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Challenges and Prospects in Dental Education During and Post Covid-19 Pandemic: Embracing the Future of Teaching and Learning

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Abstract

Covid-19 containment measures, particularly social distancing, have had a significant impact on institutions and businesses. One of the sectors most affected is the education sector where institutions have been compelled to shift from traditional classroom-based on contemporary remote-based online teaching and learning. The study aimed to identify key factors necessary for the development of a framework that will guide the efficient and effective integration of remote teaching and learning in dental education in the Philippines. The study was grounded on transformative learning theory. To accomplish the study, a mixed-methods approach and a sequential explanatory design was employed. Using the sequential explanatory design, data collection employed two phases; an initial quantitative phase for validating the themes obtained, and followed by a qualitative phase for determining themes. Target population included identified institutions offering dental programs in the Philippines. Approximately 285 respondents for the quantitative phase were involved and 24 respondents for the qualitative phase. Survey questionnaires and interview guides with structured questions were used to gather data. The ultimate outcome of the study was a proposed framework identifying the key factors that affect efficient and effective integration of remote teaching and learning in dental education in the Philippines. The quantitative results indicated that most teachers engaged in remote learning only during the pandemic and then returned to-face-to-face classes. The result indicated that teachers used laptop devices to complete remote learning tasks. The current study findings are important for teachers, students, schools, and policymakers at large in dental education. Teachers may use the findings to implement training programs on remote learning for their improvement in delivering online instructions in remote classes. Policymakers may use the results of the study to create and implement effective policies that can enhance remote learning. To ensure a comprehensive understanding of the factors influencing the integration of remote teaching and learning in dental education, the study identified several key factors from both quantitative and qualitative data. These factors highlight the necessary elements for developing a robust framework tailored to the need of dental education in the Philippines. The key factors that were identified from the merging of the quantitative and qualitative findings were (1) conducting a need assessment for planning. (2) developing a technological infrastructure and teaching considerations. (3) cultivating a content and its delivery through collaboration by establishing clear challenges of communication. (4) establishing assessment and feedback approaches. and (5) designing faculty and student support services.

The identified key factors were the features considered for the formulation of the remote teaching and learning framework to dental education.

Key Concepts: Dental Education, Remote Teaching, Remote Learning

CHAPTER 1

Introduction

The COVID-19 pandemic has interfered significantly with traditional education and has encouraged a shift to online learning. Deery (2020) observed that the safety measures proposed by the World Health Organization such as social distancing, wearing of masks, and virtual education or remote learning led to the suspension of in-person classes as means of limiting the spread of the coronavirus. As the pandemic progressed and increased in severity, Mansoor (2020) and Ali (2020) noted that schools embraced online learning as an alternative to traditional learning to keep students engaged. Furthermore, Mansoor (2020) and Ali (2020) suggested that existing research studies have only focused on the immediate effects of the pandemic on dental education with limited attention to dental education post-pandemic.

According to Ali (2020), the adoption of remote learning and teaching has limited the practical application of dentistry assessment. However, remote learning has played a significant role in limiting the spread of the virus in addition to protecting staff and students from contracting and spreading the virus. Worth noting, the limited studies on what education would look like post-pandemic has resulted in scholars presenting contradicting results on if remote learning should be incorporated into students' curricula post-pandemic (Ali, 2020). Hebebci, et al. (2020) reported that in their study teachers supported the use and incorporation of distance learning into the curriculum while students were against any form of online learning. Reporting on student response, Hebebci, et al. (2020) established that students were dissatisfied with how content was delivered which, according to them, was of poor quality and non-engaging compared to in-person classes. Additionally, Hebebci, et al. (2020) informed that the students felt a disconnect with the educational activities, and time was highly limited in zoom conferencing, leading to some failing to understand subjects being taught. Consequently, although the majority of participants in the study conducted by Mansoor (2020) were in agreements with the safety and educational benefits of distancing learning, ten percent (10%) expressed otherwise. For instance, the 10% in Mansoor's (2020) study reported that they did not enjoy zoom meetings and were strongly against remote learning and teaching because of the economic costs that accompanied the implementation of remote learning.

On the other hand, Sasere and Makhasane (2020) reported that both teachers and students in developing countries lacked the requisite knowledge to operate the technical equipment used in remote learning, thus, they likely perceived the program negatively. Moreover, the socio-economic differences between schools, teachers and students posed a significant challenge in the adoption of remote learning. Although several studies have investigated the impacts of the pandemic on education and especially in dental education, research reporting on the perception of stakeholders in dental education on the adoption and continued use of remote learning post-pandemic are still missing. Additionally, current studies have investigated the effects of the pandemic on dental education and the application of online education during the pandemic (Ali, 2020; Mansoor, 2020). They reported on the positive responses of participants on remote learning, while Hebebci, et al. (2020) reported the negative responses of students on online education, thus, noting that more studies are still needed.

Background of the Study

The COVID-19 pandemic has forced sudden transformation in many sectors, most especially, the education sector which has experienced major disruptions and unforeseen changes. Governments all over the world suspended traditional face-to-face or in-person classes and advocated for remote learning and teaching to limit the spread of the coronavirus and protect teachers and students. Although the governments and education stakeholders advocated for remote learning, the shift from the traditional face-

to-face classes to remote learning was faced with numerous challenges. Sasere and Makhasane (2020) pointed out that most schools globally lacked the technical infrastructure to facilitate virtual education. In addition, there was limited knowledge among teachers and students on how to use the available technology to facilitate virtual learning especially in fields that are traditionally taught in-person such as in dental education (Akinkugbe, et al., 2020).

During the early phases of the pandemic, dental schools were faced with challenges of how to protect their students and staff from the virus, as well as how to ensure that all staff and students adhered to the laid-down health protocols to curb the spread of the virus and infection. Governments and schools have opted for remote learning as an alternative to traditional learning due to the looming effects of the pandemic. However, there were numerous challenges associated with remote learning. Remote learning required learners and instructors to have access to technology, computers, and trained teachers (Sasere & Makhasane, 2020). According to Deery (2020), the effects of the pandemic on traditional education called for dental schools to integrate technology in the learning and teaching process. Moreover, the different opportunities and the flexibility that technology offers makes it a viable alternative to in-person classes. Even though Sasere and Makhasane (2020) showed that technology was essential in remote learning, Deery (2020) asserted that lack of skills on how to use technology to facilitate distancing learning and unavailability of infrastructure pose a serious challenge to remote learning.

To overcome the aforementioned challenges, Deery (2020) reported that enhancing teacher training, student knowledge and skills in technology facilitated remote learning. Despite the challenges in knowledge, technological equipment and infrastructure, Chang, et al. (2020) reported that students and teachers in dental schools should embrace available technology to wade off the educational challenges caused by the pandemic. Moreover, the success of remote learning according to Chang, et al. (2020) depends on the caution, flexibility and the willingness of students and educators to use the available technology and equipment for remote learning. Furthermore, Deery (2020) presented that it was high time for schools to permanently incorporate remote learning in their curricula to aid in student and staff preparation for phenomena that may result in closure of schools in future. Despite all this, there is still a gap in literature examining how dental schools in the United States are prepared for pandemic other than the current coronavirus.

Ali (2020) conducted a study that examined online learning in institutions of higher learning as an alternative for in-person classes disrupted by the pandemic. Ali (2020) concurred with Mansoor (2020) that most institutions of higher learning are embracing remote learning to continue in order to provide their students with education on how to make up for suspended in-person classes. As uncertainties still linger on as to when the virus would be stabilized and an effective vaccine against the virus be developed, Ali (2020) asserted that both teachers and students should continue to actively engage in remote learning using the available technology and equipment to continue with learning even during lockdowns. However, there were a number of concerns. In their discussion, Ali (2020) presented that the success of remote learning and teaching depended on the availability of technological resources, student accessibility, and staff confidence and preparation in terms of training, skills and knowledge. Additionally, there was a need to provide staff with the required ICT infrastructure and skills needed to effectively conduct remote teaching (Ali, 2020). In the same note, student's readiness should be enhanced by effectively preparing them psychologically, equipping them with the necessary technological tools and skills needed to successively engage and participate in remote learning.

Hebebci, et al. (2020), on the other hand, argued that while e-learning is important, educators should not take it as a replacement or a permanent alternative to traditional learning but rather as a complement of traditional learning. Studying the perception of students and teachers on distancing learning during the pandemic, Hebebci, et al. (2020) presented different results from those of Ali (2020) and Mansoor (2020). According to Hebebci, et al. (2020), most students included in the study were not satisfied with the way e-learning was conducted, citing reasons, such as difficulties in understanding the subjects, limited time, lack of infrastructure to effectively support the program, and that teachers were limited on how they delivered content. Furthermore, students expressed dissatisfaction in the sense that there were no harmonious transitions between educational activities and e-learning, which students reported as an inconvenience. In a study on global perception on the delivery of faculty of virtual programs and the assessment of institutions of higher learning during the pandemic, Sasere and Makhasane (2020) reported that in developing countries, these institutions lacked the required infrastructure to facilitate content delivery virtually. Additionally, Sasere and Makhasane (2020) revealed that lecturers and students in these countries lacked proficiency and the technical knowledge required for an effective remote learning and teaching. As a result, Sasere and Makhasane (2020) concluded that there was a need to constantly train and retrain students and lecturers and equip them with the required knowledge in addition to equipping them with the infrastructure if online learning was to succeed in these countries.

Alzahrani, et al. (2020) in a thematic analysis reported a severe disconnect in dental education as schools closed and in-person classes were suspended. According to Alzahrani, et al. (2020), while some dental schools comfortably shifted to virtual learning, some schools were struggling. Consequently, the same inequality was witnessed among students with lower economic status and limited proficiency in technological knowledge since they could not afford mobile phones or computers for online education (Moraes, et al.,2020; Alzahrani, et al.,2020). Additionally, the coronavirus pandemic has impacted negatively on dental clinical practices and student attachment. Despite the negative impacts of the virus on the teaching aspect of dental education, the pandemic has created new research opportunities, such as psychological impacts of COVID-19 on dental students and tele-dentistry. RTL teachers can incorporate these new opportunities to plan, implement, teach, learn, and reflect on their students' learning. Also, the pandemic has challenged dental educators to modernize their approaches to the required pedagogy using new digital concepts, learning platforms and online communication. Additionally, Alzahrani, et al. (2020) reported that the pandemic has encouraged dental research in the possibility of incorporating tele-dentistry and other technological advancements in teaching and attending to dental patients.

Haridy, et al. (2020) conducted a study to investigate the future of dental education in the new normal. According to Haridy, et al. (2020) the impacts of the pandemic on dental education resulted in a shift of in-person curricula to virtual curricula, adoption of simulation laboratories and implementation of virtual learning. Similarly, Moralista, et al. (2020) in a random study on how faculty perceived online education in the Philippines established that it was vital for institutions of higher learning to start focusing on the development of a framework that would help students and staff's transition into normal education post-pandemic. Comparing the perception of younger and older faculty members, Moralista. et al. (2020) noted that older faculty members were in favor of online education during and after the pandemic. They argued that online education limited the spread of the virus and protected them from contracting the virus.

In another study, Baber (2020) investigated the determinants of students' perceived learning outcomes and satisfaction with online education during the coronavirus era. According to Baber (2020) a good number of participants provided a positive response that online learning increased their satisfaction levels

and decreased the number of students dropping from online courses. The success of online teaching and learning would depend on how well schools, teachers and students are prepared to embrace remote learning. For instance, Haridy, et al. (2020) proposed that the COVID-19 pandemic has presented opportunities for investment of dental schools on modern virtual education and training facilities. Additionally, Moralista, et al. (2020) reported that the success of virtual learning was centered on how well online classes were planned and regulated. Furthermore, Moralista et al. (2020) opined that to improve deliverables in virtual learning, schools had to deal with preconceived and negative attitudes held by faculty members concerning virtual education that presented a significant challenge in getting students and faculty adjusted to virtual education. Consequently, Baber (2020) posited that there was a need to develop a balance between online and offline classes and ensure that there is adequate research on the factors influencing productive remote learning during the pandemic.

Although there is an increasing number of research studies that have been conducted that investigated student perception of remote learning during the pandemic, there are very few studies investigating the intention and willingness of dental students and teachers' continued usage of remote learning post-pandemic. Ali (2020) suggested the need for further research on the effects of remote learning in the delivery of quality dental education and how students perceived its significance and continued use in the new normal. As such, the gap in literature that the proposed study sought to address was the limited research on the perception of remote learning in the new normal in dental education.

Theoretical Framework

This study was grounded on the theory of education called Transformative Learning Theory (Mezirow, 1991,2000). Jack Mezirow developed the concept of transformative learning in 1978 after being a consultant in adult education in developing countries plus teaching at Columbia University in New York (Taylor, 1998). He was inspired by people like the Brazilian Paulo Freire, the German Jürgen Habermas, and others. However, he discovered a wide-range kind of learning that helped change women's identity in the United States. He wrote about it in several writings and practiced it in various programs including the Adult Education Guided Independent Study (AEGIS) doctoral program. Mezirow conducted a national study about women returning to community colleges in 1978. The transformative movement grew from there into numerous publications involving five international conferences, 300 paper presentations, over a dozen books, numerous journal articles, and 250 doctoral dissertations in disciplines, such as health, education, and social welfare (Mezirow, 2018).

Transformative learning is one theory of learning, and particularly focuses on adult education and young adult learning. Transformative learning is sometimes called transformation learning, and focuses on the idea that learners can adjust their thinking based on new information. Mezirow's transformative learning is defined as "an orientation which holds that the way learners interpret and reinterpret their experience is central to making meaning and learning." (Taylor & Cranton, 2012). Edgar Taylor (2007) states it is a theory that is "uniquely adult, abstract and idealized, grounded in the nature of human communications" (p174). Reflection is a huge part of the transformative theory. Some researchers say that transformative learning is the adult constructivist theory (Wicks, 2009).

Transformative education involves the roles of teacher and learner.

The role of the teacher is that of establishing an environment of care and trust to facilitate the development of sensitive relationships among learners (Taylor,1998). As a role model, the teacher demonstrates a willingness to learn by deepening and expanding their perspectives about teaching and the subject matter

(Cranton, 1994). The learner also plays a role of constructing and creating the learning environment where transformative learning can occur (Taylor, 1998).

This theory is concerned with assisting learners to explore and enter into a critical dialogue with their guiding assumptions. Transformative learning is the struggle with, and transformation of, unquestioned assumptions. Challenging taken-for-granted meaning perspectives (Mezirow, 1991) and searching for meaning, growth and transformation offer a way forward as transformative learning theory suggests that to emancipate oneself from values and meanings, one has to be uncritically assimilated. The opportunity to learn transformatively arises out of the experience of crisis or disorientation. In the light of COVID-19, pre-pandemic mindsets are dysfunctional. Transformative learning begins with a disorienting dilemma: an individual is unable to make sense of an experience within her or his current pre-pandemic frame of reference; adapting new learning may no longer suffice.

The experience of not-knowing, or the challenge of combining social solidarity with physical isolation provides the kind of disruptions that transformative learning theory defines as disorienting dilemmas (Mezirow, 1991). Feeling ashamed of being disoriented might be accompanied by fear, loss and (anticipatory) grief, not knowing how to cope with the current crisis. Hitherto, unquestioned assumptions about freedom of movement, social solidarity and the limits of knowing become fragile. Existential uncertainty is both a global crisis and an individual experience for learners.

Mezirow (1991) outlines ten phases within the process of perspective transformation, starting with (1) a disorienting dilemma, which sets the stage for (2) an exploration of feelings like guilt or shame that arise in the wake of the crisis or dilemma. In a third step, (3), learners critically assess and reflect on their guiding assumptions underlying their current meaning perspective. What follows is (4) the realization that one's personal problem is shared and (sometimes) a public issue: the public breaks into the private sphere and learners realize that others have negotiated and undergone similar changes and challenges. In the next phase, (5) learners explore alternative ways of being and living in terms of relationships, roles and actions. This phase is complemented by another phase, where (6) learners plan (new) courses of action and (7) acquire new knowledge in order to put these courses of action into practice. In the aftermath of (8) learners trying out these new roles (provisionally), they (9) build self- confidence and competence and (10) re-integrate into their lives, employing a new, transformed (meaning) perspective (pp. 168–169).

With these, a transformative Learning Framework Diagram that is specifically tailored for dental education demonstrates on how transformative learning applies to the challenges and prospects in dental education, particularly during and after the Covid-19 pandemic. The diagram will include: 1) Disorienting Dilemma- COVID-19 as a disruptive event in dental education, 2) Critical Reflection- Reflection on traditional teaching methods (e.g., hands-on clinical practice, in-person lectures), 3) Rational Discourse- Collaborative discussions on alternative teaching methods (e.g., virtual simulations, tele-dentistry) , 4) Perspective Transformation- shifting to a hybrid or technology- driven approach, 5) Integration – Implementing new teaching practices, with feedback loops for continuous improvement for future dental education (Mezirow, 1991).

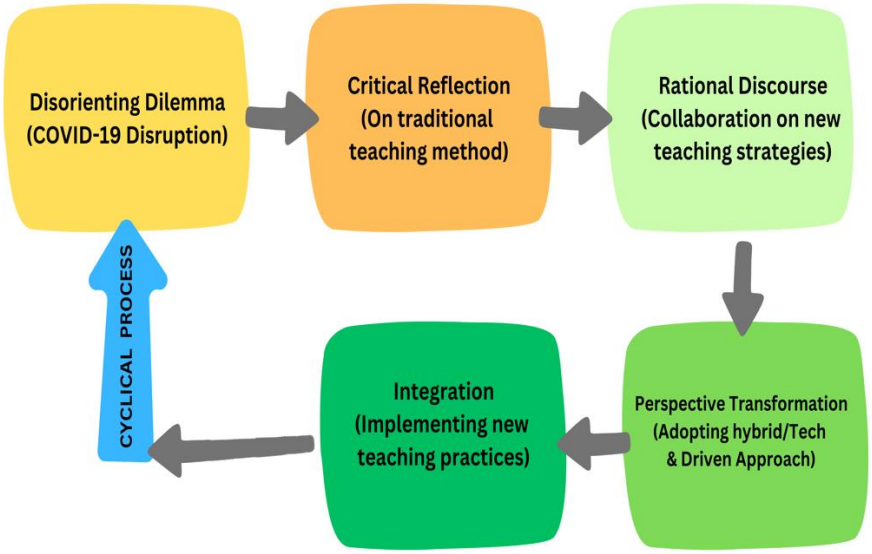


Figure 1. A flowchart of Transformative Learning Framework in dental Education.

The flowchart or framework for transformative learning in dental education as seen in figure 1 is adapted from Mezirow's (1991) Transformative learning Theory, with specific applications to challenges faced during and the post COVID-19 pandemic.

Conceptual Framework

The conceptual framework for this study is shown in Figure 1. Transformative learning theory has been used in a number of studies including online learning research. Online learning is fully in line with the principals of transformative learning as in adult education since the teacher can use a variety of technological applications, such as presentations, videos, asynchronous communication, and email in addition to authorities as scientific resources on the Internet. This activates the student towards knowledge that will move their interest, thereby changing their perceptual systems by leading them into self-realization (Pavlakou, et al., 2019)

There are five variables that will be examined in the hope to determine the key factors necessary for the development of a framework that will guide the efficient and effective integration of remote teaching and learning in dental education in the Philippines. The five variables are teachers' practices and experiences, teachers' challenges and difficulties, students' challenges and difficulties, adjustments of teachers and students, and feedback (thoughts, opinions, comments and inputs) of teachers and students. All of this information will be gathered from teachers and students, and this will be examined and analyzed quantitatively and qualitatively to come up with a list of key factors necessary for the development of a framework that will guide the efficient and effective implementation of post pandemic dental education in the Philippines.

Figure 2. Conceptual Framework

Statement of the Problem

This study aimed to identify key factors necessary for the development of a framework that would guide the efficient and effective integration of remote teaching and learning in dental education in the Philippines.

The study sought to answer the following specific questions:

1. What are the remote teaching practices and experiences that teachers have during the COVID-19 and post global pandemic in dental education with regard to technology usage, assessment strategy, methods of delivering instructions, and preparation of teaching materials?
2. What are the challenges and difficulties that teachers in dental education have encountered in terms of technological proficiency in providing remote classes, infrastructural availability to effectively support

remote teaching, time management in delivering remote classes, and teacher readiness for remote teaching during the COVID-19 and post global pandemic?

3. What are the challenges and difficulties that dental students have faced in terms of technological proficiency in attending remote classes, infrastructural accessibility to effectively support remote learning, and student readiness to comfortably shift from traditional face-to-face teaching to remote teaching during the COVID-19 and post global pandemic?
4. How do teachers and students in dental education adjust from face-to-face teaching to remote teaching and learning during the COVID-19 and post global pandemic?
5. What thoughts, opinions, comments and inputs do teachers and students, including those who will be approved for limited face to face by CHED, have concerns on how to effectively deliver remote teaching and enhance remote learning in dental education during the COVID-19 global pandemic and on times of pandemic?
6. What key factors and other outputs are necessary in developing a framework that will guide the efficient and effective implementation of remote teaching and learning in dental education?

Significance of the Study

The proposed study will be of significant importance to teachers, students, schools and policy makers at large in dental education. First, the findings will be significant to the needs of the teaching force in dental education in the sense that the results will prepare them for the challenges they are likely to encounter when offering remote learning. Moreover, the solutions to the observed challenges will not only improve their delivery of dental content, but also stimulate their minds into devising new ways of ensuring that students maximize remote learning during and after the pandemic.

Second, the findings of this mixed-method research will be important to students in the following ways: the findings will equip them with the knowledge they need to prepare for remote learning; the results will also help them identify the challenges that they are likely to face during remote learning and how to overcome them. Given the uncertainty surrounding the end of the coronavirus pandemic, the current study may provide dental students the opportunity to voice out what they think should be incorporated in the new teaching model to enhance their learning experience. Moreover, they will be able to give their opinion on if remote learning should be continued after the pandemic.

Third, this study will be significant to policy makers in the Commission on Higher Education and stakeholders of different dental school levels. Although the pandemic forced a shift to remote learning, M.C.A. Garcia, et al. (2020) reported that schools and the Commission on Higher Education were unprepared both financially and infrastructurally to facilitate the rapid shift. Therefore, the proposed study will act as a reminder that schools need to prepare for any eventualities. Furthermore, the challenges encountered in terms of network coverage, skills and availability of computers to facilitate remote learning serve as the basis for policy makers to prioritize enhanced network coverage for easy learning. Also, policy makers will be able to formulate policies that will encourage the government to set funds for infrastructure developments in schools and also to help dental students acquire laptops and other devices for remote learning.

For future research, the findings of this study will provide the foundation upon which a proposed framework will be developed to hopefully ensure an efficient and effective integration of remote learning in dental education post-pandemic that can be developed.

Scope and Delimitations of the Study

The study included dental students and faculty members from the identified dental schools in the Philippines. The Philippines is divided into three main geographical locations namely: Luzon, Visayas and Mindanao. There were three universities from Luzon (Centro Escolar University, University of the East and National University), two from Visayas (Cebu Doctors University and Southwestern University), and two from Mindanao (Davao Medical School Foundation and Misamis University) were involved in the study. Other dental schools in Luzon such as Unciano University, Emilio Aguinaldo College, Manila Central University, De Ocampo University, West Visayas College, Our Lady of Fatima University, Adventist University of the Philippines were also invited and considered to participate in the study following the inclusion criteria. The University of Baguio which was one of the original respondents from Luzon declined to participate and was replaced by National University.

