teachers had the opportunity to practice their expertise in teaching by participating in job interviews, seminars, and other school activities. These experiences contribute significantly to their ongoing professional development. The school provided pre-service science teachers with the best training experience for their future work.

## CONCLUSION

The study concludes that pre-service science teachers had both desirable and undesirable experiences during their virtual teaching internship. The virtual internship experiences of pre-service science teachers in their pre-deployment, such as the teaching preparations and trainings, became a way for them to achieve readiness in the teaching-learning process. However, despite the positive experiences and learning gained by pre-service science teachers, there are still challenges and issues that they experienced during their virtual internship especially on technology integration, students' engagement, and unconducive place of teaching and learning at home. Furthermore, during the post-

deployment, the pre-service science teachers were able to enhance their 21st century skills and competencies, as well as the technology skills needed in the teaching-learning process.

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