Faculty members who taught before and also during the pandemic were chosen. The respondent dental students were selected from third- and fourth-year level. The faculty and student respondents were identified from current dental teachers and students who were affected during the COVID-19 - pre and post pandemic period. Schools with approved implementation of face to face were considered, too.

Online platforms were used in the processing and transmission of all documents and communications needed in the study. To facilitate the gathering of data and important information, online platforms were utilized, such as video conferencing, Google or Zoom meet. Survey questionnaires using Google Forms were floated to the respondents, and the submission was via online. Analysis was delimited in examining the challenges and experiences of both dental teachers and students to identify key factors necessary for the development of a framework that will be guided to the efficient and effective integration of remote teaching and learning in dental education in the Philippines.

Definition of Terms

Adjustment. It is the gradual change (transition) from traditional in-class learning to remote learning in order to cope with educational disruptions arising from the Covid-19 pandemic and its associated containment measures (Karalis, 2020). Alternatively, transition and adjustment within the context of the current study refers to the process of switching from face-to-face classes to online learning (Sarvestani et al., 2019).

Dental Education. It is defined in this study as a university-based curriculum about dentistry that includes both formal clinical teaching and clinical experiences in various settings.

Emergency Remote Teaching. It emerged during the COVID-19 pandemic and means the same as remote teaching with the added urgency to transition from face-to-face classrooms to online technology for the delivery of education because of a crisis (Hodges, et al., 2020).

Flexible Learning. It entails customization of learning such that the individual needs of the learners are met (Huang, et al., 2020).

Hybrid Learning. It is a blended form of learning that incorporates both traditional in-class and contemporary online educational methods (Hwang, et al., 2018). According to (Hwang et al., 2018), a hybrid model may involve some students attending classes online while others attending the same classes in person.

Remote Learning. It is when a faculty member opts (whether by necessity or choice) to take face-to-face class suddenly online (Krauthamer, 2020). Typically, in these cases, the faculty member will still conduct synchronous classes via a video conferencing platform, such as Zoom, and the instructor and the students will interact in the virtual classroom, much as they would when they meet in the actual classroom

(Carpenter & Dunn, 2020). Remote learning is a form of flexible learning that involves the use of contemporary internet technology to facilitate teaching and learning without the learner and the instructor having to physically meet and have a face-to-face conversation.

Remote Student Learning Practices. This refers to the use of various technological tools of students that are web-based, web distributed, or web capable for education in their learning (Muhammad, et al., 2016). In this study, remote student practices may include the routine actions before, during and after their lesson sessions.

Remote Teaching. It occurs outside of a physical classroom. Instructors are separated from their learners in time and distance. This type of teaching may be synchronous, where students watch instructors deliver their lectures live, or asynchronous, where students watch lecture recordings at a later point in time (Carpenter & Dunn, 2020).

Remote Teaching Practices. These are used interchangeably to refer to teaching classes on the Internet in using various forms of delivery (Ali, 2020; Hodges et al., 2020). Teaching means the rigorous sharing of experience and knowledge by a teacher, instructor, or professor (Olo et al., 2020). In this study, remote teaching practices may include routine actions before, during and after lesson sessions.

CHAPTER 2

Review of Related Literature

This chapter presents some related literature and studies which are grouped according to the following themes, namely- dental education, remote teaching and learning, transformative learning theory, challenges in online teaching and learning, teachers and students' perspective in online teaching and learning, the new normal in the dental education, and opportunities and future of dental education.

COVID 19 Pandemic Crisis and Dental Education

The COVID-19 pandemic has brought to the surface inequities in many areas of life, especially revealing how the economic situation hits poor people the most (Adle, 2020). To prevent the transmission of the virus, it is required to consistently follow health and hygiene protocols. Authorities have recommended not to gather in large crowds, to follow quarantine measures, to seek prompt medical services when there is an exposure to the virus, and to avoid using public transportation. All these recommendations are sound reminders, but the one glaring problem is that the poor cannot afford to follow all these (Adle, 2020). The impacts of COVID-19 pandemic on dental education are obvious with major disruptions being in practical training and residency due to suspension of learning (Akinkugbe, et al., 2020). They asserted that besides being part of medical education, the technicalities, competitiveness, and rigorousness required by students in dental education differentiate it from other medical fields. Worth noting however is that the shift of in-person dental classes to virtual learning resulted in significant interruptions in student rotation, in-patient care, and license exams for graduating dental students (Akinkugbe, et al.2020).

In the Philippines, as other developing nations, many jobs do not have sick leave making irregular workers such as those paid per output, referred to pakyaw, or takay, are especially vulnerable (Adle, 2020). Not all workers could work at home and mass transit could not be avoided. The most affected in crisis situations are girls and women because many of this type of workforce were still expected to do domestic work and unpaid care, particularly when family members got sick (Adle, 2020).

Many small and micro businesses had to close their doors bearing the brunt of the COVID-19 economic shock (Adle, 2020). Medium size businesses were hard hit also. Essential goods such as basic food items, soap, alcohol, were being hoarded, rising prices, for those without regular incomes or savings, stocking

up on medicine and foods was not an option (Adle, 2020). The agency, A Single Drop for Safe Water, identified that in Manila and Pasig the average person did not have access to enough clean drinking water, and the water which poor families can access with often had to be fetched making social distancing difficult. This problem did have possible solutions, such as local governments using calamity funds to help low-income families buy hygiene items, or tapping private companies willing to subsidize these items (Adle, 2020).

During this time of uncertainty, schools were shut down to prevent the spread of COVID-19. Though the government in the Philippines and elsewhere have lifted the strictest isolation requirements, one area of concern is that students of all ages were falling behind in their education. Policies and recommendations were enacted to deal with the education situation worldwide and different nations have taken different avenues (Peres, et al., 2020).

This study focused on dental education in particular since there were many studies that have documented different aspects of how the COVID-19 pandemic has impacted their education endeavors. For instance, Farooq, et al. (2020) investigated how the pandemic interrupted dental education, and what role tele-dentistry has played in providing care to patients. Varvara, et al. (2021) discussed the challenges the pandemic in Italy has had on students and the need for new teaching strategies for continued professional development of teachers in order to enable them to make the changes necessary to teach mostly online. The impact the pandemic has had in dental education on students in Jordan was investigated by Hattar, et al. (2021), while Spanemberg, et al. (2020) focused on Brazil, Önöral, et al. (2020) Cyprus, Prieto, et al. (2020) Chile, and Zhao documented the educational situation in Canada and China. These authors and many others have contributed to the body of research from different perspectives and from different countries.

Even though scholars such as Ali and Hebebci have investigated student perception of remote learning during the pandemic, there are very few studies investigating the intention and willingness of dental students and teachers' continued usage of remote learning post-pandemic. For instance, in his study, Ali (2020) suggested the need to further determine the effects of remote learning in the delivery of quality dental education and how students perceived its significance and continued use in the new normal. As such, the present quantitative study sought to address the limited studies on the perception of remote learning in the new normal. There are presentations of numerous studies about the research of COVID-19, primarily concentrating on education in addition to how dental education has been affected. This chapter is divided into sections each with the aim of informing the reader of prior research to show what has been researched and what still needs to be investigated.

Transformative Learning Theory

Mezirow's (1991, 2000) transformative learning theory is the theoretical foundation for this study. Jack Mezirow developed the concept of transformative learning in 1978 after being a consultant on adult education in developing countries, plus teaching at Columbia University in New York (Taylor, 1998). He was inspired by people like the Brazilian Paulo Freire, the German Jürgen Habermas, and others. However, he discovered a wide-range kind of learning that helped change women's identity in the United States. He wrote about it in several writings and practiced it in various programs including the Adult Education Guided Independent Study (AEGIS) doctoral program. Mezirow conducted a national study about women returning to community colleges in 1978. The transformative movement grew from there into numerous publications involving five international conferences, 300 paper presentations, over a dozen books,

numerous journal articles, and 250 doctoral dissertations in disciplines, such as health, education, and social welfare (Mezirow, 2018).

The foundation for transformative learning stemmed from Habermas' ideal conditions for human discourse, adult learning and education. To fully and freely participate in this discourse, Mezirow (2018) listed the requirements of learners: (1) have accurate and complete information, (2) be free from coercion, distorting self-deception or immobilizing anxiety, (3) be open to alternative points of view—empathic, caring about how others think and feel, withholding judgment, (4) be able to understand, to weight evidence, and to assess arguments objectively, (5) be able to become aware of the context of ideas and critically reflect on assumptions, including their own, (6) have equal opportunity to participate in the various roles of discourse, and (7) have a test of validity until new perspectives evidence or arguments are encountered and validated through discourse as yielding a better judgment (p. 92). Though there is no one way of defining transformative learning, Mezirow (2018) defined transformative learning as "the process by which we transform problematic frames of reference (mindsets, habits of mind, meaning perspectives)—sets of assumption and expectations—to make them more inclusive, discriminating, open, reflective and emotionally able to change" (p. 97). Transformative learning expands the consciousness by critically examining the underlying premises of symbolic contents of the information that is received (Elias, 1997). Transformative learning happens when one changes their perspective and occurs infrequently, usually resulting from a major life transition or life crisis, yet may also result from accumulation of transformations of meaning schemes over time (Mezirow, 1995). However, less dramatic situations can also promote transformation such as those which teachers create (Torosyan, 2007).

Critically reflecting on one's assumptions and beliefs, then consciously making and implementing plans to manifest new ways to define their world is an important part of transformative learning (Mezirow, 1995). "Transformative learning develops autonomous thinking" (Mezirow, 1997, p. 5). The perspective transformation that leads to transformative learning occurs infrequently and results from a "disorienting dilemma" triggered by a life crisis. Kitchenham (2008) and Imel (1998) listed aspects of perspective transformation, as explained by Mezirow. These involve disorienting dilemma, self-examination, sense of alienation, relating discontent to others, explaining options of new behavior, building confidence in new ways, planning a course of action, knowledge to implement plans, and experimenting with new roles and reintegration. According to Brookfield (2000), transformative learning only occurs if learning involves a basic questioning or reordering of how a person thinks or acts, thereby, challenging hegemonic implications. One must not only reflect, but also critically reflect on assumptions they take for granted.

Transformative education involves the roles of teacher and learner. The role of the teacher is that of establishing an environment of care and trust to facilitate the development of sensitive relationships among learners (Taylor, 1998). As a role model, the teacher demonstrates the willingness to learn by deepening and expanding their perspectives about teaching and the subject matter (Cranton, 1994). The learner also plays a role of also constructing and creating the learning environment where transformative learning can occur (Taylor, 1998).

The study of transformative learning has generated research from an array of research designs and data collection. Qualitative methods used in studies included narrative inquiry, action/teacher research, case study, and autoethnography (Merriam & Kim, 2012). Data collection has taken the form of journal writing, photography, students' writings, and portfolios. There have been content analyses, scales, longitudinal designs, surveys, videos to record interviews (Merriam & Kim, 2012), in addition to art-based techniques, checklists, narratives, and self-evaluations utilized in quantitative studies (Cranton & Hoggan, 2012).

How to assess transformative learning has garnered several instruments to measure the process and outcomes of perspective transformative learning. For quantitative studies, Kember, et al. (2000) developed the Reflection Questionnaire to measure "the extent to which students engage in reflective thinking in professional preparation courses" (Kember et al., 2000, p. 392). It assesses understanding, habitual action, critical reflections, and reflections. However, because transformative learning occurs in so many levels, this questionnaire needs to be combined with an additional instrument. The Learning Activity Survey developed by King (2009) has been utilized in over ten years of studies. There are two major purposes: identifying whether or not adult learners had a perspective transformation in relation to their educational experience; and if so, determining what learning activities have contributed to it (King, 2009, p. 14). The Transformative Learning Survey (Stuckey, et al., 2013) assessed outcomes of college-educated adults' experiences of transformative learning. The goal was to identify commonalities of the variety of processes of transformative learning to help educators determine strategies for fostering transformative learning. The VALUE (Valid Assessment of Learning in Undergraduate Education) is a rubrics and scoring guide to assess students' own authentic work. It is campus-based at the University of Oklahoma and was developed in conjunction with its Liberal Education and America's Promise (LEAP). Romano (2018) suggested further research expanding the use of these instruments to other campuses and populations. Furthermore, future research could focus on looking into different perspectives and traditions of critical reflection in addition to using multiple data collection pathways to capture meaning-structures of reflection outcomes and processes. Are the questions asked during interviews stimulating reflection by embedding them in relevant themes and feelings on the overall meaning perspectives of the transformation process being attended to (Romano, 2018).

Bullen and Roberts (2019) found that Mezirow's precursor steps of transformative learning was useful in evaluating the change in attitudes towards Indigenous Australian people and their culture of health care students. The self-report showed that the more a student reported experiencing the precursor steps, the more likely they reported positive changes supporting transformative learning as a mechanism through which changes in attitudes can occur. A more positive attitude toward Indigenous Australians was related to experiencing a disorienting dilemma, critically reflecting on, and questioning their worldview, exploring new roles, and planning of action which were the steps associated with more positive attitudes toward Indigenous Australians. The most common precursor reported was critically reflecting with the 80% of the students stating it (Bullen & Roberts, 2019).

Zahra (2018) considers the informal learning of undergraduate dental students that take place in dental clinics and the Clinical Humanities course found that transformative learning in humanities promotes professional autonomy by providing them with the necessary skills to develop learning strategies for the entirety of their professional lives (Zahra, 2018). Students are simultaneously developing their professional identity reflected in the language of informal conversations in the atmosphere of the clinic while still learning (Zahra & Dunton, 2017). The model of transformative learning is found to encourage self-examination, as well as promote the construction of new knowledge through problem solving and story-telling, thus making meaning to their learning. Furthermore, transdisciplinary informal learning improves critical thinking skills, advocacy, reflexivity, delivery of person-centered holistic care, and understanding for the socio-cultural determinants of health (Zahra, 2018).

The Dental Education in the New Normal

According to Karalis (2020), what needs to be studied are the extent of the situation, what adjustments need to be made, and the basic dimensions of education and learning of education systems amidst

educational disruptions. This is what is often referred to as the new normal education. For almost two months, countries worldwide shut down educational instruction to stop the spread of COVID-19 affecting over 28 million learners in the Philippines and more than 1.2 billion globally. Many students and teachers began using online learning platforms to continue education, particularly in higher education (Bao, 2020). However, cases of COVID-19 infections and deaths continued to rise in many countries. The new normal was born out of the effort to open schools again in August of 2020 therefore, the Department of Education implemented the Learning Continuity Plan (LCP) in the Philippines. The Commission of Higher Education recommended implementing e-learning, distance learning, and other alternative methods of delivering education to students (CHED, 2020). The goal was to provide quality, inclusive, and accessible education to every student while implementing the new normal during the pandemic.

Developing nations had extraordinary challenges to adjust to the new normal of education. For example, Tria (2020) reviewed the literature regarding how to respond to issues that arose, problems, and trends that were arising and would arise in connection to the COVID-19 pandemic. Governments around the world instituted physical distancing, wearing face masks, and in some cases personal protective equipment to prevent the transmission of the virus (Greenstone & Nigam, 2020; Huang, 2020; Thunstrom, et al., 2020). Students, faculty, and school staff were required to wear face masks, maintain physical distance, frequent handwashing, foot baths, take sanitation measures of schools, and implement contact tracing.

Policies were put into place to provide opportunities for online learning using platforms, such as TV broadcasts, google, resources, guidelines, video lectures, and online channels were introduced (UNESCO, 2020). For higher education, the strengthening of blended learning using such platforms as messenger, zoom, google classroom, Facebook, YouTube, and Edmodo (CHED, 2020). Other delivery methods consisted of home-schooling and numerous options to limit face-to-face learning (CHED, 2020; Department of Education, 2020). However, online learning was difficult in the Philippines because it has the lowest connectivity in Asia (Akamai, 2017). According to Winthrop (2020) challenges would include student security and safety, equity gaps, quality of learning compromised, and assessment results in addition to changes in grading systems, and student performance. Such classes in sciences, physical education, the arts, and culture were delimited to paper and pen tests unless schools required student assessments in these areas to be completed in person (Toquero, 2020). Proms, sports, and other extra-curricular activities were discontinued. Online and blending learning was used for training teachers to implement the new instructional format to transition to the new normal (Toquero, 2020).

Higher education institutions needed to generate knowledge and its applications demonstrating effectiveness, efficiency, and competitiveness by strengthening research in health and pandemic areas (Toquero, 2020). WHO also emphasized accelerating research and development programs focused on containing the spread and caring for those who are affected, in addition to learnings from the COVID 19 pandemic to better prepare for unforeseen future pandemics (WHOa). How each sector in government would plan, evaluate, adapt and implement policies in responding to the crisis is another area of research needed.

New program offerings related to medicine, health, and research should be developed. The demand for nurses, doctors, and medical technology is expected to increase, so higher education institutions should scout students to promote interest in and pandemic's eradication. Furthermore, health literacy can be accomplished by incorporating health into classes in both basic and higher education (Abel & McQueen, 2020). Guidelines to plan and implement these types of actions in the Philippines is the goal of the proposed dissertation, which was also a recommended future research topic by Tria (2020) who stated,

"The challenge herewith is on how to provide and deliver quality education amidst exceptional times, like the COVID-19 pandemic, and on what extent are we going to become prepared when another crisis comes in the future" (p. 3).

After a year from the COVID-19 pandemic started, research studies have been conducted to understand how the pandemic affected and impacted not the dental education system but also the dental students themselves. For instance, Akinkugbe, et al. (2020) studied the effects of pandemic on dental education and students' wellness and stress levels in the United States. With a total of 436 participants, Akinkugbe, et al. (2020) established that despite students scoring high in psychological well-being and assessment tests, there were increased cases of anxiety and stress among dental students. A further analysis of the collected data showed that anxiety and stress were elevated in female students than in male students. Akinkugbe, et al. (2020) concluded that the pandemic has impacted negatively on dental students' mental health. Meanwhile, Deery (2020) studied 67 dental schools in the United States to establish the severity of the virus on dental education.

Barabari, et al. (2020) reviewed the literature about dental education during the COVID-19 crisis and composed the following list for further considerations of the long-term impacts on dental education, clinical practice, and dental research, namely (1) preparedness and contingency planning for modifying clinical practice in dentistry, (2) optimization of cross-infection control protocols, (3) further focus on prevention and oral health promotion for the public, (4) patient empowerment and education, (5) incorporation of modern it-based and online forms of teaching and assessment into dental education, which can also help the environment and reduce pollution, increased role of e-consultancy and tele-medicine.; and (6) further investment in relevant dental research fields. (p. 13)

Haroon, et al. (2020) discussed the adjustments of blended learning and virtual curriculum that could be integrated into dental education in the future. For example, instead of clinical learning to build clinical skills virtual learning reality/augmented reality (VR/AR) – based simulation devices and haptic technology has shown to be helpful. Online platforms have been used previous to the onset of the COVID-19 pandemic in crisis situations in Africa, Afghanistan, and Far-eastern countries (Ghani, 2020). Software like EXamsoft and Canvas have allowed examinations to be conducted remotely. Two other tools shown to be useful for remote assessment are online open book examinations (OBEs) and objective structured clinical examinations (OSCEs) (Emami, 2018; Remtulla, et al., 2020). However, these do not meet requirements for assessment of clinical skills competency needed for awarding the final degree (Haroon, et al., 2020). Varying results have been garnered from surveys of teachers and students as to the usefulness and effectiveness of remote education (Dumford & Miller, 2018; Rajab, 2018). According to Bennardo, et al (2020), some kind of remote education evaluation strategies would most likely be continued in the dental education system after the threat of COVID-19 was over. Yet, Haroon, et al. (2020) stated this would pose a great challenge to developing countries where there are poor Internet connections and frequent power outages, so it may not be a practical answer. Furthermore, many low socio-economic disadvantaged people in developed countries rely on student clinics for the dentistry needs and many have had to provide emergency care by faculty, having a negative impact on this group of patients (Remtulla, 2020).

The cornerstone of dental education is hands-on skill acquisition training (Alzahrani, et al., 2020). This has proven difficult, especially for 3rd and 4th year students to achieve this milestone (Haroon, et al., 2020). During the first two years of education physical typodonts and manikins are utilized. Now with the advancement of technology, alternatives such as VR/AR-based simulation devices and haptics have been

developed, which have shown to be reliable and safe for students to develop manual dexterity and fine-motor skills. Haptics allow students to gain tactile feedback while touching and feeling virtual teeth (Ghai, et al., 2020). Some drawbacks about the use of this technology are they are expensive, they do not cover all aspects of dentistry, and are scarce in developing countries (Haroon, et al., 2020).

According to Ghani (2020), even though there has been an explosion of online information it is still difficult to identify reliable research and guidance and beneficial risk assessment level. Non-contact laboratory-based research resumed as soon as the pandemic was over. Bennardo, et al. (2020) and Emami (2020) recommended critical reviews of existing scientific research and surveys using online data collections are worthwhile activities. However, patient-based research needed to wait until regulatory authorities advised resuming this activity (Haroon, et al., 2020).

Changing the curriculum of dental programs was recommended (Desai, 2020). Crisis management during a health crisis, knowledge about infectious diseases, and natural disasters had to be included in the undergraduate level (Haroon, et al., 2020). Training in proper infection control and management of occupational hazards should be made mandatory (Haroon, et al., 2020). Tele-dentistry and triaging would also be valuable for the future dental workforce (Ghai, 2020; Meng, et al., 2020).

Emergency Remote Teaching and Learning in Dental Education

Literature about remote dental education since the onset of COVID-19 have garnered a plethora of studies (Barabari, et al., 2021; Chavarría-Bolaños, et al., 2020; de León, et al., 2020; Santos, et al., 2021; Sobouti, et al., 2021). The interruption of the face-to-face format for students to learn clinical skills and theoretical sciences stopped abruptly because of the danger of the transmission due to the inevitability of close contact with patients (de León, et al., 2020; Sobouti, et al., 2021). To provide high quality dental education teaching, institutions and different organizations have been forced to implement new teaching modalities globally to ensure safe dental education. In fact, Santos, et al. (2021) designated remote learning that was urgently developed, but because of the pandemic a new educational scheme referred to as Emergency Remote Teaching was designed adding the creation of online activities which may be useful during the return to face-to-face teaching. Meanwhile, Moraes, et al. (2020) investigated the challenges posed by the pandemic on dental education in Brazil. Analyzing a total of 3,122 responses, Moraes, et al. (2020) found that the dentist's workload significantly reduced during the pandemic. The reason for the reduced workload was because many people were afraid of contracting the virus, so they shied away from hospitals and dental clinics. Additionally, the reports that coronavirus was transmitted through saliva and other oral droplets resulted in many people failing to visit dental clinics given the nature of services offered that would spiral patient-dentist infection (Moraes, et al., 2020). With such prevailing facts, dentists and dental schools were forced to adopt and re-evaluate their clinical routines with consequential economic burden to the economically disadvantaged patients, such as the need to have access to technology for remote learning. Furthermore, Alvarez (2020) focused on the Philippines higher education, which instituted Emergency Remote Teaching in the face of COVID-19 pandemic.

Challenges of Online Learning and Teaching in New Normal Education

In developing countries different challenges, such as affordability and accessibility are prominent obstacles to online learning and teaching (Alvarez, 2020; Roberts & Hernandez, 2019). In Nigeria despite widespread use of technology in learning and teaching, the international digital parameter was not incorporated into school curriculum, thus creating problems for teachers and students (Njoku, 2018). As stated by Amadora (2020), "With the drastic changes in education, I can't help but regret taking face-to-face classes for granted. Now, during this difficult time, it seems that our gadgets are all we have

(par.1). Monumental challenges appear, especially during synchronous classes, which are classes conducted in real-time.

Many technical problems were incurred during online classes (Amadora, 2020). Technical issues were quite common in developing countries, like the Philippines, where Internet plans are not created equal. "Can someone tell the professor I/he/she got disconnected?" "Oops! Where did he go? (referring to the professor who doesn't realize he got cut off), "I have unstable Wifi", "Do you guys see/hear me?" (Amadora, 2020, par. 3). This type of technical problem was quite common in cities, but it was even more compounded by students and instructors who live outside major cities in developing countries.

Amadora (2020) points out that audio clarity and outdated devices along with old software cause problems. He further adds that background noises and an unwanted echo from both instructors and students are very distracting during oral presentations. Headphones with a built-in mic can solve a limited amount of these problems, but only for those who can afford them. At a time when jobs are hanging by a thin thread and high unemployment, not everyone can afford to update their systems and platforms to enable video conferencing, a necessity for online learning (Amadora, 2020).

System glitches and short attention spans have also become shared challenges for students and instructors alike (Amadora, 2020). Applications appear to have bad days not unlike students. Opening the devices and logging in seems easy enough, except when there is a system glitch. Some examples are sudden removal from an ongoing class, crashing of the application, incompatibility of applications on certain devices, etc. (Amadora, 2020). Though not technical short attention spans have become an issue for several reasons, not all students have the self-discipline to be focused and attentive during online classes. When working from home, it is easy to give into the comfort of home and doze off. It is easy to get distracted on smartphones, deliveries, and pets are also common. Students' helping each other may be one solution so no one gets left behind (Amadora, 2020). As one student/participant in a study said, "There was this incident that I can no longer manage the files that I downloaded from our online platform, and so I asked my dorm mate, who at that time was having a siesta or nap. Luckily, she lent me her laptop for about two hours" (Alvarez, 2020, p. 148).

Some positives to the implementation of online learning have surfaced (Castillo, 2020). For instance, online learning provides flexibility as students and instructors can access learning resources at any time, at any distance (Daniel, 2016; Orr, et al., 2019; Stone, et al., 2019). For working professionals and those living in remote areas, this is most convenient. Because materials are sometimes provided free for online learners, making learning online cost effective (Hilton, 2016; Jemni & Khribi, 2017; Ozdemir & Hendricks, 2017).

The educational sector was one of the first to suffer the effects of COVID-19 because of social distancing requirements to prevent the collapse of health systems (Spanemberg, et al., 2020). Educational modalities gained relevance (Akinkugbe, et al., 2020). Remote teaching can improve communication skills, time management, critical thinking skills, and knowledge, which can be applied beyond face-to-face classrooms (Wang, et al., 2020). Furthermore, professors developed new modalities promoting student creativity instead of the traditional teacher-centered teaching consisting primarily of lecturing. Learning online encourages self-learning independence and improves their capacity to utilize online resources (Barabari & Moharamzadeh, 2020).

The study conducted by Alvarez in 2020 revealed four themes of five participants' phenomenological lived experiences, namely, lack of technological devices, financial constraints, poor Internet access, and affective or emotional support. Specifically, affective or emotional support, access and affordability, as

well as financial stability contributed to the disruption of learning engagement along with putting additional pressure on students (Alvarez, 2020).

Many challenges surfaced with the transition from classroom to online dental teaching and learning. Redesigning of curricula, adjustments to academic calendars, (Alzahrani, et al., 2020; Dos Santos, 2020), and reorganization of infrastructure and teaching methods have been required (Dos Santos, 2019). To increase safety to prevent exposure to the virus, there were also online conferences, exams, webinars, and digital platforms instituted (Desai, 2020; Akinkugbe, et al., 2020) resulting in stress and distress for students and professors (Versaci, et al., 2020). Dental schools in some countries have recommended updating preventive dentistry classes, adding more continuing education classes, and workshops to improve infection control in teaching clinics (Dos Santos, et al., 2019; Umeizudike, et al., 2020). At the University of Costa Rica, findings revealed dental students had Internet access, however, the stability and quality of connection was different depending on the device used (Chavarría-Bolaños, et al. 2020). The success rate of the students who used cell phones was 64%; desktop computers was 8%; tablets was 39%; and laptops was the highest at 84% (Chavarría, et al., 2020). Dental students practiced procedures using a micromotor while simultaneously videoconferencing with instructors at the University of Sydney, Australia; and if students could not afford a micromotor, the use of wax carving practices was utilized (Sukumar, et al., 2021).

Students and teachers' abrupt transition from face-to-face classes to online education has resulted in many challenges that must be addressed (Rotas & Cahapay, 2020). One of the challenges was how quickly universities and other institutions of learning would shift to virtual learning and training of dental students. However, one of the biggest problems was those disadvantaged students who could not adapt quickly to the advances in technology (Alvarez, 2020), which was even more challenging for developing countries like the Philippines where educational challenges had been persistent prior to COVID-19 (Rotas & Cahapay, 2020). According to Baticulon (2021), the COVID-19 pandemic widened the digital divide of Filipino students. A nationwide survey revealed that 32% and 22% out of 3,670 Filipino medical students did not have reliable Internet and are having difficulties adjusting to online learning. For some the difficulty was the lack of finances to buy learning devices to tune in to online classes and immediately turn in assignments on the new system (Baticulon, 2021).

Research has shown that increased cases of stress were reported not only in the Philippines educational sector (AlAteeq, et al., 2020; Baloran, 2020), but also in other developed and developing countries, including Pakistan (Adnan & Anwar, 2020); Philippines (Arinto, 2016); Ghana (Henaku, 2020); Zimbabwe (Matswetu, et al., 2020); Nepal (Subedi, et al., 2020); India (Dhawan, 2020). In addition, Bozkurt, et al. (2020) conducted a study in 31 countries about the pandemic interruption of education.

Rotas and Cahapay (2020) surveyed 32 Filipino students who were enrolled in a higher education institution after the reopening of schools in August of 2020. The primary criterion for choosing participants was Internet connectivity, regardless of sex, age, economic status, course standing or geographical location. The content analysis of a study by Rotas and Cahapay (2020) revealed the following categories of difficulties in remote learning, namely, (1) unstable internet connectivity, (2) inadequate learning resources, (3) electric power interruptions, (4) vague learning contents, (5) overloaded lesson activities, (6) limited teacher scaffolds, (7) poor peer communication, (8) conflict with home responsibilities, (9) poor learning environment, (10) financial related problems, (11) physical health compromises, and (12) mental health struggles. (p. 15).

Many other studies found similar difficulties with online learning in developing countries (Aboagye, et al., 2020; Amadora, 2020; Bao, 2020; Baticulon, et al., 2020; Castillo, 2020; Entsie, 2020; Henaku, 2020; 2020; Saavedra, 2020; Sarwar, et al., 2020; Subedi, et al., 2020; Verawardina, et al., 2020). Some difficulties stemmed also from the inability of teachers to produce appropriate materials due to unclear directions or lack of experience (Burgess & Sievertsen, 2020; Chen, et al., 2020). Rotas and Cahapay (2020) also found that many students were spending all day attending their online classes, thus, neglecting physical activities.

The challenges of switching from face-to-face classes to online learning were also investigated by Sarvestani, et al. (2019) in Virtual School of Shiraz University of Medical Sciences (SUMS) in Iran. The students reported 13 educational challenges, such as the failure of teachers to accompany students at the early stages of projects and an extensive amount of context in addition to a large number of modules.

There were 10 organizational challenges reported, for example, non-diversification of e-learning courses (Sarvestani, et al., 2019). Nine ethical challenges were reported; among them were the lack of appropriate culture for applying the discipline and negative perceptions toward e-learning. The eight technical challenges included low speed Internet and shortage of physical spaces in e-learning. Five supportive challenges consisted of lack of facilities and lack of permission to use the canteen. There were five evaluation challenges including mandatory in-person exams for e-learning classes and not allocating a reasonable basis of computation of the final grade to these exams (Sarvestani, et al., 2019).

Two examples of the three managerial challenges were inefficiency of educational content and rejection of students by the head of virtual teachers because of lack of time. Lastly, two communication challenges were reported by students, one was lack of interaction with the academic staff and classmates along with the lack of face-to-face communication. Sarvestani, et al. (2019) concluded that each criticism and different viewpoints would help recognize other features of the problem and provide a deeper understanding of the problem.

Public school teachers in the Philippines also faced many challenges of transitioning from face-to-face classes to online classes, as have public school teachers in other countries. Paras et al. (2021) found that most teachers are challenged by the lack of resources, workloads, and the handling of students, all of which contribute to stress and burnout. Burnout is a global concern and education is regarded as a highly stressful profession (Hwang et al., 2019). WHO (2019) recently classified burnout as a "workplace phenomena" and it results from the unsuccessful management of chronic workplace stress, characterized by exhaustion, reduced professional efficacy, and cynicism. The results of Russell's et al. (2020) study showed burnout mediated the association between job demands and work engagement yet there was a stronger relationship to the lack of resources. University of Texas Research Showcase (2020) conducted research, which revealed that out of the entire population, the most affected are educators. The shortage of material support added to the challenges and many teachers also experienced stress that may lead to burnout.

Teachers in many countries have had many challenges in the changeover to online teaching caused by the COVID-19 pandemic. Dziuban, et al. (2018) found that teachers were not trained to teach online which caused frustration and confusion. A study by Pajarianto, et al. (2020) found that teachers in India experienced significant mental stress when abruptly shifted to online teaching due to insufficient preparedness for this new mode of instruction. Similarly, in Stockholm, Sweden, teachers reported not only disparities in access to technology and resources but also feelings of depression arising from the sudden transition to online education (Ramberg, 2019). Schaffhauser (2020) stated teachers felt anxious

and stressed, as well as 81% reported putting in 14 hours a day to complete their professional responsibilities. The University of Pennsylvania (2016) showed that the mental and emotional distractions experienced by teachers often caused procrastination and improper anger management.

On the other hand, teachers in the Philippines have developed different and creative styles of teaching since the transition to online learning, which helped them connect to their students, even though there were limited interactions (Talidong & Toquero, 2020.

Students' and Teachers' Perspective of Online Education

Although technology was described and selected as the most viable alternative for teaching, some scholars have presented findings of displeasure especially from students. For instance, Mansoor (2020) investigated how teachers and students viewed remote teaching during the pandemic. Using quantitative research and a sample of 40 participants, Mansoor (2020) found that 10% of the students expressed greatest displeasure to remote learning and Zoom conferencing used for remote teaching. Correspondingly, 90% of dental students drafted into remote learning programs expressed positive reviews on the educational benefits of remote teaching. Additionally, 50% of the respondents said that despite the inability to access physical classes and laboratories, zoom classes provided a much better alternative for them to continue learning. Despite the differences in the results, most students supported remote learning during the pandemic, maybe for reasons such as the need to protect themselves, their classmates, and family from the virus. Additionally, the 10% who were against remote learning provided room for further research to academically establish their reasons for being against remote learning. Mansoor (2020) suggested the need to permanently include sentiments on remote teaching and learning in the curriculum that were echoed by 80% of the participants that were interviewed.

In extant literature, there are only a few studies investigating the impacts of the pandemic on the adoption of remote learning by dental schools. Most of the studies focused on how the pandemic has impacted traditional education and how schools have turned to remote learning as an alternative. For instance, Sycinska-Dziarnowska and Paradowska-Stankiewicz (2020) conducted a study to examine the challenges faced by dentists and dental clinics and the overall needs of the population for dental care during the pandemic. Overall, the coronavirus pandemic has negatively impacted dental visits (Moraes, et al.,2020). In their findings, Sycińska-Dziarnowska and Paradowska-Stankiewicz (2020) reported that there was a significant drop in the number of dental visits, for the virus is spread through droplets with oral fluids such as saliva. As such, many people for fear of contracting the virus have shied away from visiting dental clinics and hospitals in general (Moraes, et al.,2020). Despite the negative impacts of the virus on dental practice as limited visits to dental clinics, Sycinska-Dziarnowska and Paradowska-Stankiewicz (2020) suggested that it was high time that dental clinics considered telemedicine to limit overcrowding and continue providing dental services to patients remotely. Applying telemedicine in healthcare system will not only solve overcrowding problems but also protect patients from being exposed to the virus, enhance the quality of health, and reduce medical costs and waiting time in dental clinic (Sycińska-Dziarnowska & Paradowska-Stankiewicz, 2020).

Hung, et al. (2020) determined that both stress and fear of infection affected the students and staff at the University of Otago, New Zealand. A total of 90% of dental staff perceived their health at risk while working in clinics during the COVID-19 pandemic along with 93% of students. Stress also rose with 80% of staff and 87% of students (Loch, et al., 2020). However, at the University of Utah in the United States, 72% of dental students reported taking online courses previously making the transition from classroom to

online learning an easy changeover. Even though no students felt uncomfortable, 38% were concerned about the quality of content of remote classes (Hung, et al., 2020).

The essential factors of student motivations and learning attitudes had to be taken into an account for remote teaching to be successful (Chavarría, et al., 2020; Damien, et al., 2020). At the Justus-Liebig University of Giessen's School of Dentistry, Germany, 36.8% of students preferred face-to-face classes and instructors and students had mostly positive attitudes about the implementation of online learning to continue education during COVID-19 (Schlenz, et al., 2020). Videos of real-life clinical demonstrations were widely used as visual resources at the University of Montpellier (Schlenz, et al., 2020). All students preferred videos of clinical topics such as endodontics (Chavarría, et al., 2020). Demonstrations about dental emergencies were found to have a positive response at the University of Texas in Houston, however students practicing on mannequins themselves in face-to-face classes favored it. (Damien, et al., 2020). Dental emergency categories in conjunction with the creation of Local Urgent Dental Care hubs throughout the United Kingdom where patients could go for care for problems were not manageable remotely, such as severe and uncontrolled pain spreading, recurrent or continuing infection, avulsed permanent toot, and severe trauma (Coronavirus » Updates and Guidance for Primary Dental Care; Management of Acute Dental Problems During COVID-19 Pandemic).

Opportunities and Future of Dental Education

There are many solutions proposed to deal with the education crisis from different points of views addressing various aspects of teaching and learning online. UNESCO Director-General Audrey Azoulay stated about the educational crises, which arose from the COVID-19 pandemic, "We are entering uncharted territory and working with countries to find hi-tech, low-tech and no-tech solutions to assure the continuity of learning." A crisis, as defined by Pearson and Clair (1998) who developed it by combining other definitions, is a "low probability, high-impact event that threatens the viability of the organization and is characterized by ambiguity of cause, effect, and means of resolution, as well as by a belief that decisions must be made swiftly" (p. 61). The Learning Continuity Plan (LCP) for reopening schools in the Philippines is one such guide to assist with the preparation of reopening schools by adjusting to the "new normal", yet staying true to the Sulong Edukalidad and Education Futures framework, and making adjustments depending on the local conditions of COVID-19 (Department of Education, 2020).

To complete the years' education, institutions began to share clinical cases, high-quality classes, and problem-based learning tutorials, in addition to promoting online exams. In China, professors used a variety of web platforms and social programs. Professors used Zoom Meeting®, Aula Tencent®, Superstar Learning®, DingTalk®, Rain Classroom®, Pmp Mooc®, and Tencent Meeting® (Damien, et al., 2020). Different forms of online teaching in China were instituted, 74% used live broadcast, 68 % recorded broadcast, 50 % MOOCs, and 45 % used video conferencing (Ferrazzano, et al., 2020). Schools also used virtual patients for students to develop treatment planning, the ability to interview patients, and background checks. (Ferrazzano, et al., 2020). Online discussions utilizing computerized virtual patients were found to be also an effective alternative (Alzahrani, et al., 2020).

Because some dental clinics and dental schools were closed or partially closed during the COVID-19 crises, telemedicine was successfully used on a global basis to evaluate emergency cases by videoconferencing or telephone calls (Alzahrani, et al., 2020; Ghai, et al., 2020; Peres, et al., 2020). Telemedicine is a practical and simple strategy for consultations that students utilize without going to their school or seeing their faculty. Nonetheless, telemedicine is not used widely in different countries for dental consultations (Alzahrani, et al., 2020; Ghai, et al., 2020; Peres, et al., 2020).

Strict safety measures were implemented to ensure the prevention of cross infection at colleges and universities (Hung, et al., 2020; Schlenz, et al., 2020). Therefore, classes were suspended in Europe and several countries in the American continent to protect faculty and students. However, as time went on, dental regulatory authorities recommended instructions with the goal of limiting contact with patients with dental emergencies only (Hung, et al., 2020; Schlenz, et al., 2020). Many clinical procedures involve the use of vibrating and rotating instruments, such as ultrasound, triple syringes, and handpieces, which produce particles in bioaerosols that scatter into the environment, thereby adhering to nearby surfaces (Peng, et al., 2020; Wei, et al., 2016). Controlling bioaerosols dispersion was a main challenge to reduce the risk of infection between patients and students, which became an important strategy (Dos Santos, et al., 2020; Schlenz, et al., 2020). Because the American Dental Association, the CDC, as well as each country or locality providing relevant regulations about these types of issues, it is vitally important for dental institutions, students, and faculty to stay informed (Hung, et al., 2020; Schlenz, et al., 2020). Mexico and Saudi Arabia promoted prevention and public health dentistry classes, thereby preparing students to act faster in situations such as the COVID-19 pandemic (Alzahrani, et al., 2020; Iyer, et al., 2020).

Another possible solution born out of the COVID-19 pandemic was innovated by Vertiv. An Uninterruptible Power Supply (UPS) is essential for the Internet with only twelve hours a day, but with numerous interruptions and not compatible for online learning scenarios (Castillo, 2020). Jason Lim, country manager of Vertiv Philippines explained:

A UPS can protect these critical devices from main supply problems, including spikes, voltage dips, fluctuations, and complete power failures, using a dedicated battery. Having a UPS at home can also help in "bridging the gap" as it seamlessly switches the source to battery mode so devices can continue working until they are safely shut down, or the main power is restored. Therefore, Vertiv introduced a full-range of Liebert UPS, which is highly efficient, future-proof, and eco-friendly (Castillo, 2020).

However, for people who live in developing countries like the Philippines, the pandemic lockdown had devastating effects on the population in which the lower class comprises 58%, and only about 40% are considered middle income (Albert, et al., 2018). Families sent their children money while obtaining their education, but sometimes students themselves had to borrow money to sustain remote learning. Students from disadvantaged backgrounds were left behind, while only the privileged could afford to sustain online learning (Alvarez, 2020). Because of the emotional impact of the pandemic schools had to respond to students by providing emotional and psychological presence to students (Bozkurt & Sharma, 2020; Carver, 2020). Emphasis was on compassion and caring instead of grades in this time of crises (Bozkurt & Sharma, 2020).

Barabari and Moharamzadeh (2020) suggested the following list of possible dental research areas related to the COVID-19 pandemic: (1) dental public health issues in relation to COVID-19, (2) impacts of the novel coronavirus pandemic on dental professionals and the dental sector, (3) cross infection control and PPE in dentistry, (4) role of dental professionals and patients in screening, prevention, diagnosis and management of the novel coronavirus disease, (5) Innovations in remote consultation and alternative IT-based methods in dental education and training; and (6) oral biology research in terms of the interactions of human oral tissues with COVID-19 and the effects of COVID-19 infection or its treatment on oral hard and soft tissues. Application of tissue engineered models of human oral and respiratory mucosa in this field can be a clinically relevant and rapid tool in investigating the disease mechanisms and potential therapeutic approaches. (Barabari & Moharamzadeh, 2020; Moharamzadeh, et al., 2007; Penninger, et al., 2020)

Synthesis

Literature about education since the onset of COVID-19 was reviewed. Since the transformative learning theory as defined and explained by Mezirow (1978, 1991, 1995, 2000, 2018). is the foundation for the present study. Some aspects of perspective transformation were explained by Mezirow who finds it useful in changing the attitudes of learners which resulted from major life transitions or life crisis. Emergency Remote Teaching is a new concept stemming from the rapid transition from face-to-face to online teaching due to the COVID-19 pandemic (Alvarez, 2020; de León, et al., 2020; Sobouti, et al., 2021). There have been many challenges of online learning and teaching, especially for developing countries, such as unreliable Internet and lack of finances to purchase needed technology. (Alvarez, 2020; Amadora, 2020; Njoku, 2018; Roberts & Hernandez, 2019). Research on the perspectives of students and teachers about the transition to online classes provided valuable information that can help stakeholders improve the educational process (AlAteeq, et al., 2020; Alvarez, 2020; Baloran, 2020; Rotas & Cahapay, 2020; Santos, 2020; Sarvestani, et al. (2019). Possible solutions and suggested future research were also presented (Barabari & Moharamzadeh, 2020; Emami, 2020; Karalis, 2020; Moharamzadeh, et al., 2007; Penninger, et al., 2020).

CHAPTER 3

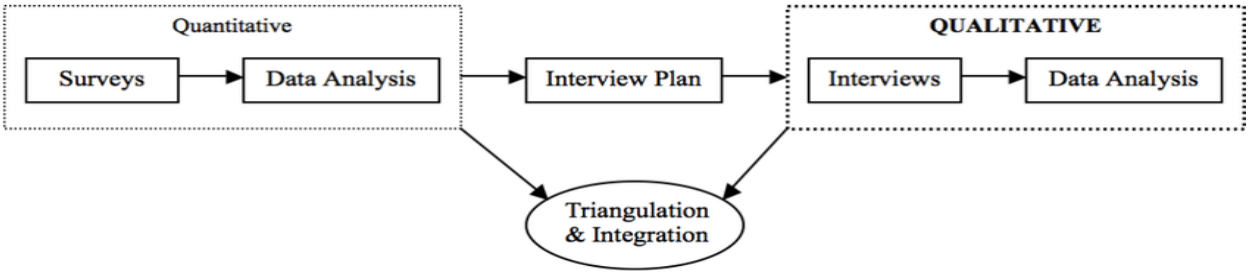
Methods

This chapter delves into the methodological framework guiding this research study, outlining the research design, detailing the sequential explanatory mixed- design methods approach which was adopted, and justifying the choice based on the research questions posed. It describes the participant selection process, including criteria for inclusion, and recruitment strategies to ensure a representative sample. It provides an overview of the data collection techniques employed, such as surveys and interviews, highlighting their relevance to the objectives of the study. Likewise, it discusses the tools and instruments used for data gathering, ensuring reliability and validity. The data analysis procedures are explored, specifying the statistical methods or qualitative coding techniques applied to interpret the findings. Ethical considerations are addressed, underscoring the importance of informed consent and participant confidentiality throughout the research process. By systematically presenting these elements, this chapter aims to equip the reader with a clear understanding of the methods employed, their rationale, and how they contribute to the integrity of the research outcomes.

Research Design

This study intended to determine the factors that established the effectiveness and efficiency of remote teaching and learning integration in dental education. The sequential explanatory design mixed methods (Figure 2) was employed in the study. According to Creswell (2014), mixed methods involved combining quantitative and qualitative methods in a single research study. According to Brierly (2017), research on mixed methods includes collecting and analyzing quantitative and qualitative data and integrating the two sets of results to draw inferences from quantitative and qualitative results.

Figure 2. Sequential Explanatory Mixed Design



Quantitative method was considered and found it to be appropriate for the study. Collection of quantitative data was done first to determine the key factors that affect remote learning and teaching in dental education. In this study, the researcher intended to explore the various factors that determine the effectiveness and efficiency of remote teaching and learning integration in dental education (Cooper & Schindler, 2003). Notably, the quantitative methods were used to examine the extent to which relationships exist among or between variables (Leedy and Ormond,2005). As such, quantitative research mainly involves collection and analysis of numerical data in order to draw inferences from the findings.

Qualitative method typically involves a researcher's inquiry into the concepts, meanings, opinions, symbols, and descriptions of objects or phenomena (Lune & Berg, 2017). In the study, the researcher's overall aim was to develop a theory that can help scholars understand the factors that determine the efficacy and efficiency of remote learning and teaching integration in dental education.

According to Creswell and Clarke (2017), one of the key attributes of qualitative research is that it involves collection and analysis of non-numerical data. Qualitative research is most appropriate when a researcher intends to collect data that are composed of descriptive and factual information about a particular phenomenon. A qualitative inquiry also allows researchers to conduct an in-depth examination of the phenomena of interest in order to extract reliable, meaningful, and factual information. Most importantly, a qualitative inquiry allows theory to emerge from data, which can then be verified using a quantitative study

A sequential explanatory design to collect and analyze quantitative and qualitative data was employed in this study. According to Creswell and Clarke (2011), a sequential explanatory design is characterized by two phases of data collection; a quantitative data collection phase followed by qualitative data collection. A sequential explanatory design is appropriate when the researcher intends to develop insights into the meanings and implications of initial quantitative findings (Onwuegbuxie, et al., 2010).

Apart from the two phases of data collection, a sequential explanatory design was also characterized by two phases of data analysis. In the initial phase, quantitative analysis, mainly exploratory factor analysis, was conducted to determine which of the factors collected during the initial survey significantly explain the latent variable under consideration. (Berman, 2017).

In the second phase, qualitative thematic or content analysis was conducted in order to draw themes from the non-numerical data. In other words, the rationale for this approach was that the quantitative data and their subsequent analysis provided a general understanding of the research problem. Hence, the qualitative data and their analysis refined and explained those statistical results by exploring participants' views in more depth (Creswell, 2003).

Participants of the Study

The target population was composed of dental students and instructors in the Philippines. There were 33 dental schools in the Philippines and there was no statistics on the exact number of dental students who were enrolled and also the number of teachers that teach dental subjects. As such, it was difficult to

estimate how many students were currently enrolled in the Philippine dental education institutions and the corresponding number of teachers.

A letter addressed to the President through the Dean of each selected dental school was submitted to request for the number of dental students who were currently enrolled in the School Year 2022- 2023 and the number of dental instructors who were currently employed in their institution.

Recruitment of participants comprised employed dental faculty members and dental students, that is, third- and fourth-year dental students, who were enrolled in the in-person learning before, during and with the approved implementation of face to face scheme. Notably, recently employed dental instructors and recently enrolled students were included. Faculty members and students from identified dental education institutions encompassing Luzon, Visayas and Mindanao were the respondents in this study. Since this was a mixed-methods study, both quantitative and qualitative sample sizes were appropriately selected.

Quantitative Sampling

To obtain the respondents required for quantitative sampling, probability sampling technique was used, specifically simple random sampling. In quantitative research, simple random sampling is the easiest and cheapest probability sampling commonly used by researchers seeking to quickly and easily select a sample that is an equal representation of a particular population without much hassle. For instance, Frost (2021) defined simple random sampling as a probability sampling technique used by the researcher to randomly choose participants from a population and that all members of the population have an equal chance of being selected and included in the research study.

Examining the statistics of dental students in the Philippines for the last five years, the average is at about 4,000 dentists per year (Statista Research Department, 2022). As of October 31, 2021, the number of dentists in the Philippines was 4,284 with a slight decrease from previous years. The department of research in Statista wrote that as of 2021, the total number of dentists in the whole of Philippines was 188.1 thousand. Therefore, for the 33-dental colleges found in the Philippines, each school average is 130 dental students, whereby the number might be higher in some colleges (The Department of Statista Research, 2022)

Seven dental universities selected for this study were based on specific characteristics which are the quality and number of courses they offer, the length of time the students have been training in a clinical setting, the average number of students enrolling and graduating, that is, if they have a high intake and graduation of dental students.

Noteworthy, 170 dental students were selected randomly from these dental universities. Using simple random sampling techniques, at least 24 students from each chosen dental school and at least 12 faculty or teachers were randomly selected. Important to note is that, for both teachers and students, to be included in the study, the following were set as inclusion criteria, namely, (a) each respondent is either be a dental student or teacher in a dental education institution in Philippines; (b) each respondent must be of legal consenting age of at least 18 years; (c) if the respondent is a student, he/she must be in his/her third or fourth years of study in a dental education institution in Philippines and (d) If the respondent is a teacher, they must have been in the profession for at least three years in the same school regardless of their status or ranking that can offer valuable insights before, during and post pandemic.

Since the researcher intended to collect information about the respondents' experiences in dental education, students who may not have accumulated enough experience to offer valuable insights before, during and post pandemic were excluded.

The respondents must have signed the legal consent form expressing their willingness to take part in the study. Only respondents who indicated their willingness to take part in the study were interviewed. New students and new teachers to the profession who may not have accumulated adequate experience to offer any valuable insights were excluded.

Qualitative Sampling

Following successful collection and analysis of quantitative data, the researcher embarked on the second phase of the study, which involved qualitative data collection and analysis. Prior to collecting the data, a qualitative sample size was selected and chosen; respondents were recruited appropriately. Notably, the purposive sampling technique was used for selecting an appropriate sample size. According to Etikan, et al. (2016), purposive sampling involves the researcher's own discretion, judgment, and a set of clearly-defined inclusion criteria to determine the participants who are eligible for participation in the study. The purposive or judgmental sampling technique is most appropriate when the target population is hard to access (Etikan, et al., 2016). In this study, a complete listing of all the dental schools in the Philippines was done. Since they did not have the exact number of dental students enrolled and number of teachers employed in the dental school, any probabilistic sampling method would be inappropriate for collecting a representative qualitative sample size. Per se, purposive sampling was considered an appropriate technique for the qualitative phase.

Twelve equally proportioned teacher and student respondents were involved as representative in qualitative sample size for the qualitative phase. In existing literature, there was no one-size-fit-all criteria or framework for defining an adequate sample size. However, several scholars have made different recommendations regarding appropriate qualitative sample sizes. For instance, Morse (2005) recommended that a sample size of between 6-10 respondents was adequate for achieving data saturation in qualitative studies. Guest, et al. (2006) conducted a systematic literature review on the sample sizes most appropriate for qualitative studies and found that a sample size of 12 was adequate for attaining data saturation. According to them, a qualitative sample size should be large enough to ensure no new information emerges from a further increase in sample size, but also noted that a qualitative sample size must not be extremely large considering the huge amount of data that is likely to be collected from in-depth interviews and open-ended responses from respondents. The sample size of 12 was considered appropriate for the current study as recruiting 12 dental education teachers and students was feasible from the budgetary and time resource perspectives.

Research Instruments

Two research instruments for collecting data for this study were used. For the collection of quantitative data, a survey questionnaire consisted of structured questions (see Appendix A) was used for the purpose of gathering teachers' and students' experiences and challenges on remote teaching and learning during and post pandemic, and their perception on the continued use of remote teaching and learning beyond the pandemic period. It is divided into two sections. The first section was designed to collect demographic data and data on the participants' experiences with regard to remote teaching and learning. Notably, the first section contained information if the participants had an effective, dependable, stimulating, and attractive experience with remote teaching/learning. The second section collected information on the challenges the participants experienced with remote teaching/learning in terms of facilitating conditions, such as infrastructure (computers & a reliable internet connection), and effort expectancy (the ease of, and skills needed for, engaging in remote teaching/learning). The extent to which the participants agreed with the continued use of remote teaching/learning to in-person teaching and learning was also gathered.

For qualitative data collection, a semi-structured interview guide questionnaire (see appendices B and C) was used to gather the participants' opinions, views, and perceptions of remote teaching and learning during and after the COVID-19 pandemic. It was composed of a series of semi-structured interview questions. Particularly, the questions only acted as a guide for the interviewer since an in-depth interview was conducted.

In the qualitative phase of data collection, selection and recruitment of teacher and student respondents were meticulously done by the researcher, such as suitable venues for different respondents (in case of a one-on-one interview), video conferencing facilities in case of a remote interview, and audio and video-recording equipment was identified and secured to smoothly conduct the interviews.

Prior to the conduct of the interview, the researcher informed the respondents that their responses were to be used for data collection, and requested them to indicate their willingness to participate prior to engaging them in the interviews. Interview protocol was observed in the conduct of the actual interview to ensure that the conversations between the interviewer and the respondents were audio and videotaped properly. An audio and video recording device were used to capture live conversations with the respondents.

Validation of the Research Instruments

Validity and Reliability of the Quantitative Instrument

The survey questionnaire was developed from scratch by the researcher and had not been utilized before in any other study. As such, its credibility for use in the study, the reliability and validity analysis were established, particularly, reliability was the extent to which the instrument was capable of producing similar findings in different time and research contexts (Creswell, 2014). To establish validity in the proposed study, the researcher used internal consistency – the extent to which items of each section were interrelated. Second, validity refers to the extent to which a given instrument measures what it purports to measure. In the proposed study, validity was established by face validity. Face validity entailed looking at the questionnaire and deciding on whether it actually measured what was intended to be measured. The researcher used a panel of experts to rate the instrument if it measures what was intended to measure.

Threats to Validity in Qualitative Research

In this study, there were two main threats to validity during the qualitative phase; respondent bias and researcher bias. Respondent bias refers to the situation in which participants fail to provide honest and genuine responses (FitzPatrick, 2019). Conversely, researcher bias refers to a situation in which the researcher's knowledge and assumptions influence the study outcomes (Ronkainen & Wiltshire, 2021). For instance, a researcher may decide to influence participants into answering research questions in a certain way.

To address respondent bias, three main strategies were used; triangulation, member-checking, and prolonged involvement. Triangulation involves the use of multiple research methods or sources of data in order to increase the credibility of findings (Fusch, et al., 2018). In the proposed study, the researcher used methodological triangulation where both quantitative and qualitative research methods were used. It was anticipated that the findings from both qualitative and quantitative phases were comparable; hence, the threat of respondent bias was minimized. Apart from triangulation, member-checking was used to ensure participants provided responses that were genuine. In qualitative research member-checking refers to the process of allowing participants to review their responses for accuracy and resonance with their expectations and experiences (Ronkainen & Wiltshire, 2021). Lastly, prolonged involvement was used to ensure participants had enough time to articulate their points during data collection. Prolonged

involvement allowed the researcher to assess whether participants consistently made the same responses (Ronkainen & Wiltshire, 2021).

To address researcher bias, the researcher used peer debriefing and audit trailing. First, peer debriefing involved other researchers and was requested to review and evaluate the transcripts, themes, and findings of the study. The independent researchers then provided their opinions on whether the themes obtained and conclusions made from the study were biased. The researcher also kept an audit trail of all the details of raw data collected, the codes that were extracted from the data, and how the codes were combined to generate themes.

Data Saturation

In qualitative research, data saturation is a point in qualitative data collection where no new information emerges regardless of the number of new participants interviewed. To ensure data saturation, the researcher ensured data saturation by interviewing multiple participants using the same research questions. According to Guest, et al. (2006), saturation in qualitative research may be attained with a sample of at least 12 participants. Consequently, the researcher began with a sample of 24 participants (12 students and 12 instructors). The researcher interviewed each student and each instructor individually. After every interview, the researcher generated codes and themes in accordance with Clarke and Braun's (2014) approach to qualitative data analysis. By the time the 12th participant was interviewed, no new themes emerged, indicating that saturation have been achieved.

Data Gathering Procedure

Phase 1: Quantitative Data Collection and Procedure

Quantitative data were collected using a user-designed data collection scale that was based on the variables that served as predictors on the challenges and difficulties of dental teachers and students in the remote teaching learning experiences during the COVID-19 pandemic. Prior to collecting the data, approval from the Institutional Ethics Review Board (IERB) was sought first. Since the qualitative phase was yet to be completed, a declaration of the specific scales that was used could not be made at this point. Nevertheless, the scale was also developed based on existing theories and empirical findings associated with the key themes identified. It was also expected that the themes obtained would be of teachers and of students, so different scales for teachers and students were developed.

Respondents were recruited via the Qualtrics platform. Qualtrics is an online platform that allows researchers to recruit participants and perform data collection without having to physically meet the respondents. As such, the researcher designed the research scale on the Qualtrics platform, generated an access link, and shared it with potential participants on targeted social media platforms such as Facebook and Twitter. Just like in the qualitative phase, a screening questionnaire was included to filter out participants who do not meet the inclusion criteria such as students in other departments.

Phase 2: Qualitative Data Collection and Procedure

During the data collection process, the researcher began by requesting the respondents to have an online interview via Zoom. Agreement between the researcher and the respondents on the preferred dates of the interview was conducted. To ensure the data was collected in a timely manner, the conduct of the interview took place over a period of two to three weeks. Particularly, the researcher intended to interview at least two respondents per day for the entire one-week period.

To ensure privacy and confidentiality maintained, only one respondent was interviewed per session. According to Bardyn, et al. (2012), group interviews such as focus-groups may not be appropriate for

exhaustively collecting qualitative data as some respondents may feel intimidated, thus, they are unable to express their perceptions and opinions freely.

During every interview session, the researcher began by warmly welcoming the respondents and then explaining to them the purpose of the study and their expected role as well. The researcher also explained to them that they were free and could exit the study at any stage.

Additionally, the researcher explained to the respondent that the conversation was audio/videotaped for later use but would not be shared with anyone else. After setting the scene and making the respondent comfortable, the researcher then embarked on the interview, which took approximately 45 minutes. Respondent coding was done based on the order in which they appeared for the interview to facilitate the identification of the respondents. For instance, the first respondent was saved S1and T1, the second S2 and T2, the third S3 and T3, and so on.

The audio/videotaped files for each interview session was transferred from the recording device to a computer where they were saved in a password-protected folder. Particularly, each audio/video file was saved alongside the code that was assigned to the respondent. For instance, for respondent an audio/videotaped conversation with respondent S1/T1 was saved as Audio- S1/T1, while an audiotaped conversation with respondent 7 was saved Audio-S7/T7 and so on.

Generally, respondents could exit the study at any point in time regardless of how crucial their role was. However, for those respondents who persisted to stay until the end of the data collection period, the researcher officially communicated to them via email or phone about the end of the data collection period. However, a debriefing session was conducted only after all follow-up interviews were conducted.

Member-checking was employed as a way of enhancing the credibility of the findings. Consequently, the end of the initial data collection phase did not necessarily signal the end of the study. Notably, the audio/videotaped files could not be reliably used for qualitative analysis in their raw form. Instead, they were converted to transcripts for easy processing.

Transcription was conducted after the session but the transcripts were sent back to the respondents for member checking. It was only after member-checking was done that a debriefing session was held to dismiss the respondents and thank them for their time and commitment.

Ethical Considerations

Issues of Trustworthiness

There were four key issues of trustworthiness that were addressed in the study; credibility, dependability, transferability, and conformability (Hadi & Closs, 2016). Credibility was the extent to which results from a qualitative inquiry were believable from the respondents' perspective. Since the main purpose of qualitative research was to describe the feelings and opinions of these respondents regardless of their external truthfulness or falsity, they were the only ones who could determine whether or not the findings were credible. To attain credibility, the researcher used two strategies; member-checking and triangulation. Member-checking was involved by giving back transcribed audio files to respective respondents to check whether the transcribed information matched the ideas and opinions they intended to communicate during the interview. Furthermore, methodological triangulation had been used, whereby a second quantitative inquiry was performed to validate the findings of the qualitative study.

Second, dependability refers to the extent to which the findings of a qualitative study can be replicated in the same context or using the same respondents or target population (Hadi & Closs, 2016). To ensure dependability of the qualitative findings, the researcher used an audit trail where all procedures used in the current study, and any changes made, were described. Particularly, the audit trail allowed the

researcher to follow the procedures and conduct a thorough analysis. Additionally, triangulation allowed the researcher to achieve dependability since the findings of the follow-up qualitative study was compared to the findings of the initial quantitative inquiry. Third, as Harrison, et al., (2001) posits transferability is the extent to which the findings of a qualitative research may be generalizable to other contexts Notably, generalizing a research to another context was the responsibility of the person doing the generalization. In order to ensure future scholars to have a clear grip of this research, a clear description of the research context and any assumptions made should be conducted. Lastly, conformability is the extent to which a researcher is biased in their qualitative inquiry (Harrison, et al., 2001). To reduce the degree of biasness, the researcher documented all assumptions and procedures when collecting and analyzing data.

In the study, there were several ethical considerations that needed to be addressed. First, the researcher's approval from the IRB prior to embarking on any data collection exercised. Second, during data collection, the researcher adhered to key ethical considerations, applicable to this study, that were cited in the Belmont Report. Particularly, the Belmont Report describes three key ethical considerations for academic researchers; respect for persons, justice, and beneficence (Adashi, et al., 2018). In this study, only beneficence and respect for persons were applicable. Beneficence is the principle of ensuring minimal harm caused to respondents, or, conversely, maximum benefit is accorded to respondents (Adashi, et al., 2018). In this study, the potential harm that could befell respondents was the breach of confidentiality and privacy. To ensure respondents' details and responses remain confidential, the researcher used the coding scheme described under section Criteria in the Selection/Recruitment of Respondents. The coding scheme was intended to protect the identities of the respondents as anyone would easily recognize them if they gained access to their audio files. Additionally, the researcher stored respondents' audiotaped responses on a password-protected computer to prevent any illegal access especially by third parties. Lastly, any hard copies bearing respondents' details were stored in a safe and locked for three to five years after which they will be destroyed by shredding or burning.

Second, respect for persons refers to the need for researchers to allow respondents informed consent (Adashi, et al., 2018). The researcher adhered to this ethical principle by allowing respondents to sign an informed consent letter indicating their willingness to participate in the study. The researcher did not use any coercion or incentives to dupe the respondents into signing the informed consent letter. Instead, respondents were informed of what the data collection process involves and their role, especially on key sensitive issues such as audio-recording of conversations.

Data Analysis

Quantitative Data Analysis

Quantitative analysis was conducted using SPSS AMOS software for structure equation modelling. Typically, an exploratory factor analysis was conducted whereby independent variables were the factors extracted from the initial survey data, while the dependent variables were the latent variable of effectiveness of remote learning and teaching integration in dental education. The purpose of the exploratory factor analysis was to identify the factors that significantly determined the effectiveness of remote learning and teaching integration in dental education. The factors that load strongly and significantly on the latent variable, and the latent variable itself, thus formed a framework for explaining factors that determined the efficiency and effectiveness of remote teaching and learning integration in dental education.

Qualitative Data Analysis

Qualitative data analysis was performed using NVivo software for qualitative analysis. Prior to embarking

on qualitative analysis, transcription of the audio files was performed first and then sending them back to the respondents for member-checking. Data analysis processes were done after member-checking. The six-step process by Clarke and Braun (2014) was used as a qualitative analysis framework. According to Clarke and Braun (2014), qualitative data analysis is conducted in six phases; familiarization, coding, generating themes, reviewing themes, naming themes, and final write-up. During familiarization, the researcher read through the transcripts in order to have a general understanding of the respondent's opinions and feelings regarding the phenomenon under investigation. Reading through the transcripts allowed the researcher to own the qualitative data. In the second stage, the coding was performed which would typically entail identifying lines of codes that were relevant to the study context and portray a particular meaning. Reading through the entirety of the transcripts while identifying lines of codes that were appropriate in the study's context was done.

During theme generation, the lines of codes were grouped that are not only related to each other but also jointly represent a particular generic concept. In the fourth stage, themes were reviewed in terms of their relevance to the study questions and general research context. Themes that were irrelevant were either eliminated or their codes were reviewed and added to more relevant themes. In the fifth stage, after cleaning

out irrelevant themes, the researcher then assigned names to the remaining relevant ones for reporting purposes. Finally, the final write-up was conducted, which included a review of what was proposed and what was actually done, and the qualitative data analysis findings.

CHAPTER 4

Results and Discussion

This chapter presents the analysis and interpretation of the quantitative data and the qualitative data. Discussion of the results deals with teachers' teaching practices and experiences, challenges that they and their students encountered, such as their adjustment during the COVID-19 and post-global dental education. Included also in the discussion are the thoughts of teachers and students on how to effectively deliver remote teaching and enhance remote learning in dental education. Results of the discussion will be used as a basis to identify the key factors in developing the proposed framework that will serve as guide in the efficient and effective implementation of teaching and learning in dental education.

A. The Quantitative Data and Findings

1. Teaching practices and experiences that teachers have during the COVID-19 and post-global pandemic in dental education with regard to technology usage, assessment strategy, methods of delivering instructions, and preparation of teaching materials.

Teaching practices refers to the methods, strategies, and tools educators used to deliver content and facilitate learning and includes instructional design, technology usage, assessment methods and classroom management techniques whereas, teaching experiences encompass the personal and professional experiences of educators as they navigate teaching and includes their challenges, successes, emotional responses, and overall reflections on the teaching process. Discussion of the results of the data gathered and their interpretations during the Covid-19 is presented as follows:

1.1 Teaching Practices and Experiences That Teachers Have During the COVID- 19 in Dental Education with regard to:

1.1.1 Technology Usage

Table 1
Teacher Respondents Who Are Engaged in Remote Teaching *N=35*

Yes/No Response	f	%
Yes	32	91.4
No	3	8.6
Total	35	100.0

Table 1 depicts that most teachers stated that during COVID-19 pandemic, they were engaged in remote learning, 32 (91.4%). There are three (8.6%) who do not partake in remote learning. The findings show a significant shift in educational practices during the pandemic, with a vast majority of teachers adapting to remote learning. The shift reflects the resilience and adaptability of educators in ensuring continuity of education under unprecedented circumstances. However, 8.6% of non-participating teachers indicate that barriers, such as technological access and personal preferences still exist and need to be addressed to ensure inclusivity and preparedness for future disruptions.

In the previous study of Saha, et al. (2021) about half of the teachers conducted online classes without any training on online teaching; teachers mostly preferred online teaching during the pandemic to avoid the spread of the virus, and no one preferred physical teaching. However, there were several reasons why some dental teachers struggled to engage in remote teaching activity due to lack of technology skills, pedagogical adjustments, student engagement, motivation, feedback and assessment and institutional support. Understanding and addressing these challenges through adequate training, resources and support can help dental instructors adapt and succeed in remote teaching environments. For effective use of technologies, all faculty members must be trained on using the online platforms for teaching (Saha, et al.,2020). Fundamentally, stable internet connections should be certain for both teachers and students for efficient and seamless remote learning, alternatively, remote teaching will fail to provide quality education under any circumstances.

Table 2
Students' Respondents Who Are Engaged In Remote Learning N=294

Yes/No Response	f	%
Yes	289	98.3
No	5	1.70
Total	294	100.0

Table 2 suggests that the majority of the students 289 (98.3%) participated in remote learning, while only five (5) a small percentage, (1.7%) did not. The result indicates a generally successful implementation of remote learning, but also suggests a need for ongoing support and interventions to address the needs of the small percentage of students who did not participate. It underscores the importance of understanding the barriers faced by the students and highlights the potential for remote learning as viable educational tool moving forward. According to (Hollister, et.al., 2020), majority of the students felt more comfortable asking and answering questions in online classes, suggesting that there may be features of learning online to which students are receptive, and which may also benefit in-person classes. However, in line with the study of Hollister, et al, (2022) which stated that students seemed to struggle with engagement before the pandemic during the in-person lectures, and it appeared from their survey findings that students struggled

even more with engagement in remote courses. Thus, there are several reasons why some dental students may not engage in remote learning such as the lack of access to technology, learning style, technical difficulties, quality of instruction, physical needs, and motivation and self-discipline. Moreover, findings from Deery's study (2020) suggested that one of the core challenges of implementing remote teaching and learning was the lack of technical skills required to operate requisite technology facilities.

Understanding and addressing these barriers are crucial for making remote learning more inclusive and effective. While the research of Hollister, et. al. acknowledges the difficulties associated with online learning, it also demonstrates that with appropriate tools, online education can captivate students. Student feedback revealed consistent perceptions before and after transitioning to online learning, noting that course assignments facilitated learning and were intellectually stimulating (Hollister, et. al., 2020).

Table 3

Was Remote Learning a Normal Part of Your School Approach to Teaching or Was the Approach Only Adopted During the Pandemic?

Teachers Choice	f	%
Used only during the pandemic.	18	51.4
Does not apply	10	28.6
Used even before the pandemic.	7	20.0
Total	35	100.0

Table 3 reveals that most teachers used remote learning only during the pandemic, 18 (51.5%). There are several explanations to justify the results. For one, prior to the pandemic, remote learning was more common in higher education and specialized courses rather than in K-12 education. Some schools and districts might have had online programs approaches, but it was not as universally adopted or as deeply integrated into the standard curriculum as it became during the pandemic. Online learning carries a stigma of being lower quality than face to face learning (Hodges, et al, 2020). Another is the rapid shift to online learning and teaching by numerous institutions simultaneously may reinforce the perception that online education is a subpar alternative, when in reality, the urgency of this transition under current circumstances does not allow the thoughtful design needed to fully leverage the benefits of the online format. In contrast to experiences that are planned from the beginning and designed to be online, remote teaching is a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances (Hodges, et al, 2020). Furthermore, it entails utilizing entirely remote teaching methods for instruction that would normally be conducted in person or as blended courses, with the intention to revert to original format once the crisis is over (Hodges, et al, 2020).

Table 4

As the COVID-19 winds down, have you returned to in person classes?

Yes/No Response	f	%
Yes	33	94.29
No	2	5.71
Total	35	100.0

Many dental faculty members have returned to in-person classes as public health conditions have improved, and schools have reopened for in-person instruction. Therefore, most dental teachers stated that they have since returned to in-person classes, 33 (94.3%) as seen in Table 4. The reason for this is the return to in-person teaching is driven by several key factors aside from safety protocols, like for instance, student engagement and participation, collaboration and teamwork, effectiveness of in-person instruction and improved public health conditions. More importantly, teachers should continue to navigate challenges brought by the ongoing COVID-19 pandemic, balancing in-person instruction while ensuring their safety, health and achievements of their students as well.

Based on the findings of Kelly's study (2021), one implication that was revealed was the need for teachers to feel safe upon their return to the classroom. It made clear the need for support from school administration, their deans, and colleagues, for a well-supported teacher would feel comfortable and teach in what they considered ideal classroom conditions for their wellbeing (Kelly, 2021). Teachers were certain their deans and district administration, as well as their colleagues, all worked together to provide the best possible learning environment for their students and work environment for themselves.

Table 5
What Devices Do You Use to Complete Remote Teaching Tasks?

Devices	f	%
Laptop	26	74.3
Tablet	5	14.3
Desktop Computer	4	11.4
Total	35	100.0

Regarding the device teachers used to complete teaching tasks, Table 5 reveals that the majority use laptops, 26 (74.3%). According to the study of (Kattan, 2020), the use of laptops in education, especially for more complex or significant tasks, has become increasingly prominent because of accessibility to information, enhanced productivity, collaboration tools, and interactive learning. For these reasons, laptops are indispensable tools in modern education, particularly for more demanding and significant tasks. They provide teachers and students with the capabilities and resources needed to excel in a variety of subjects and learning activities. It concluded that technology has made teachers become more creative in their lesson planning because of the number of resources that are available for them to use in planning and implementing the lesson. Another important aspect of this study that supported past studies involved the training of teachers on the use of technology in the classroom; educators who participated in the interview all agreed that it was very important for continual training on the use of technology in the classroom.

The results imply that the impact of computers on the world of education is no different than the effect technology has had on society (Kattan, 2020). Since the development of the desktop computer, students across the country have been exposed to on how to use these time-saving tools. One-to-one computer initiatives have been around for almost a decade (Kattan, 2020). School districts have invested money into computers and tablets, not to mention the interactive boards and laptop computers most teachers have in the classroom. In his study, he looked at a varied groups of schools (socioeconomic, middle school grade structure, etc.) to investigate if the use of technology has changed the pedagogy and instructional

environment of teachers and if it has led to more innovative and customized lesson planning and assessment (Kattan, 2020).

Table 6
Is the Device You Used for Remote Classes Provided by the School or Your Personal Devices?

Devices	f	%
Personal device	35	100.0
Provided by the school	0	0
Total	35	100.0

As shown in Table 6, all of the 35 (100%) teacher respondents use their own personal device in imparting their knowledge. The possible reason is that teachers prefer their own devices because of familiarity. The results imply that teachers are more comfortable and efficient with their own personal devices and tools to enhance their teaching experience.

Furthermore, emergency remote teaching (ERT) confronts teachers with several consequences which may be challenging, such as managing work from home, handling different digital tools for online learning, and keeping in touch with students digitally (Klusmann, et al., 2022). As faculty transit and adapt to the new normal in the higher education landscape, they must be afforded with continued support, training and development and be provided with ways to more fully understand and expand the opportunities that online education presents (Moralista, et al 2020). While the ideal situation is for the schools to provide devices to teachers specifically to be equipped for remote teaching to ensure uniformity, technical support and security; however, schools often face financial limitations that prevent them from supplying every teacher with high-quality, specialized devices for remote teaching.

Table 7
What type of internet connection do you use during flexible learning activities?

Devices	f	%
Wifi	18	51.4
Fiber internet	10	28.6
Mobile data	4	11.4
Cable internet	3	8.6
Total	35	100.0

During the flexible learning activities, the wifi internet connection obtains 51.4%, and followed by Fiber internet, 28.6%; mobile data, 11.4%; and cable internet, 8.6%, as seen in Table 7. The results suggest that the internet is a powerful resource for reaching millions of people of different geographical regions and serves as an engine to continue education (Alzahrani, et al, 2020). They concluded that dental educators now have the capabilities and technologies to modernize their approaches of teaching by adopting new digital concepts to amplify communication online. Due to the restriction policy implemented to control the spread of the virus, individuals turned to the resources of the Internet for socialization in place of common social activities. The use of online technological tools shows that a new stage of the

"technological age" has entered (Korkmaz, et al. 2022). They support the idea that increasing access to the internet and technology help eliminate education inequality.

Hence, wifi internet connection is widely used during flexible learning activities because of accessibility, convenience, infrastructures, speed and performances, but it is also important to note that it comes with challenges, such as security concerns and variations in signal strength. Moreover, the internet connectivity provides a strong technical support to ensure reliable connections for all the participants in flexible learning.

Table 8
Is Your Internet Connection Provided by the School?

Teachers Choice	f	%
No	25	71.4
Yes	7	20
Partially subsidized by the school	3	8.6
Total	35	100.0

As gleaned in Table 8, about 25 (71.4%) of the teachers responded that the school primarily did not provide the interconnection, seven (20.0%) stated that the school provided it, and only three (8.6%) said it was partially subsidized by the school. It is noteworthy that most teachers mentioned that the school did not provide internet connections due to funding restrictions and resource limitations that impact the decision-making and the allocated funds. Will (2020) mentioned that overnight, high-speed, reliable home internet access suddenly became essential to the work of teaching—and most teachers are paying for it out of their own pockets.

However, many educational institutions have recognized the essential nature of reliable internet for effective teaching and learning in which some institutions have taken a step to provide internet stipends or other forms of internet access support to ensure that teachers can conduct classes effectively.

1.1.2 Assessment Strategy

Table 9
How Would You Rate the Level of Effectiveness of These Specific Types of Assessments for Assessing Students Remotely?

Type of Assessments	Level of Effectiveness	f	(%)
Oral Reports	Somewhat effective	16	45.7
	Neither effective nor ineffective	8	22.9
	Somewhat ineffective	8	22.9
	Very effective	2	5.7
	Very ineffective	1	2.9
Group Presentation	Somewhat effective	17	48.6
	Somewhat ineffective	9	25.7
	Neither effective nor ineffective	8	22.9
	Very ineffective	1	2.9

Research Reports	Somewhat effective	18	51.4
	Neither effective nor ineffective	8	22.9
	Somewhat ineffective	7	20
	Very effective	1	2.9
	Very ineffective	1	2.9
Video Presentation	Somewhat effective	15	42.9
	Neither effective nor ineffective	11	31.4
	Somewhat ineffective	4	11.4
	Very effective	3	8.6
	Very ineffective	2	5.7

Table 9 shows that most teachers responded that the level of effectiveness of these specific types of assessments for assessing students remotely (oral reports, group presentations, research reports, and video presentations is somewhat effective. While remote assessments like oral reports, group presentations, research reports, and video presentations have their merits, they also face significant challenges in remote settings. Technical issues, disparities in resources, and reduced engagement can hinder their effectiveness. However, there are also opportunities for improvement, such as levering technology to enhance feedback and accessibility. The effectiveness of these assessment types in remote settings can be somewhat limited, but with careful planning and support, they can still be valuable tools for assessing student learning. Anderson, et al. (2020) argue that remote assessments can increase accessibility for some students, allowing them to engage in assessments in a more flexible and personalized environment.

However, each of these assessment formats has distinct advantages that support various educational goals while adapting well to the remote learning environment. These assessment methods not only work well in a traditional classroom but also adapt seamlessly to remote learning environments, ensuring that essential competencies are evaluated effectively. Using video technology in teaching and learning can help bring closer relationships between students and lecturers (Rahiem, 2021). According to scholarly research, the use of video can demonstrate motor skills and creativity (Al Natour & Woo, 2020; Azevedo, et al. 2022). Videos can be used to teach principles and rules and provide immediate feedback (Hidayana, 2023).

Several benefits may be acquired in remote assessment, such as allowing students to demonstrate their mastery in various ways, placing students as the center of the learning process, and giving them more control over how they demonstrate their knowledge and skills. With these formats, students are able to express their original thought, individual output and creativity. The joy of learning using technology also will stimulate students to learn better (Hidayana, 2023). Students can also gain various knowledge and experience through educational technology (Niki Maleki & Rahimi, 2022).

1.1.3 Method of Delivering Instructions

Table 10

To What Extent Do You Agree That Remote Teaching/Learning Is an Effective Modality?

Extend of Effectiveness		f	%
	Somewhat effective	15	42.9

	Somewhat ineffective	8	22.9
	Strongly disagree	4	11.4
	Neither agree nor disagree	3	8.6
	Agree	2	5.7
	Disagree	2	5.7
	Strongly agree	1	2.9

Information on remote teaching as an effective modality is provided in Table 10. It shows that most teachers (15 or 42.9%). consider remote teaching/learning as a somewhat effective modality. This is followed somewhat ineffective by eight or 22.9%; and three (8.6%) neither agree nor disagree. There are studies that explain these results. In the study of Karakose (2021), it mentioned that due to the abundance of information and resources on the internet, students become lost in the clutter of information, resulting in low learning efficiency. There are also technical issues with online remote learning, such as unstable Internet connections that affect the quality of online learning. However, the web-based remote translation teaching mode is an efficient, convenient, and flexible teaching mode, which can provide higher quality resources and learning opportunities for college education, (Li, 2023). Students are more satisfied with the web-based teaching mode than traditional face-to-face teaching mode, and it is more suitable for the fast-paced lifestyle of current college students (Li, 2023).

Flexibility is what makes remote teaching and learning effective. Technology, social interaction, teacher preparedness, engagement and assessment are some of the challenges that remote teaching and learning need to be considered to make it more effective. With the continuous development of information technology, Internet-based remote education mode has become an important teaching form. In this teaching mode, students can learn anytime and anywhere through the internet, reducing time and space constraints, while also improving learning efficiency and satisfaction (Li, 2023). Therefore, remote teaching and learning indeed has a mixed impact due to a variety of factors that make it more effective.

1.1.4 Preparation of Materials

Table 11

How Would You Rate the Level of Difficulty with Google Classroom, Canva, Canvas, and Zoom Remotely? N=35

Platform.	Level of Difficulty	f	%
Google Classroom	Easy	14	40.00
	Neither easy nor difficult	10	28.60
	Extremely Easy	6	17.10
	No response	4	11.40
	Somewhat difficult	1	2.90
Canva	Neither easy nor difficult	13	37.10
	No response	10	28.60
	Easy	7	20.00
	Extremely Easy	3	8.60
	Somewhat difficult	2	5.70

Canvas	No response	13	37.10
	Easy	12	34.30
	Neither easy nor difficult	7	20.00
	Extremely Easy	2	5.70
	Somewhat difficult	1	2.90
Zoom	Easy	15	42.90
	Extremely Easy	9	25.70
	Neither easy nor difficult	8	22.90
	No response	2	5.70
	Somewhat difficult	1	2.90

Table 11 shows that most teachers find the use of Zoom (42.9 %), Google Classroom (40.0 %), and Canvas (34.30 %) easy to utilize. However, they find the use of Canva as neither easy nor difficult. This is because teachers choose what they prefer depending on individual preferences, experiences and specific support available in different educational environments. The Google Classroom, Canvas, and Zoom are user-friendly because teachers can quickly grasp how to create assignments with students in virtual classes. These platforms are designed with education in mind to offer intuitive navigation and straightforward functionalities. On the other hand, teachers rarely use Canva because they have fewer training resources, thus, leading to a more self-directed learning process. Hence, as technology progresses, teachers should explore ways to utilize it to adapt their classroom management to contemporary changes.

The use of Google Classroom as an educational platform is not yet widely used in the Philippines setting during the conduct of this study (Santos, J.M, 2021). This research is a valid proof of the possibilities of making online classroom management work for both the teachers and the students (Santos, J.M, 2021). It is noteworthy that despite encountering difficulties, Google Classroom proves to be an effective educational tool, offering students substantial convenience. Its accessibility allows for learning flexibility, enabling students to engage in their studies from any location and at any time. This platform streamlines the learning process, saving time and energy, particularly, beneficial during remote learning situations. However, the primary obstacle encountered is the unreliable internet connection (Tamala, et.al., 2024).

1.2 Teaching Practices and Experiences That Teachers Have During Post-Global Pandemic in Dental Education with regards to

1.2.1 Technology Usage

Table 12
What Devices Do You Use to Complete In-Person Teaching Tasks?

Devices	f	%
Laptop	30	85.7
Tablet	4	11.4
Desktop Computer	1	2.90
Total	35	100.0

Technology presents two roles to observe: as a tool and as the teacher (Martin, 2022). Regarding in-person teaching tasks, most teachers state that they use laptops, 30 (85.7%). These devices are their own personal

devices as seen in Table 12. The reliance on laptops post pandemic reflects a shift towards a more integrated approach
to teaching that embraces the benefit of digital technology. The adaptability, portability, and multi-functionality of the laptops enable the educators to navigate the complexities of teaching environments. Teachers can transport lesson plans, materials and digital resources effortlessly from one teaching environment to another. As schools resumed full in-person learning in the succeeding school years, questions persisted about whether the increased use of digital devices during the pandemic has permanently transformed classroom instruction or merely caused a temporary shift (Edweek Research Center, 2022). The EdWeek Research Center surveyed educators regarding students' current access to school-issued devices, professional development opportunities intended to help teachers integrate the use of devices into instruction, and the degree to which expanded use of devices changed teaching and learning. According to the EdWeek Research Center (2022), "Eighty-five percent of teachers, principals, and district leaders say all the students in their classrooms, schools, and districts have a school-issued digital device, such as a Chromebook or an iPad" (p. 3). Computers such as laptops and cell phones have been of vital importance for accessing information and databases in an easier and more agile way, since nowadays any person can access web pages from any digital device (Manzano Perez, et al., 2023). Many teachers now use a blended learning approach that combines traditional face to face instruction with online approach. The use of laptops can create and deliver presentations to compile student records and access online resources, such as grading systems, lesson planning and communication.

Table 13
Is the Device You Used for In-Person Classes Provided by the School or Your Personal Devices?

Teachers' Choice	f	%
Personal device	33	94.29
Provided by the school	2	5.71
Total	35	100.0

Table 13 shows that 33 (94.29%) of the teachers provide their own personal device for in-person classes, while 5.71% of teachers use the device provided by the school. Similar to the occurrence of COVID-19 pandemic, most teachers prefer their own personal device in their teaching environment in the post global pandemic. When campuses were closed in March 2020 due to COVID-19, schools had to switch to remote learning. A study consistent with the situation in the Philippines regarding the provision of personal devices during in-person classes is the research conducted by Sung, et al. (2020) which examined the availability and impact of digital devices on students' learning experiences in the Philippines. In their study, it highlighted challenges related to the limited provision of personal devices by the schools. Many students in the Philippines still lack access to personal devices, which impacts their learning experiences and outcomes and their study, suggesting that equitable distribution of devices and improved infrastructure are necessary to enhance the effectiveness of digital learning tools in schools. Consequently, the City of New York invested over $360 million to purchase 725,000 iPads and Chromebooks. This significant change greatly increased students' access to devices, encouraging many teachers to integrate technology more frequently into their lesson plans (Amin, R., 2023). This case is comparable to the situation of the third world country where most teachers provide their own devices, so they can handle their classes online. However, there seems to be limited official guidance from the department for schools adjusting to a post-

remote learning environment. A spokesperson mentioned that they advocate for the use of "21st century teaching practices" which aim to offer students "personalized, flexible learning" (Amin, R., 2023). Amir stated that officials also offer professional learning for teachers on teaching in remote or hybrid environments. Apparently, schools still need to support and provide grants or stipends for device purchases and professional development that focus on technology integration.

1.2.2 Assessment Strategy

Table 14

How Would You Rate the Level of Effectiveness of These Specific Types of Assessments for Assessing Students In-Person Post Pandemic?

Type of Assessment	Level of Effectiveness	f	%
Oral Reports	Somewhat effective	20	57.14
	Very effective	8	22.86
	Neither effective nor ineffective	5	14.29
	Somewhat ineffective	2	5.710
	Very ineffective	0	0.0
Group Presentation	Somewhat effective	15	42.86
	Very effective	10	28.57
	Neither effective nor ineffective	8	22.86
	Somewhat ineffective	1	2.860
	Very ineffective	1	2.860
Research Reports	Somewhat effective	19	54.29
	Very effective	9	25.71
	Neither effective nor ineffective	3	8.570
	Somewhat ineffective	2	5.710
	Very ineffective	2	5.710
Video Presentation	Somewhat effective	16	45.71
	Very effective	9	25.71
	Neither effective nor ineffective	7	20.00
	Somewhat ineffective	2	5.700
	Very ineffective	1	2.860

As gleaned from Table 14, most teachers respond that the level of effectiveness of these specific types of assessments for assessing students in person (oral reports, group presentations, research reports, and video presentations) is *somewhat effective*. In the study of Stoian, et.al. (2022), it stated that even if the COVID-19 pandemic had an unprecedented impact on educational institutions, their research pointed out several aspects emerging from the educational experience in the online environment that can be used to improve face-to-face activities and lead to a more effective and sustainable education. Stoian, et al. (2022) showed in their study that the students' request to use electronic educational resources in face-to-face learning activities (online materials for lectures and practical activities), which, in addition to accessibility, provide

them with more time for learning, a better assessment, and more practical aspects. In addition, their study indicated some aspects considered useful for face-to-face activities by the students, such as group interaction for various projects, easier interaction and communication in the online environment, team and mutual help spirit developed online. Positive characteristics of the online interaction with peers were considered to be the flexibility for longer hours online and the ability to talk to a larger number of peers through technology. Stoian, et.al added that the perception of the effort and the level of difficulty of switching from the online education to the face-to-face was considered to be the most beneficial in terms of the students' professional development that can lead to the idea of adopting a blended learning solution. For instance, research shows that tertiary college students in the Philippines opt for blended learning (a combination of traditional classroom training and online activities) for the post-pandemic and future career education as it improves their satisfaction and retention and helps them to socialize at the same time (Guillen, 2022). The perception of "somewhat effective" in assessing oral reports, group and video presentation and research reports reflects a combination of student engagement challenges, skill development needs, technological hurdles, subjectivity in grading and the overall context of teaching and learning. As teachers seek to enhance the effectiveness of these assessments, ongoing reflection, refinement and professional development are essential to address the diverse needs of their students and ensure meaningful learning experiences.

1.2.3 Methods of Delivery of Instructions

Table 15

To What Extent Do You Agree That In-Person Teaching/Learning Is an Effective Modality?

	f	%
Strongly agree	25	71.4
Agree	5	14.3
Somewhat effective	4	11.4
Neither agree nor disagree	1	2.90
Strongly disagree	0	0
Somewhat ineffective	0	0
Disagree	0	0

The data shown in Table 15 depicts that the majority of the teacher respondents strongly agree that the in-person teaching and learning is an effective modality in delivering method of instructions with 71.4% after the pandemic. According to the study of Photopoulos, et al. (2022), they concluded that students who preferred in-person teaching focused on effective learning, and although they expressed their satisfaction for not commuting to the campus, they raised the problem of "zoom fatigue." Students were also interested in preserving and developing face-to-face relationships with their fellow students and teachers and stressed the importance of face-to-face interactions in learning, socialization, and psychological health and viewed education in a collectivistic way rather than focusing on fulfilling their individual needs.

While many students initially appreciated the convenience of online classes—such as not having to commute and the flexibility to attend class from their own homes—an emerging phenomenon known as "Zoom fatigue" has become a significant issue. This fatigue is characterized by the exhaustion that arises from prolonged video conferencing, often due to the cognitive load of processing visual and auditory

information simultaneously and the lack of physical presence that supports engagement. Despite the advantages of online learning, many students have expressed a strong preference for in-person teaching. They perceive it as more conducive to effective learning for several reasons. Firstly, in-person instruction allows for richer interactions—both academic and social. The ability to engage directly with instructors and peers fosters a collaborative learning environment where ideas can be exchanged more readily. Students can ask questions spontaneously, participate in discussions more fully, and engage in hands-on activities that are often more challenging to replicate online. Moreover, students recognize the value of building and maintaining face-to-face relationships with their peers and teachers. These relationships play a vital role in enhancing the educational experience. The informal interactions that occur on campus—whether in the hallways, during group work, or while socializing—contribute to a sense of belonging and community. This sense of community is essential for psychological well-being, as it provides support, motivation, and a shared space for socialization. Students have articulated that these interactions are not merely supplementary but fundamental to their learning and personal development. The collectivistic perspective that students have towards education underscores their desire for a supportive learning environment. They view education as a shared journey, emphasizing collaboration over competition. This collectivistic lens highlights the importance of camaraderie, mutual support, and shared goals among students. In this context, learning is seen as a communal effort rather than a solitary pursuit, and students feel that their educational experiences are enriched when they can engage with their peers in a meaningful way. As institutions consider future educational models, it is crucial to strike a balance between the efficiencies of online learning and the invaluable aspects of in-person interactions. Blended learning approaches that incorporate both modalities could be a way to address the diverse needs of students, allowing them to benefit from the convenience of online resources while also providing opportunities for face-to-face engagement. This approach could support not only academic success but also the social and emotional well-being of students, fostering a more holistic educational experience that aligns with their collective values and needs. Ultimately, understanding and responding to these preferences and experiences is essential for educators and institutions as they navigate the post-pandemic educational landscape and work to create environments that support effective learning and meaningful relationships.

1.2.4 Preparations of Material

Table 16
How Would You Rate the Level of Difficulty with Google Classroom, Canva, Canvas, and Zoom in an In-Person Post Pandemic? N=35

Platform	Level of Difficulty	f	%
Google Classroom	Easy	26	74.29
	Extremely Easy	8	22.86
	Neither easy nor difficult	1	2.86
	Somewhat difficult	0	0.00
	No response	0	0.0
Canva	Easy	15	42.86
	Extremely Easy	10	28.57
	Neither easy nor difficult	5	14.29
	Somewhat difficult	3	8.57

	No response	2	5.71
Canvas	Easy	27	77.14
	Extremely Easy	5	14.29
	Neither easy nor difficult	3	8.57
	Somewhat difficult	0	0.0
	No response	0	0.0
Zoom	Easy	31	88.57
	Extremely Easy	2	5.72
	Neither easy nor difficult	1	2.86
	Somewhat difficult	1	2.86
	No response	0	0.0

Table 16 shows that Google classroom, Canvas and Zoom are easy to utilize with 74.29%, 77.14% and 88.57%, respectively compared to Canva which is extremely easy to use by the teachers with 42.86%. Sart (2021) concluded in her study that the data showed it as the most used digital technologies- Google Classroom, Blackboard, Canvas, and Zoom to Google Drive, YouTube WhatsApp, and Notability – affect positively minimum to 88% of the university students on the teaching and learning even in the most difficult subjects including those of the applied ones. Moreover, Sart (2021) stated that in order to maximize teaching and learning, the new digital technologies should be used for both face to face and distance learning ecosystems. In the higher education institutions, they also create a long-term model by developing and systematizing a roadmap for future teaching, learning, collaborating, networking, assessing, and researching at the university level.

Since the pandemic, many educators and students have become accustomed to using google classroom, zoom and canvas for their course management and virtual meetings. This familiarity often leads to greater ease of use as users have developed workflows and navigational skills specific to these platforms. The ease of use of these platforms in an educational context arises from their design focus, integration capabilities, user familiarity and real-time collaborative tools, all tailored toward enhancing the learning experience. In contrast, Canva serves a different primary purpose that may not align as closely with the immediate needs of educators and students in a learning environment.

In summary, data reveal that the majority of the teachers and students engaged in online/ remote teaching during the pandemic crisis. Majority of the teachers provide their own personal devices because they are more comfortable and efficient with the tools and help them enhance their remote teaching experience.

Teachers stated that remote teaching is a temporary shift of instructional delivery to an alternate delivery mode due to the global pandemic crisis. Majority of the teachers and students use laptops because they are indispensable tools in modern education, particularly for more demanding and significant tasks.

According to the teachers' responses, wi-fi internet connection is useful to them during flexible learning activities because of accessibility, convenience, infrastructures, speed and performances. It is said that internet connectivity provides a strong technical support to ensure reliable connections for all their students in flexible learning.

Due to budget constraints, most schools fail to provide their internet connection and teachers usually end up paying for it out of their own pockets. In their online/remote teaching, teachers find the Google Classroom, Canvas, and Zoom as user-friendly. Teachers rate the assessment format in remote teaching as somewhat effective. Teachers think that the assessment strategy in a traditional classroom works well

and can be adopted seamlessly to remote learning environments to ensure that essential learning competencies are evaluated effectively.

Majority of the dental teachers have returned to being in person driven due to several key factors aside from safety protocols, like student engagement and participation, collaboration and teamwork, effectiveness of in-person instruction and improved public health conditions.

2. Challenges That Teachers in Dental Education Have Encountered in Terms of Technological Proficiency in Providing Remote Classes, Infrastructural Availability to Effectively Support Remote Teaching, Time Management in Delivering Remote Classes, and Teacher Readiness for Teaching during the COVID-19 and Post-Global Pandemic

Dental education has profoundly been affected by the pandemic and even after the crises. Many dental schools and teachers shifted to work from home using technology driven resources to perform teaching tasks. On the other hand, most of the schools opted to go back to in-person teaching. Some schools have preferred hybrid modes of instruction. However, there are challenges in dental education that teachers have faced during the Covid-19 and post global pandemic crisis.

2.1 Challenges That Teachers in Dental Education Have Encountered during the COVID-19 in terms of:

2.1.1 Technological Proficiency in Providing Remote Classes

Table 17

How Would You Rate Your Level of Proficiency with Using These Specific Types of Tools for Remote Learning?

Platform	Level of Proficiency	f	%
Google Classroom	Moderately proficient	19	54.3
	Very proficient	9	25.7
	Slightly proficient	4	11.4
	No response	3	8.6
Canva	Moderately proficient	12	34.3
	No response	8	22.9
	Slightly proficient	6	17.1
	Very proficient	5	14.3
	Not at all proficient	3	8.6
	Extremely proficient	1	2.9
Canvas	Moderately proficient	17	48.6
	No response	10	28.6
	Very proficient	5	14.3
	Not at all proficient	2	5.7
	Slightly proficient	1	2.9
Zoom	Moderately proficient	15	42.9
	Very proficient	7	20
	Extremely proficient	5	14.3
	No response	4	11.4

	Slightly proficient	4	11.4

Regarding teachers' level of proficiency with Google Classroom, Canva, Canvas, and Zoom for remote learning, most teachers rate themselves moderately proficient as provided in Table 17. These findings indicate that not all teachers have the same level of comfort with technology. Some may find it challenging to move beyond basic functionalities, especially if they are not inherently tech-savvy. Some teachers may be resistant to fully embracing digital tools, preferring traditional methods of teaching. According to Courtney, et al. (2022), teachers reported that overexposure to technology created a challenge and they noted that students needed to be proficient as well with technology throughout the pandemic. On a positive side, teachers rate themselves as moderately proficient in using Google classroom, Canva, Canvas and Zoon because these platforms indicate a solid understanding of its benefit for further professional development, thereby, school can help teachers enhance their technological proficiency for, in turn, it will also improve the educational experience for both teachers and students. In contrast, Al Badi, et al, (2023) found that teachers' attitudes about using Google classrooms was high. However, it indicated a need for conducting effective training for teachers to overcome certain challenges. According to Al Badi, et al. (2023), teachers utilize many educational platforms during remote teaching, such as Google Classroom, Microsoft Teams, and Blackboard. Google Classroom is a new tool introduced through Google Apps for Education in 2014. Teachers believe in using these platforms in the teaching and learning process and have reached a high level of confidence in using them, so it is easy for them to keep using them. It is noteworthy that Google classroom provides powerful features that make it ideal to be used with students since it offers an online ERT environment for preparing a lesson, distributing content materials, and designing an evaluation (Amin & Sundari, 2020). Besides its features and effectiveness, Google Classroom has been a suitable alternative for teachers to ensure that what used to be delivered face-to-face before COVID 19 can now be delivered synchronously or asynchronously during ERT (Al Badi, et al, 2023). Al Badi, et al. (2023), recommend conducting effective training for teachers to overcome the challenges they face while using the platform and providing tablets and personal computers for students with limited income

2.1.2 Infrastructural Availability

Table 18

How Would You Rate the Availability of the Infrastructure Needed by Students for Remote Learning?

Available Infrastructure	Rate	f	%
Overall	Moderately available	20	57.1
	Slightly available	10	28.6
	Very available	3	8.6
	Extremely available	2	5.7
Affordable equipment (i.e. laptops, tablets, mobile phones, etc.)	Moderately available	14	40
	Slightly available	9	25.7
	Very available	9	25.7
	Extremely available	2	5.7
	Not at all available	1	2.9
Affordable internet plans	Moderately available	19	54.3

	Slightly available	6	17.1
	Very available	6	17.1
	Extremely available	2	5.7
	Not at all available	2	5.7
Reliable internet connections	Moderately available	17	48.6
	Slightly available	11	31.4
	Very available	4	11.4
	Not at all available	2	5.7
	Extremely available	1	2.9
Free software for students	Slightly available	11	31.4
	Moderately available	9	25.7
	Not at all available	9	25.7
	Very available	5	14.3
	Extremely available	1	2.9
Low-cost software for students	Slightly Available	13	37.1
	Moderately available	12	34.3
	Not at all available	5	14.3
	Very available	4	11.4
	Extremely available	1	2.9

As revealed in Table 18, the overall results show the availability of the infrastructure needed by students for remote learning is moderately available as stated by teachers. Specifically, equipment such as laptops, tablets, mobile phones, internet plans, and reliable internet connections are moderately available. However, teachers rate free/low-cost software for students as slightly available. This highlights a significant gap between the availability of affordable equipment and reliable internet plans. Additionally, the effectiveness of free or low-cost software is often hindered by limited funding, low awareness and usability challenges.

It is very important to note, remote learning may not ensure quality learning due to variation in existing technology infrastructures, digital competencies of students and teachers, and resources at home for learning across schools. According to Kennedy, et al, (2022), availability and suitability are the essential components of remote teaching and learning to have successful take-up and effective technology infrastructures. Before determining whether the technology is suitable, it is necessary to assess the access to technology in the first place. This includes access to reliable and affordable physical devices (e.g., computers, laptops) and Internet connectivity, which are basic requirements for remote learning that takes place online (ITU, 2021a).

By adopting targeted strategies to raise awareness, secure partnerships, and leverage available resources, schools and districts can improve access to the necessary software, ensuring a more comprehensive and equitable remote learning infrastructure for all students.

2.1.3 Time Management in Delivering Remote Classes.

Table 19
Effectiveness of Managing Time in Delivering Tasks Related to Remote Classes

		f	%
Remote	Moderately proficient	20	57.1
	Very proficient	11	31.4
	Extremely proficient	3	8.6
	Slightly proficient	1	2.9

Regarding teachers' management of time when completing tasks related to remote classes, Table 19 shows that most teachers consider themselves moderately *proficient*. More than half of the educators, 20 (57.1%), rate themselves moderately proficient in time management for remote teaching; this reflects the challenges and demands of adapting to a new teaching environment, multitasking, increased workload, and maintaining a work-life balance. Many teachers feel a sense of guilt between the amount of time that they wish to devote to courses and the amount of time that they can actually dedicate to their teaching (Heath and Shine, 2023). There are many considerations to improve teachers' time management in remote teaching. Asynchronous teaching, chunking, and micro-learning are well-established methods of instructional delivery to facilitate time management (Heath and Shine, 2023). Micro-learning, also referred to as bite-sized learning, is an approach in which students are provided "nuggets that are just the right size for cognitive processing" in order to facilitate their learning process (Major & Calandrino, 2018). The shift to remote teaching, however, necessitates reevaluating these approaches due to the emerging challenges brought about by the COVID-19 pandemic. However, these instructional methods still require some time prior to the start of a semester for teachers to prepare course materials and perhaps to organize courses differently (Heath and Shine, 2023). It is suggested that schools can help teachers improve their time management by providing targeted professional development, streamlining administrative tasks, encouraging collaboration, and boosting effective scheduling and support systems. This will lead to a more efficient and effective remote teaching experience for both teachers and students.

2.1.4 Teacher Readiness for Teaching Remotely

Table 20
Readiness to Teach Classes

		f	%
Remotely	Moderately ready	22	62.9
	Very ready	8	22.9
	Slightly ready	3	8.6
	Extremely ready	2	5.7

Concerning teachers' readiness to teach classes remotely, the majority of teachers stated that they are *moderately ready* as seen in Table 20.

Nearly 70% of instructors feel they are moderately or very prepared to teach online. It means that teachers' moderate readiness for remote teaching reflects the various challenges and adjustments they face, from technology adaptation and training deficiencies to student engagement and work-life balance issues. This affirms what Bolliger & Halupa (2021) stated. Despite these results, there are factors that negatively affect the confidence of instructors, which are lack of ability or institutional support, issues with the delivery format and technology, concerns for students, integrity of assessments, time constraints, and workload

issues (Bolliger & Halupa, 2021). By addressing these areas through targeted training, support, collaboration, and infrastructure improvements, schools can help teachers feel more confident and prepared for the demands of remote teaching. According to Bolliger and Halupa, the results of their study reinforced the need for professional development and institutional support for instructors who transition from a traditional to an online teaching environment, regardless of whether it is a voluntary or forced shift.

2.2. Challenges That Teachers in Dental Education Have Encountered during the Post-Global Pandemic in terms of:

2.2.1 Providing Technological Proficiency

Table 21
How Would You Rate Your Level of Proficiency with Using These Specific Types of Tools for In-Person Learning?

Platform	Level of Proficiency	f	(%)
Google Classroom	Moderately proficient	17	48.6
	No response	7	20
	Slightly proficient	5	14.3
	Not at all proficient	1	2.9
	Moderately proficient	17	48.6
Canva	Moderately proficient	13	37.1
	No response	7	20
	Very proficient	6	17.1
	Not at all proficient	4	11.4
	Slightly proficient	4	11.4
	Extremely proficient	1	2.9
Canvas	Moderately proficient	15	42.9
	No response	10	28.6
	Very proficient	6	17.1
	Not at all proficient	2	5.7
	Extremely proficient	1	2.9
	Slightly proficient	1	2.9
Zoom	Moderately proficient	14	40.00
	Very proficient	8	22.90
	No response	7	20.00
	Extremely proficient	3	8.60
	Slightly proficient	3	8.60

Similar to the teachers' responses during the COVID pandemic (remote teaching), teachers' level of proficiency with Google Classroom, Canva, Canvas, and Zoom for in-person learning is also *moderately proficient.* These responses are provided in Table 21. One possible reason for these results is that teachers' self-assessment as moderately proficient in tools like Google classroom, Zoom, Canvas and Canva during

the return to in-person learning reflects their ability to quickly adapt to these technologies while also highlighting areas where further technology support and skills training are needed. However, teachers state that using digital technologies increased their workload. Technological advancement and the growing availability of WIFI and tablets mean that teachers are now able to access and utilize an array of digital technologies to help them achieve their pedagogic goals (Moorehouse, 2023). The results also imply that by providing comprehensive training, practical opportunities, and robust technical support, schools can help teachers enhance their proficiency and integrate these tools more effectively into their teaching practices. Indeed, teachers today are faced with so many fascinating options for using technology to enhance learning that can be overwhelming (Kessler, 2018: 205). As we move on from the pandemic, the field of education should focus on maintaining, exploring, and creating curricula and digital resources that will endure future crises (Courtney, et al. 2022). Technology is meant to support the teacher and equip them with tools to move their students' learning forward (Courtney, et al. 2022). Many teachers believe that effective integration of technology into the curriculum should anticipate student needs and optimize student learning (Courtney, et al. 2022).

Although educational technology has undoubtedly revolutionized the approach to instructing students, it is not a substitute for successful teaching methods. Instead, it aims to enrich the curriculum and support the teacher's optimal teaching strategies. The use of digital technologies in education has been extensively explored, with its potential to enhance and transform teaching well-documented (Golonka, et al. 2014; Hockley and Dudeney 2018).

2.2.2 Time Management in Delivering In- Person Teaching

Table 22

Management of Time in Delivering In- Person Teaching

Time management delivery in In-person Teaching		f	%
In-person classes	Somewhat effective	22	62.9
	Very effective	11	31.4
	Somewhat ineffective	2	5.7

Additionally, teachers are mostly somewhat effective in managing their time when completing tasks related to in-person classes as seen in Table 22. It appears that the pandemic has led to changes in teachers' daily time use — including reduced time spent in instruction (Jones, et al., 2021). The effectiveness of time management of teachers during the return to in-person classes can be attributed to the skills and strategies they have developed during remote learning and teaching.

According to the research of Jones et al., 2021, their data indicate that, after COVID-related school closures, positive affect during instruction actually *increased*. Their conjecture that this result might indicate that time spent with students during instruction was the highlight of many teachers' work days post transition to distance teaching. Arguably however, their study holds implications for how they should think about teachers' work as they return to fully in-person learning. It is also noted that by continuing to leverage effective digital tools, focusing on professional development, further collaboration, and maintaining clear communication channels, schools can help educators support and improve their time management.

The integral structure and routine of in-person teaching minimizes reliance on technology and their ability to use established classroom management techniques. Detailed evidence on how U.S. teachers distribute their working time across work activities is relatively scarce (Jones, et al., 2021). While they would

certainly not advocate that teachers reduce their daily teaching loads from 214 minutes per day to 61, there may be reasons to consider reducing the daily instructional demands place on teachers (Jones et al., 2021). It seems reasonable to assume that, at least in the near future, remote teaching will continue to be a part of school operations. If this is the case, they believe schools and districts could benefit from robust evidence of what teachers' work was like after in-person instruction and how the broader disruptions associated with the pandemic impacted teachers' work-related affect (Jones et al., 2021).

2.2.3 Teacher Readiness for Teaching In Person Classes

Table 23

Readiness to Teach Classes

Readiness to teach classes		f	%
In-person classes	Very ready	14	40
	Extremely ready	11	31.4
	Moderately ready	9	25.7
	Slightly ready	1	2.9

Table 23 provides information that teachers are *very ready* to return to in-person teaching, 14 (40%). The results suggest that teachers felt very ready to return to in-person classes due to their deep-seated familiarity with traditional methods, the challenges faced during the remote learning, increased adaptability, strong support systems, and the implementation of effective health and safety measures. In the assessment of teachers' readiness on the transition in teaching modalities, Millar (2023) states that teachers were ready when it comes to foundational knowledge, skills and dispositions, instructional planning, instructional methods and strategies, assessment and evaluation and management. This indicates that teachers are thoroughly prepared in various crucial aspects of their role as educators. They possess the knowledge, skills, and attitudes required to deliver effective instruction, evaluate student learning and efficiently manage their classrooms. Most of the teachers are willing to explore new teaching strategies in the transition of teaching modalities (Millar, 2023). It implies that many teachers are not just receptive to change but are also highly enthusiastic about discovering and applying new instructional methods. Acknowledging the readiness of teachers in various aspects of education, as per Millar's suggestion, it is important to create a supportive and dynamic environment that facilitates continuous growth, collaboration, and innovation among educators.

In summary, the results of descriptive statistics conducted for this second research question revealed that teachers' proficiency in remote learning tools like Google Classroom, Canva, Canvas, and Zoom is moderately high. They also have moderate proficiency in in-person learning tools. Infrastructure for remote learning is moderately available, including laptops, tablets, mobile phones, internet plans, and reliable internet connections. However, free/low-cost software is slightly available. Teachers are moderately proficient in managing time for remote classes and somewhat effective in in-person classes. They are moderately ready to teach remotely and very ready to return to in-person teaching. Overall, teachers are well-prepared for remote and in-person teaching.

Educational institutions can create a more informed and supportive environment for teachers, enhancing their capabilities to effectively navigate the challenges of online and in-person teaching. Educational institutions can effectively facilitate the transition between teaching modalities and create an environment conducive to growth, innovation, and improved learning outcomes for students. Educational institutions can implement tailored approaches that support teachers in achieving their full potential and delivering

high-quality education to their students (Millar, 2023). By prioritizing continuous professional development, utilizing technology, adhering to health protocols, nurturing a sense of community, and offering strong support, educators can maintain and improve classroom effectiveness.

3. Challenges That Dental Students Have Faced in Terms of Technological Proficiency in Attending Classes, Infrastructural Accessibility to Effectively Support Learning, and Student Readiness to Comfortably Shift from Traditional Face-to-Face Teaching to Remote Teaching during the COVID-19 and Post Global Pandemic

Dental students have faced numerous challenges during the transition from traditional face-to-face teaching to remote learning during the COVID-19 pandemic and in the post-pandemic period. By acknowledging and addressing these challenges, dental education programs can help students' transition more comfortably and effectively, ultimately preparing them for successful careers in dentistry.

3.1 Challenges That Dental Students Have Faced from Traditional Face-to-Face Teaching to Remote Teaching during the COVID-19 in terms of:

For Teachers

3.1.1 Technological Proficiency with Types of Infrastructure in Attending Classes during COVID-19 Pandemic.

Table 24

Level of Students' Proficiency with Types of Infrastructures for Remote Learning on the Teachers' Eye View

Platform	Level of Proficiency	f	%
Google Classroom	Moderately proficient	19	54.3
	Very proficient	9	25.7
	Slightly proficient	4	11.4
	No response	3	8.6
Canva	Moderately proficient	12	34.3
	No response	8	22.9
	Slightly proficient	6	17.1
	Very proficient	5	14.3
	Not at all proficient	3	8.6
	Extremely proficient	1	2.9
Canvas	Moderately proficient	17	48.6
	No response	10	28.6
	Very proficient	5	14.3
	Not at all proficient	2	5.7
	Slightly proficient	1	2.9
Zoom	Moderately proficient	15	42.9
	Very proficient	7	20
	Extremely proficient	5	14.3
	No response	4	11.4
	Slightly proficient	4	11.4

Data show that the majority of teachers consider the students to be *moderately proficient* in using Google Classroom, Canva, Canvas, and Zoom for remote learning as gleaned in Table 24. According to Hodges, et al, careful online learning planning includes not only identifying the content to be discussed but also on how to support various types of interactions that are important for the learning process. Online learning recognizes that learning is a social and cognitive process, which is not just a matter of transmitting information (Hodges et.al, 2020). The readiness of teachers includes the use of various platforms as online learning media, the quality of the internet networking, the availability of internet data packages for students, and the lack of smartphone or laptop facilities (Safitri, et al, 2022). Teachers observed that students faced significant challenges related to technological proficiency and infrastructure during the COVID-19 pandemic. These included varying skill levels with digital tools, inconsistent access to devices and reliable internet, inadequate learning environments, and limited technical support. But with a combination of additional guidance, flexible learning options, enhanced parental involvement, efforts to ensure equitable access, and the creation of support networks, educators can help attenuate these challenges and support students in their remote learning endeavors. Teachers are not proficient in utilizing technology for teaching and learning, not because they are uninterested in implementing it, but because extensive support and resources are required. Consequently, teachers often opt for traditional teaching methods. Few teachers use Zoom as a platform for online learning because it is a relatively new application in Asian countries, and they are not familiar with its features. However, the popularity of Zoom is still widely used by activists of higher education alone to conduct online seminars, while among teachers and students, Zoom is not yet popularly used. Even so, the teachers who have used Zoom in implementing online learning think that the application is better than the other platforms because besides being easy to use, it can also directly meet all students (Safitri, et al, 2022). Google Classroom is also able to build an attractive learning atmosphere because this application was developed with information in the form of audio and video which is in accordance with the pedagogical technological aspects. Thus, the learning quality will be better (Fitriningtiyas, et al., 2019). However, not all teachers understand information technology, especially the elderly teachers. They feel difficult to understand Quipper School and Google Meet because they do not understand technology (Safitri, et al, 2022). The integration of new teaching methods with existing practices is a common theme in educational research (De Vera, et al., 2021). A significant challenge facing teachers in the educational quest for technology integration is lack of ICT competence (De Vera, et al., 2021). Some teachers continue to face challenges due to pandemic, including their readiness to prepare educational media and conduct teaching and learning activities. Consequently, it is crucial for all societal elements, such as government and schools, to assess each teacher's preparedness to determine if further support is needed for optimal online learning during COVID-19 pandemic (Safitri, et al, 2022). Teachers without technological knowledge find it increasingly challenging to address technological problems during teaching and learning. Hence, novice teachers are lacking competencies related to online instructional preparations. However, it is also significant that teacher education institutions have to help prepare teachers to equip them with knowledge on integrating technology in lesson preparations. Teachers need time to develop a higher level of skill in applying various applications in their lessons (De Vera, et al., 2021).

3.1.2 Student Readiness to Comfortably Shift from Face-to-Face Teaching to Remote Learning.

Table 25

Teachers' Perceptions of Students' Readiness to Learn during COVID-19 Pandemic

		f	%
Teachers' perception of students' readiness to learn remotely	Moderately ready	19	54.29
	Slightly ready	8	22.86
	Very ready	6	17.14
	Extremely ready	1	2.86
	Not at all ready	1	2.86

According to teachers, students are *moderately ready* to learn remotely, as well as to learn in person as shown in Table 25. Teachers determined significant variability in students' readiness to learn during COVID-19 pandemic. Undergraduate students are ready towards the use of online learning in terms of their motivation, facilities and technology capabilities (Kamaruzaman, et al., 2022). However, the students feel that they are *moderately ready* for the usefulness and self-directed learning during online learning. Kamaruzaman, et al. (2022) recommend that educators should use online learning because the students are ready, especially if they have enough facilities to help them towards online learning. In contrast, educators should focus on helping students complete their work by providing regular reminders and offering learning materials to enhance their skills. While some students adapt quickly, others face substantial challenges. Teachers must utilize increased communication, flexible teaching methods, emotional and social support and efforts to improve resource accessibility to support students' readiness. Understanding and addressing these diverse needs are crucial in helping students navigate the complexities of remote learning and maintain their educational progression.

For Students

3.1.3 Technological Proficiency in Attending Classes Remote Learning during COVID-19 Pandemic.

Table 26

Students' Proficiency with the Technological Skills for Attending Remote Classes

How would you rate your proficiency with the technological skills for attending remote classes?		f	%
	Moderately proficient	160	54.4
	Very proficient	82	27.9
	Slightly proficient	25	8.5
	Extremely proficient	24	8.2
	Not at all proficient	3	1

Majority of students stated are proficient with the technological skills for attending remote classes. Regarding students' level of proficiency in using Google Classroom, Canva, Canvas, Zoom, MS Word, and MS PowerPoint, they are either very or moderately proficient as provided in Tables 26 and 27. Among all the different online learning challenges, the students experienced the least challenge on technological literacy and competency (Barrot, et. al., 2021). Students' moderately proficiency with online learning platforms like Google classroom, canvas, and Zoom compared to their very high proficiency with MS word and MS Powerpoint reflects differences in familiarity, experience, and the learning management systems (LMS) like google classroom and canvas which may have been newer to many students especially

those who primarily learned in traditional classroom setting before the pandemic. While most studies revealed that technology use and competency were the most common challenges that students face during the online classes the case is a bit different in developing countries in times of pandemic (Barrot, et. al., 2021). Some faculty noted that some students struggled with in-person communication after the transition (Becker, et. al., 2022). One of the methods proposed to provide dental students with "live education"; substituting the face-to-face element, has been to promote the use of electronic/digital media applications on computers, "tablet" handheld devices and telephones. Some of these applications include Zoom and Facetime. At Manchester University Dental Hospital, it prefers to utilize the Zoom application, which offers users some highly useful features for both dental teachers and the dental students (Zoom, 2020): no financial cost, conference meetings/rooms inclusive of multiple users, screen sharing possible, calendar integration to arrange conferences and meetings, file sharing, online chat and HD video and audio (Mansoor, 2020). The benefits of Zoom despite some inconvenience with time restrictions can be argued that the methodology of delivering this type of teaching and receiving this type of learning should be continued beyond the pandemic (Mansoor, 2020). The ability of "generation Z" students to be able to readily utilize the developments in technology, applications and electronic features would seem to make them ideal candidates to be able to maximize the effectiveness of the equipment and materials available and to assist the success of the remote educational meetings, given adequate support if needed (Mansoor, 2020). Despite occasional connectivity challenges, the majority of students found Google Classroom very and extremely helpful in conducting their online classes in the midst of the COVID-19 outbreak. They are able to migrate from face- to-face to online and blended learning courses as a result of their personal learning experiences with this platform. The use of Google Classroom as a learning platform makes it easier to teach and learn. It enables the students to overcome their concerns about connectivity and accessibility, resulting in the desired learning outcomes (Jaca, 2022). In addition, students claim that the usage of Canvas in learning activities has several benefits. Those benefits are (1) various features of Canvas that help them in learning, (2) developing students' engagement, and (3) promoting students' self-regulated learning (Fatimah, et. al., 2022). Consequently, to address this, schools should invest in structured training, user-friendly design, integrated learning solutions, accessible resources, and ongoing feedback mechanisms. These strategies can help bridge the proficiency gap making students more confident and capable in navigating the diverse technological landscape of modern education.

Table 27

Students' Level of Proficiency with Specific Tools for Remote Learning during COVID-19 pandemic

Platform	Level of Proficiency	f	%
Google Classroom	Moderately proficient	87	29.6
	Very proficient	80	27.2
	No response	54	18.4
	Extremely proficient	41	13.9
	Slightly proficient	18	6.1
	Not at all proficient	14	4.8
Canva	Very proficient	95	32.3
	Extremely proficient	66	22.4
	Moderately proficient	61	20.7

	No response	57	19.4
	Slightly proficient	14	4.8
	Not at all proficient	1	0.3
Canvas	Very proficient	113	38.4
	Moderately proficient	65	22.1
	Extremely proficient	63	21.4
	No response	33	11.2
	Slightly proficient	15	5.1
	Not at all proficient	5	1.7
Zoom	Moderately proficient	93	31.6
	Very proficient	78	26.5
	No response	51	17.3
	Extremely proficient	44	15
	Slightly proficient	21	7.1
	Not at all proficient	7	2.4
MS Word	Very proficient	92	31.3
	Moderately proficient	66	22.4
	Extremely proficient	61	20.7
	No response	60	20.4
	Slightly proficient	13	4.4
	Not at all proficient	2	0.7
MS PowerPoint	Very proficient	87	29.6
	Moderately proficient	84	28.6
	No response	61	20.7
	Extremely proficient	46	15.6
	Slightly proficient	12	4.1
	Not at all proficient	4	1.4

3.1.4 Infrastructural Accessibility to Effectively Support Learning during COVID-19 Pandemic.

Table 28
Availability of Specific Infrastructures

Infrastructure Availability	Level of Availability	f	%
Affordable equipment (i.e. laptops, tablets, mobile phones, etc.) -Remote	Moderately available	128	43.5
	Very available	69	23.5
	Slightly available	46	15.6
	Extremely available	43	14.6
	Not at all available	8	2.7
Affordable internet plans -Remote	Moderately available	126	42.9

	Very available	75	25.5
	Slightly available	50	17
	Extremely available	33	11.2
	Not at all available	10	3.4
Reliable internet connections -Remote	Moderately available	126	42.9
	Slightly available	75	25.5
	Very available	50	17
	Extremely available	30	10.2
	Not at all available	13	4.4
Free software for students-Remote	Very available	107	36.4
	Slightly available	84	28.6
	Not at all available	44	15
	Very available	40	13.6
	Extremely available	19	6.5
Low-cost software for students (add as needed) - Remote	Moderately available	113	38.4
	Slightly available	84	28.6
	Very available	38	12.9
	Not at all available	35	11.9
	Extremely available	24	8.2

Regarding the availability of specific forms of infrastructure needed by students for remote learning, most students state that laptops, tablets, mobile phones, affordable internet plans, internet connectivity, free/low cost software for students, are *moderately available* as seen in Table 28. While some resources are moderately available, the equitable distribution and effective utilization of these resources are highly variable. This creates a complex set of challenges that affect students' ability to smoothly transition to remote learning. Not all students have access to necessary devices like laptops, tablets and even mobile phones because in some households, multiple family members might need to share a single device. Students who are not satisfied with distance education explain the reason for their dissatisfaction, thus, resulting in not understanding the subject, finding the teacher inadequate, inadequate time, and lack of infrastructure (Hebebci, et.al., 2020). Training can be carried out so that teachers and students can adapt to distance education more easily, and the necessary infrastructure support can be further strengthened to eliminate technical problems (Hebebci, et.al., 2020). Based on the result of the online survey of Asio, et al. (2022), done to the students, they concluded that internet connectivity would pose a big challenge among students for their online learning. This idea also applies to the institution, the school administration, the faculty, and the staff. Thus, the result justified the recommendation for appropriate actions intended to remedy such a problem. Secondly, the study also found that a majority of students had smartphones. that students were able to learn on an online basis. Mobile devices such as smartphones are a great help because of their multiple functions especially in learning nowadays (Asio, et. al., 2022). However, not every household could afford robust internet plans even from urban, rural and underserved areas which lack reliable internet infrastructure.

3.1.5 Students' Readiness to Comfortably Shift Traditional Teaching to Remote Learning

Table 29

How Would You Rate Your Readiness to Learn Remotely?

Readiness to learn	Level of readiness	f	%
Remotely	Moderately ready	147	50
	Very ready	79	26.9
	Slightly ready	40	13.6
	Extremely ready	20	6.8
	Not at all ready	8	2.7

Students find themselves ready for remote learning (Tan, et al, 2023). Overall, half of the students are *moderately ready* to learn remotely and 26. 9% express that they are *very ready* as seen in Table 29. Students state that during the COVID-19 pandemic they were moderately ready to learn remotely highlighting a mixed bag of preparedness, confidence and challenges they encountered. There may be several implications to enhance remote learning readiness, such as students' possession of basic level of technological proficiency which may allow them to navigate key functionalities, parental involvement in creating supportive home learning environments because remote learning often takes place in home where students might face physical distractions and emotional stress like family responsibility, noise and lack of quiet workspace impacting their ability to focus. There should also be efforts to train the educators to develop online learning activities which incorporate the socio-relational aspects of learning into the remote learning experience (Tan, et al, 2023). Addressing these areas can help bridge the readiness gap and support students to thrive in remote learning contexts. According to Tan, et al.'s research (2023), the domain of self-directed learning and computer and internet efficacy obtained the lowest rating, and based on their findings, the support for student readiness in transition from instructor-driven learning models to self-directed learning models is crucial and requires attention of institutions of higher learning. Exploring methods to improve self-directed learning and increasing availability of technology and conducting sessions to improve computer and internet efficacy can be considered in the early stages of medical pre-clinical years to ensure equitable access for all students (Tan, et al, 2023).

3.2 Challenges That Dental Students Have Faced from Traditional Face-to-Face Teaching to Remote Teaching during the Post-Global Pandemic in terms of:

For Teachers

3.2.1 Technological Proficiency With Types of Infrastructure in Attending Classes during the Post-Global Pandemic

Table 30

Students' Technological Proficiency with Types of Infrastructure for Attending In-Person Classes

Type of Infrastructure	Level of Proficiency	f	%
Google Classroom	Moderately proficient	17	48.57
	No response	7	20
	Slightly proficient	5	14.26
	Very proficient	5	14.26
	Not at all proficient	1	2.86

Canva	Moderately proficient	13	37.14
	No response	7	20
	Very proficient	6	17.14
	Not at all proficient	4	11.43
	Slightly proficient	4	11.43
	Extremely proficient	1	2.86
Canvas	Moderately proficient	15	42.86
	No response	10	28.57
	Very proficient	6	17.14
	Not at all proficient	2	5.7
	Extremely proficient	1	2.86
	Slightly proficient	1	2.86
Zoom	Moderately proficient	14	40
	Very proficient	8	22.86
	No response	7	20
	Extremely proficient	3	8.57
	Slightly proficient	3	8.57
MS Word	Moderately proficient	10	28.57
	Very proficient	10	28.57
	No response	6	17.14
	Extremely proficient	5	14.26
	Slightly proficient	3	8.57
	Not at all proficient	1	2.86
MS PowerPoint	Very proficient	12	34.29
	Moderately proficient	11	31.43
	Extremely proficient	7	20
	Slightly proficient	3	8.57
	No response	1	2.86
	Not at all proficient	1	2.86

The COVID-19 pandemic has provided us with an opportunity to pave the way for introducing digital learning (Pokhrel, et.al., 2021). Regarding in-person classes, most teachers state that their students are *moderately proficient* in using Google Classroom, Canva, Canvas, Zoom, MS Word, and MS PowerPoint for in-person learning as gleaned in Table 30. The moderate proficiency observed in dental students by the teachers regarding technological tools post-pandemic is a multi-faceted issue. It involves a mix of transitional challenges, inconsistent exposure, lack of regular use and ongoing training, and natural focus on the hands-on, practical aspects of their education. E-learning is improved, and teachers use blended learning and utilize digital platforms for education after the pandemic. Moreover, the teachers and their students have developed and improved many skills. Mainly of which is that the teachers have become

aware of the need for new strategies and educational technologies to meet their students' needs (Alibrahim, A.A., 2024). Some pedagogical implications can be advocated for teachers to participate in e-communities of practice and e-courses to explore new educational technologies and strategies for teaching with technology. The most important recommendation is that teachers should support and assist students in using their digital skills in education and create more e-activities using technologies (Alibrahim, A.A., 2024). After the COVID-19 pandemic when the normal classes resume, teachers and learners should be encouraged to continue using such online tools to enhance teaching and learning (Pokhrel, et.al., 2021). As the context and requirements of learning shifted back towards in-person settings, the proficient in using remote learning tools understandably saw a decline.

3.2.2 Students' Readiness to Comfortably Shift from Remote Classes to In Person Classes on the Teachers' View

Table 31

Teachers' Rating on Students' Readiness to Comfortably Shift to In-Person Classes

How would you rate your students' readiness to comfortably shift to in-person classes?		f	%
In-person classes	Moderately ready	21	60
	Very ready	9	25.71
	Extremely ready	4	11.43
	Slightly ready	1	2.86

According to teachers, students are moderately ready to learn in-person as gleaned from the data in Table 31. Teachers being moderately ready, rather than very ready, to resume in-person teaching after the pandemic is influenced by a complex interplay of health concerns because some teachers may have their health vulnerabilities or concerns about bringing the virus home to at-risk family members; curriculum adjustment, because teachers may need to readjust their lesson plans and catch up on the content that may fall behind; changes in classroom dynamic that posed social distancing and other preventive measures that can change the dynamics of classroom interaction making traditional teaching approaches less effective; resource management challenges because some teachers still lack adequate resources and support from school due to shortages issues from the pandemic; technological integration because some schools may adopt hybrid models combining in-person and remote learning and they have to manage both, which can be demanding and complex; the need for continued professional development that teachers feel a gap in their traditional teaching experience due to prolonged period of remote teaching in which this gap can affect their confidence and perceived readiness, and lastly, the need to support students through their transition and re-adjustments. Positive and negative feedback were given by students regarding the transition to online classes during the pandemic as far as online learning, for this, teaching, assessment, and interaction must be considered (Stoian, et al., 2022). In the study of Stoian, et al., the distribution of the answers regarding the perception of the effort and the level of difficulty of switching from the online education to the face-to-face one and considered to be the most beneficial in terms of the students' professional development can lead to the idea of adopting a blended learning solution. As a new era is coming in which the online tools need to be perfected since technology-enhanced learning is integrated in higher education, blended learning seems to be gaining ground among students' preferences for future

studies. For instance, research shows that tertiary college students in the Philippines opt for blended learning (a combination of traditional classroom training and online activities) for the post-pandemic and future career education as it improves their satisfaction and retention and helps them to socialize at the same time (Guillen, 2022). The concerns students raised about online teaching include excessive amounts of information, the effectiveness of virtual instruction, and the challenge of adapting to the course structure to fit the online format.

For Students

3.2.3 Technological Proficiency in Attending In-Person Classes

Table 32

Students' Level of Proficiency with Specific Tools for In-Person Learning

Specific Tools for In-Person	Level of Proficiency	f	%
Google Classroom	No response	186	63.3
	Moderately proficient	32	10.9
	Very proficient	30	10.2
	Extremely proficient	26	8.8
	Not at all proficient	16	5.4
	Slightly proficient	4	1.4
Canva	No response	206	70.1
	Extremely proficient	30	10.2
	Very proficient	29	9.9
	Moderately proficient	15	5.1
	Slightly proficient	11	3.7
	Not at all proficient	3	1
Canvas	No response	174	59.2
	Extremely proficient	38	12.9
	Very proficient	38	12.9
	Moderately proficient	33	11.2
	Slightly proficient	9	3.1
	Not at all proficient	2	0.7
Zoom	No response	238	81
	Slightly proficient	20	6.8
	Moderately proficient	14	4.8
	Not at all proficient	9	3.1
	Very proficient	7	2.4
	Extremely proficient	6	2
MS Word	No response	232	78.9
	Extremely proficient	27	9.2
	Very proficient	19	6.5

	Not at all proficient	7	2.4
	Moderately proficient	6	2
	Slightly proficient	3	1
MS PowerPoint	No response	253	86.1
	Moderately proficient	11	3.7
	Very proficient	10	3.4
	Extremely proficient	8	2.7
	Not at all proficient	6	2
	Slightly proficient	6	2

Table 32 presents that the majority of students are *proficient* with the technological skills for attending in-person classes. Regarding students' level of proficiency in using Google Classroom, Canva, Canvas, Zoom, MS Word, and MS PowerPoint, most students are either *extremely or moderately proficient.* Students believe that using Google Classroom for English language learning has many benefits despite this setback, such as increased engagement, more efficient assignment collection, increased flexibility, and improvements in language proficiency in the reading, writing, and listening domains (Tamala, et.al., 2024). On the other hand, despite these advantages, students also mention unfavorable experiences related to using Google Classroom for online instruction. These negative consequences are procrastination, the possibility of plagiarism, and frustrated and restless sensations (Tamala, et.al., 2024). Students' higher proficiency in MS Word and PowerPoint, Canvas and Canva compared to Zoom and Google classroom is influenced by factors, such as the frequency of use, support and resources, user experience and the nature of engagement each tool requires. These elements together create varying levels of familiarity and skills with each platform.

Table 33

Availability of Specific Infrastructures during Post-Global Pandemic

Infrastructure Availability	Level of Availability	f	%
Overall – in-person	Moderately available	136	46.3
	Very available	105	35.7
		29	9.9
	Slightly available	24	8.2
Affordable equipment (i.e. laptops, tablets, mobile phones, etc.)- In-person	Moderately available	147	50
	Very available	64	21.8
	Slightly available	45	15.3
	Extremely available	26	8.8
	Not at all available	12	4.1
Affordable internet plans - in-person	Moderately available	132	44.9
	Very available	68	23.1
	Slightly available	59	20.1
	Extremely available	26	8.8
	Not at all available	9	3.1

Reliable internet connections in in-person	Moderately available	138	46.9
	Slightly available	74	25.2
	Very available	42	14.3
	Extremely available	25	8.5
	Not at all available	15	5.1
Free software for students - In-person	Moderately available	114	38.8
	Slightly available	78	26.5
	Very available	48	16.3
	Not at all available	33	11.2
	Extremely available	21	7.1
[Low-cost software for students (as needed) - in-person	Moderately available	125	42.5
	Slightly available	79	26.9
	Very available	42	14.3
	Not at all available	28	9.5
	Extremely available	20	6.8

Regarding the availability of specific forms of infrastructure needed by students for in-person classes, Table 33 shows that most students state that laptops, tablets, mobile phones, affordable internet plans, internet connectivity, free/low cost software for students are *moderately available.* The transition from remote teaching during COVID-19 to in-person schooling comes with numerous challenges for students, particularly in terms of availability and reliability of specific forms, such as equipment, internet plans and software. These enthusiastic appeals from students emphasize the need for lecturers and administrators to ensure adequate ICT infrastructure and student support services to make learning meaningful and enjoyable for everyone. Essentially, it can be concluded that lecturers and teaching staff, as key stakeholders in the successful implementation of ICT-integrated learning, should be valued and supported accordingly (Ali, 2020). This can be attributed to economic challenges specially to many families that caused economic hardships; infrastructure limitations because some students living from rural and underserved urban areas still struggle with reliable connectivity which faces persistent issues with internet access and reliability; budget and resources constraints and inconsistent technological proficiency that are available but not fully optimized which lead to a moderate readiness and availability. Universities and educational institutions have embraced various tools like laptops, projectors, tablets and interactive whiteboards, alongside internet-based educational software and learning applications, with findings indicating that students have a strong affinity for mobile technology and mobile-integrated learning, a sentiment widely acknowledge by both staff and students (Ali, 2020).

3.2.6 Student Readiness to Comfortably Shift from Remote Classes to In Person Classes

Table 34

Students' Readiness to Return to In-Person Classes

How would you rate your readiness to return to in-person classes?		f	%
In-person classes	Moderately ready	136	46.3
	Very ready	94	32

	Extremely ready	43	14.6
	Slightly ready	20	6.8
	Not at all ready	1	0.3

Moreover, the data shown in Table 34 provides that students are *moderately ready t*o learn in-person classes. The moderate readiness of students to return to in-person classes post pandemic can be attributed to a combination of lingering health concerns, academic challenges, operational challenges, behavioral and psychological adjustments, technological transition, personal experience and different levels of school preparedness. These factors contribute to a cautious and gradual transition back to the traditional classroom setting. Fears about contacting COVID-19 or other illnesses still linger for many families and students, and safety protocols, students are still hesitant about returning fully. Some students may have fallen behind academically, which leads to uncertainty about their ability to catch up. Students have become accustomed to the convenience and flexibility of digital tools and remote learning platforms. Going back to traditional methods requires adaptation again. In their experiences, students thrived in a remote learning environment, while others struggled. There are students who did not like the online experience and would not like to continue it after the pandemic (Stoian, et al., 2022). After a prolonged period of isolation, students might find it challenging to re-engage socially. As 2022 saw the return to face-to-face education, research has been conducted to gauge students' feelings and opinions regarding this issue for a better implementation of safety measures and for an outlook on how university life might look in the future both from a learning and a teaching perspective (Stoian, et al., 2022). Various factors contribute to the disapproval of online education, including insufficient technical support, ambiguous organizational guidelines and policies, internet connection issues, inadequacy of at-home learning setting, restrictions on hands-on learning experience in the laboratory, teachers' challenges in effectively delivering online instruction, and deficiency in engagement. Returning to face-to-face education could definitely be one of the solutions for students to regain their social skills (Stoian, et al., 2022). Students have also reported disadvantages regarding online learning—perhaps the most important ones are those related to their physical and mental health. Academic performance was also affected by online learning (Stoian et al., 2022).

In summary, results of descriptive statistics conducted to address this third research question reveal that the majority of teachers reported that students are moderately proficient with using Google Classroom, Canva, Canvas, and Zoom for remote learning and moderately proficient in using these tools for in-person classes. According to teachers, students are moderately ready to learn remotely and are prepared to return to in-person classes.

According to students, students' proficiency levels vary between extremely and moderately proficient in using these tools. The availability of specific infrastructure for remote learning and in-person classes is moderately available, including laptops, tablets, mobile phones, affordable internet plans, internet connectivity, and free/low-cost software. Overall, students are moderately prepared to learn remotely and return to in-person classes.

4. Teachers and Students' Dental Education Adjustment from Face-to-Face Teaching to Remote Teaching and Learning in Dental Education during the COVID-19 and Post Global Pandemic

The transition from face-to-face teaching to remote teaching and learning in dental education during COVID-19 pandemic has been a significant adjustment for both teachers and students. The shift brought

about various challenges and adaptations that have shaped the educational landscape in dental school. There are several key aspects of adjustments the teachers and students may adapt, such as the use of technology, teaching methods innovations, access to resources and online learning adjustments, maintaining engagement, peer collaborations and ongoing support and development. This adjustment was a complex and multifaceted process that both educators and students demonstrated resilience and creativity in navigating these challenges, and the lesson learned likely shapes the future of dental education in meaningful ways.

For Teachers

Table 35

Practices That Are Effective to Help Teachers Adjust from Traditional to Remote Teaching.

N = 35

Teachers' Practices	Level of Effectiveness	*f*	%
Technology, such as Laptop, tablets, desk computers	Moderately effective	18	51.42
	Slightly effective	11	31.42
	Very effective	3	8.57
	Not at all effective	2	5.71
	No response	1	2.85
Time management	Moderately productive	26	74.42
	Very productive	4	11.43
	Slightly productive	3	8.57
	Not at all productive	2	5.71
	No response	0	0

Due to the current state of the healthcare system, it is essential to make a distinction between remote learning and online learning (Hodges, et al. 2020). Table 35 presents teachers' adjustment in the use of technology and time management from traditional teaching to remote teaching which is moderately effective (51.42%) and moderately productive (74.42%), respectively. Teachers' pedagogical skills aren't suited to online education, and they haven't been prepared to deal with such situations (Dar, et.al, 2024). The transition to online learning presents specific challenges in dental education, particularly for subjects requiring hands-on experience (Rao NL, et al., 2024). Deery (2020) emphasizes the need for dental schools to adapt their curricula and policies to incorporate effective distance learning methods. The research of Rao N., et al. reinforces the notion by highlighting the importance of a strong educator-student connection for successful online learning. In the face of these challenges, educators and administrators remain committed to creating a conducive learning environment that prioritizes adaptability (Rao NL, et al., 2024). Teachers' perception with use of technology and time management practices is moderately effective during the shift from traditional to remote teaching because of sudden nature of transition, technological challenges, the need for significant pedagogical adjustments, varied student engagement levels, time management issues because this requires more preparation time for lessons and grading and additional time spent on troubleshooting. Technical issues leading to increased workload, communication barriers made it harder for teachers to gauge student understanding and provide instant feedback due to

limited access to resources because some teaching materials are not easily transferable and accessible affecting the quality of instruction. Gaps in professional development are inadequate in digital tools that teachers have to learn on the job, which is not equally effective for everyone. Challenges associated with online assessment and feedback that require new approaches to testing are not reliable as they are in the traditional methods to ensure academic honesty and integrity in online assessment. Despite some advantages, participants with e-learning skills reported internet connectivity and speed issues. Slow internet hindered video streaming for students (Rao NL, et al., 2024). Although they were able to manage to adapt, these intricacies can result in a moderate to very effectiveness. The absence of direct patient interaction remains a significant hurdle (Deery, 2020). However, several institutions are actively addressing this limitation by adopting diverse e-learning tools like flash multimedia, digitized images, virtual patient simulations, and virtual reality (VR) simulators (Rao NL, et al., 2024). In Rao NL et al.'s research, students and educators acknowledged the benefits of flexibility, improved online teaching skills, and efficient time management.

Table 36

Practices That Are effective to Help Teachers Adjust from Remote Teaching to In-_Person Teaching. n = 35

Teachers Practices	Level of Effectiveness	*f*	%
Technology such as laptop, tablets, desk computers	Very effective	31	88.57
	Moderately effective	2	5.71
	Slight effective	1	2.85
	Not at all effective	1	2.85
	No response	0	0.0
Time Management	Very productive	33	94.28
	Moderately productive	1	2.85
	Slightly productive	1	2.85
	Not at all productive	0	0.0
	No response	0	0.0

Moreover, Table 36 shows that teachers are very effective (88.57%) in technology, such as laptops, desk computers, mobile phones and desk computers, while in time management is very productive (94.28%) from remote teaching to In-person teaching. In addition, online learning integrates technology into the online teaching and learning process. The pedagogies must be raised with online tools, namely the suitability and ability of technology. It is crucial to ensure that the selected tools or resources, such as videos, help students achieve the desired results and can help develop practical knowledge (Safitri, et al., 2022). Choosing the right platform is very useful in implementing online learning because online learning requires special teacher's attention to the condition of the environment. Even though students learn online, they also need someone to guide the learning process. Therefore, teachers need to provide feedback to students, respond promptly, and provide individualized guidance for each student. This interaction improves student motivation in the online learning process (Gómez-Rey, et. al., 2016). The implementation of online learning relies on the availability of smartphones and or computers as the medium. While these devices are now commonly owned by many, they remain difficult to access by individuals with lower-middle economic status. Teachers' view their practices involving technology and

time management as very effective and very productive, respectively, when transitioning back to in-person teaching and learning due to improved technological proficiency, the integration of blended learning techniques, efficient time management strategies, enhanced student engagement, better assessment and feedback processes, greater resources accessibility, improved communication, ongoing professional development and the effective use of classroom management tools. These skills and practices developed during remote teaching have been carried over, enriching the in-person educational experience and making it more effective and productive. In terms of strategies employed by students, the most frequently used were resource management and utilization, help-seeking, technical aptitude enhancement, time management, and learning environment control (Barrot, et. al., 2021).

For Students

Table 37

Practices That Are Effective to Help Students Adjust from Traditional Face-to-Face to Remote Teaching. N = 294

Teachers Practices	Level of Effectiveness	*f*	%
Technology such as Laptop, tablets, desk computers	Moderately effective	174	59.18
	Slightly effective	65	22.11
	Very effective	34	11.56
	Not at all effective	17	5.78
	No response	4	1.36
Time Management	Moderately productive	166	56.46
	Very productive	77	26.19
	Slightly productive	48	16.33
	Not at all productive	3	1.02
	No response	0	0

Students' adjustment from traditional to remote teaching and learning with technology is moderately effective (59.18%) and time management is also moderately productive (56.46%), respectively, as illustrated in Table 37. Students view their practices involving technology like laptops, mobile phones, and time management as moderately effective and productive when transitioning from traditional to remote teaching and learning because students had to quickly adapt to using technology as a new tool for their learning that requires skills and familiarity with different platforms. The technical issues that they confront in online learning situations are dependent on many factors, such as the quality of communications infrastructure and the availability and access to software and hardware platforms to support learning (Turnbull, D., et al., 2021). Technical issues, like connectivity problems, interrupt their learning process and in addition, not all students have reliable internet access leading to challenges in their ability to participate effectively in remote learning. They face distractions at home, such as balancing home chores and remote learning thus creating additional challenges which make it harder to maintain productivity. Their social interaction and collaborations are hindered causing less productivity and motivation. They sometimes procrastinate their classwork which affects their time management and productivity. The capacity for learners to participate in online learning communities needs to be enhanced to ensure that a similar sense of connectedness can be retained if programs transition to online-only modes of delivery (Turnbull, D., et al. 2021). Students should also have the opportunity to express opinions and ask questions on the learning materials that they do not understand. Despite Zoom being user friendly, the

majority of users have difficulty 'joining the group'. Common technical problems include weak internet network quality, outdated hardware specifications, or a malfunctioning webcam and microphone. This is because using Zoom requires high-speed Internet access (Archibald, et.al.2019). In the research of Becker, et. al., 2022, mind mapping software was utilized to capture themes and subthemes. Identified themes were related to problem-solving skills, grades, time management, attendance, and interpersonal communication, both in terms of student-to-student and student-to-faculty communication. For these identified areas, outcomes during the return to in-person learning are mostly undesirable. The inability to adopt and employ sound study skills and time management practices impacts academic success. Late submissions or failure to submit assignments were related to low academic achievement (You, W., 2015). Time management and attendance issues were linked to poorer grades, and faculty felt that these behaviors and outcomes suggested that academic performance was not the most important priority for many students (Becker, et. al., 2022). Challenges with time management are worrisome since effective strategies are linked to better academic outcomes. The importance of effective time management on class performance was also observed during the COVID-19 pandemic as these skills were shown to positively correlate with self-efficacy and learning engagement (Heo, et al., 2021). One study on students' self-assessment of their own behaviors with online schooling during the pandemic reported that they had diminished time management skills and their ability to complete assignments on time had decreased (Aguilera-Hermida PA., 2020). On the contrary in general, all students were very enthusiastic in online learning during their learning from home period. This is characterized by active and communicative students during the learning. Students also always tried to attend the online learning at the agreed time. There were some interesting things during the online learning process, like though some students were usually passive in offline learning, they were quite active in the online learning process (Safitri, et al, 2022).

Table 38

Practices That Are Effective to Help Students Adjust from Remote Teaching to In-Person Teaching. n = 294

Teachers Practices	Level of Effectiveness	*f*	%
Technology such as Laptop, tablets, desk computers	Very effective	153	52.04
	Moderately effective	94	31.97
	Slightly effective	36	12.24
	Not at all effective	11	3.74
	No response	0	0
Time Management	Very productive	158	53.74
	Moderately productive	111	37.76
	Slightly productive	14	4.76
	Not at all productive	9	3.06
	No response	2	0.68

The data shown in Table 38 presents that students are very effective and very productive in both technology (52.04%) and time management (53.74%) in their dental education adjustments from remote to in-person classes. Students view their practices involving technology and time management as very effective in enhancing their learning experience and organization when transitioning back to in-person learning. The overall productivity was due to the need to readjust to structured schedules, face new

environmental dynamics, manage increased social interactions and cope with emotional and mental aspects of returning to a physical classroom. The benefits of enhanced technological proficiency and improved time management skills are counterbalanced by the challenges inherent in this significant transition. According to Turnbull, D., et al. 2021, there is no one-size fits all approach that will meet the diverse needs of learners from different disciplines across the globe. University administrations need to adopt flexible approaches to technology adoption that fully consider the unique circumstances of learners in specific locations and circumstances. In order to cope with restrictions on person-to-person interactions, HEIs have accelerated their transition to online learning with profound consequences for both students and faculty. This transition has been facilitated by the integration of online technologies such as Zoom and Moodle into course delivery systems which have in turn instigated changes to traditional F2F pedagogical practices to accommodate e-learning for different knowledge domains (Turnbull et. al., 2021).

5. Teachers and Students' Thoughts and Comments Including Those Who Will Be Approved for Limited Face-to-Face Teaching That Concern Effective Delivery of Remote Teaching and Enhance Remote Learning in Dental Education during the COVID-19 and Post-Global Pandemic

The thoughts and comments from teachers and students regarding effective delivery of remote teaching and enhancement of remote learning during the COVID-19 pandemic and beyond reflect a collaborative spirit aimed at leveraging the lesson learned. By embracing clear communication, engaging content, and a focus on safety and well-being, dental education can continue to evolve and improve, ultimately better preparing students for their future careers in the field.

For Teachers

Table 39

Teachers' Perceptions of the Effectiveness of Types of Modalities, and Readiness to Return to In-Person Classes.

		f	%
1. To what extent do you agree that remote teaching/learning is an effective modality? [RATE]	Somewhat effective	15	42.9
	Somewhat ineffective	8	22.9
	Strongly disagree	4	11.4
	Neither agree nor disagree	3	8.6
	Agree	2	5.7
	Disagree	2	5.7
	Strongly agree	1	2.9
2. To what extent do you agree that in-person teaching/learning is an effective modality? [RATE]	Strongly agree	17	48.6
	Agree	11	31.4
	Somewhat effective	5	14.3
	Neither agree nor disagree	1	2.9

	Strongly disagree	1	2.9
3. How would you rate your readiness shift from remote teaching/learning to traditional face-to-face teaching/learning? [RATE]	Agree	15	42.9
	Strongly agree	10	28.6
	Somewhat effective	6	17.1
	Neither agree nor disagree	2	5.7
	Strongly disagree	2	5.7

Regarding teachers' responses, most teachers feel that remote teaching and learning is *somewhat effective* as a modality. Additionally, most teachers *strongly agree* that in-person teaching/learning is an effective modality. Lastly, most teachers *agree* they would be ready to shift from remote teaching/learning to traditional face-to-face teaching/learning as gleaned in Table 39. Teachers' perceptions of remote teaching and learning being somewhat effective reflect both its benefits and inherent limitations with a balanced view that acknowledges both strengths and limitations of the modality. In the study of Honra, (2022), teachers can create a learning community to share best practices applied during the remote teaching and learning modality. Gen Z and millennial teachers could share their experiences of effectively using various technologies in teaching students with Gen X teachers. Likewise, Gen X could share some pedagogical practices they employed with the former (Honra, 2022). While remote learning provides flexibility, safety during pandemics and some technological advantages, it also presents significant challenges in engagement, instructional quality and classroom management. Not all students thrive in an online learning environment because of their learning styles since some students benefit from interactive, hands-on experiences that in-person provides and are difficult to copy effectively in online mode. Keeping the students engaged and actively participating in a virtual environment is harder than in a physical classroom. Not all students have equal access to reliable internet, appropriate devices or a conducive learning environment at home. According to the study of Quintos, et al., respondents agreed that lack of technological infrastructure, access to a computer for schoolwork, lack of availability of parents/guardian to support learning at home, lack of adequate communication with parents on coordinated curriculum-aligned learning and access to internet connectivity to both teachers and learners are the different strains of online learning modality (Quintos, et.al., 2021). Maintaining discipline and managing a classroom environment is more complicated online, where teachers have less control over students' distractions. Dental subjects require hands-on practice which may suffer in a remote format because the depth and richness of in-person instruction and practice are lessened. Teachers' strong agreement on the effectiveness of in-person teaching and learning is rooted in the enhanced engagement because a face to face interaction facilitates direct eye contact and non-verbal communication, which are crucial for understanding student comprehension and retaining information more effectively. Since in-person classes provide a structured routine that helps students develop good study habits and time management skills, the students can focus more during class time. It also offers effective classroom management, for teachers can more effectively manage the classroom areas by minimizing distractions and maintaining discipline; likewise, it provides better access to resources in which students can access physical resources like books, lab equipment and classroom materials more readily; it gives social and emotional learning opportunities, such as peer interactions and teachers' emotional support can build relationships with students, fostering a safer and more supportive learning environment that this modality provides. Honra (2022) recommends that the school administrations prioritize teachers' professional development by providing them with vital training and seminars to improve the said skills. The head of various educational institutions should

empower teachers by providing them with meaningful and helpful professional development training. Teachers likely agree on their readiness to transition back to face-to-face learning due to their familiarity with traditional teaching methods and the positive aspects of in-person interaction. The results of the study of Quintos, et al, revealed that the comfort and confidence level of teachers on the integration of technology in the classroom indicated that though the respondents were somewhat confident and comfortable in using technology, they did not have much confidence on it because of the various challenges, uncertainties, potential stressors associated with the shift, ranging from logistical, health-related, and emotional factors for professional development and support during the transition period. Technological innovations have great potential to enhance curriculum and teaching processes, but due to the sudden changes in the Philippine educational system caused by the pandemic, teachers may not be fully prepared to engage with and integrate technology into their teaching practices. Likewise, teachers and students may not have the adequate knowledge and skills to utilize technology to support online learning (Quintos, et.al., 2021).

For Students

Table 40 presents that most students *agree* that in-person teaching/learning is an *effective modality*.

The COVID-19 pandemic profoundly impacted the academic lives of all learners. Students can learn both online and in-person depending on the dominant instructional modality students chose (Larson, et.al., 2023). Some learners easily adapt from classroom setting to online learning changes but struggle most with the new learning modalities, for the learners needed to cope with their studies despite the health crisis they had to face. As such, learning is far better with the presence of teachers since

Table 40
Students' Perceptions of the Effectiveness of Types of Modalities and Readiness to Return to In-Person Classes

		f	%
Remote Teaching/Learning	Somewhat effective	107	36.4
	Neither agree nor disagree	66	22.4
	Somewhat ineffective	49	16.7
	Agree	34	11.6
	Disagree	20	6.8
	Strongly agree	10	3.4
	Strongly disagree	8	2.7
In-Person Teaching/Learning	Strongly agree	105	35.7
	Agree	100	34
	Somewhat effective	53	18
	Neither agree nor disagree	21	7.1
	Somewhat ineffective	12	4.1
	Disagree	3	1
Readiness to shift from Remote to in-person	Agree	97	33
	Somewhat effective	81	27.6
	Strongly agree	39	13.3

	Neither agree nor disagree	36	12.2
	Somewhat ineffective	36	12.2
	Disagree	4	1.4
	Strongly disagree	1	0.3

Students learn more if they can interact with their teachers and classmates (Potane, et.al, 2023). The current cohort of undergraduate students is often said to value technology and is assumed to prefer immersive, interactive, and personalized learning experiences. In contrast, many educators recognize the value of face-to-face classes and believe that attending class positively impacts student performance (Lewohl, 2023). Students mainly claim that remote teaching/learning is somewhat an effective modality. That the students perceive remote learning as only *somewhat effective* underscores the complexity of the experience. Following the pandemic-induced shift in educational modalities from in-person to online, the calls for a return to "normalcy" or in-person learning has guided institutional policy-making and culture more broadly (Tulloch, 2024). The shift to in-person learning modalities is an opportunity to think critically, and make an accounting of the features of both the in-person learning modalities of "the before times" as well as of the COVID- induced period of online learning. An account of if the tools utilized are available and suitable and what an educational future looks like with the integration of the tools used during the online period to the in-person learning modality (Tulloch, 2024). Further, students feel that the in-class experience is enhanced by using the active learning platform and that this mode of teaching help them understand and apply the course concepts (Lewohl, 2023). While remote learning offers flexibility and access to a wide range of resources, various challenges can impede its effectiveness. Addressing these issues requires a multifaceted approach, including improving technology access, providing support for diverse learning needs, enhancing engagement strategies, and ensuring robust communication channels. The integrated approach can assist the overall effectiveness of remote teaching and learning.

Students' strong agreement that in-person teaching and learning are more effective stems from the tangible and intangible benefits that traditional classroom can provide because it allows them direct, face-to-face interaction with teachers and peers, which can lead to a clearer understanding and richer discussions. They can maintain a consistent routine and can enhance focus on discipline and time management because the in-person classrooms are more controlled and have less distractions that most students commonly face at home during remote learning. Dental subjects require ample hands-on practice, experiments, labs or physical demonstration that are effectively taught in person, for they provide experiential learning and can enhance understanding. Most students prefer the in-person teacher because the presence of a teacher can provide more direct encouragement and motivation for them to stay focused and accountable. These elements collectively create a more effective and enriching educational experience.

With regard to the students' view that the readiness to shift from remote to in-person learning is *somewhat effective*, it is likely influenced by a combination of mixed experiences with remote and traditional learning. Different students have different learning experiences that some of them have thrived in a remote setting and found more conducive to their learning styles, making their shift back to in –person learning less immediately effective. Potane, et al (2023) assessed and evaluated certain measures such as their emotional, physical health, and financial needs in order for the learners to be ready to be back to face-to-face learning. The students' gradual adjustment to the then ongoing health safety could have contributed to their hesitation that has affected their perception of their readiness for in-person teaching and learning. The benefit of using this teaching approach is that it can be adopted for use in any discipline that involves

both the acquisition and application of knowledge; it is readily scalable to accommodate large classes and can be used for both online and hybrid learning environments (Lewohl, 2023). Further, students felt that the in-class experience was enhanced by using the active learning platform and that this mode of teaching helped them to understand and apply the course concepts (Lewohl, 2023). Based on the analysis of Larson, et al., they suggest that providing modality options does benefit students. The majority of students in this study indicated that having modality options was a good thing. It can help alleviate anxiety and stress and allow students to regulate their learning based on individual needs (Larson, et.al., 2023). Providing a choice of modality also accommodates attendance issues that occur due to health conditions, weather, and other unexpected situations. Not only does it provide students with a way to catch up when they cannot attend in-person lectures, but it also allows them to review content covered in class when preparing for exams (Larson, et.al., 2023). In the study of Lewohl (2023), it reveals that attending face-to-face classes still holds significant value, as students reported greater benefits from in-person interactions compared to relying on independent study. Hollister, et al, (2022), proposed that the courses and professors, despite the modality switch and changes to teaching and assessment strategies maintained the level of learning that students felt they were getting out of their course (Hollister et.al., 2022).

Results of descriptive statistics conducted for this fifth research question reveal that both students and teachers find remote teaching and learning to be effective modality. Students find remote teaching somewhat effective, while teachers find in-person teaching and learning to be effective. Most teachers and students are prepared to transition from remote to traditional face-to-face teaching.

B. The Qualitative Data and Findings

Member-checked transcripts verbatim of the interviews with 12 students and 12 teachers were imported as source files into NVivo 14 computer-assisted qualitative data analysis software. Teachers' and students' responses from the interview questions were the sources of qualitative data to generate themes using the inductive and thematic analysis (Clarke & Braun, 2014) for remote teaching and in-person learning and teaching during and post pandemic.

1. Teachers' Teaching Practices and Experiences That Teachers Have during the COVID-19 and Post Global Pandemic in Dental Education with regard to Technology Usage, Assessment Strategy, Methods of Delivering Instructions, and Preparation of Teaching Materials.

Table 41

Thematic Analysis of Teachers' Teaching Practices and Experiences Responses during COVID-19 Remote Teaching and In-Person from the Interview Questions

Aspect	Illustrative Teacher Responses /Initial Coding	Code	Subthemes/ Preliminary Themes	Themes
Technology Usage	"I just started using tablets and iPads during remote teaching" (T2) and "I use my laptop and tablet to check and grade their activities and assignments" (T6). "I used	Preference to use of tablets, laptops in classroom activities and assignment Promote the ease of use of laptops	Importance of technology in times of crises	Use of Technology in times of crisis

	laptop" (T12) and "Laptop was used to facilitate online discussions and quizzes" (T13). We use virtual classroom (via Zoom/Google Meet) to present our PowerPoint and discussion (T1). T11 stated, "I used Zoom for online lectures and online student consultation, it was free during the Covid-19 era for the members of the academy." T9 said, "I chose Google meet and Zoom platforms for their ease of use." T1 provided the following representative response: "I find it easy to cope with the technology because when I was growing up the technology was continuously improving," indicating that growing up with technology was the source of his proficiency. T11 said in another representative response, "I can say that I am somehow proficient since I can easily learn new technologies whenever they become available." Similarly, T6 reported, "As a millennial, I consider myself an 8/10 when it comes to using electronic gadgets and navigating new platforms. If I do not know how to	Explore the use Zoom/ Google Meet and powerpoint Ease of use Proficient with technology	Encourage creativity in the choice of technology Technology proficiency	Proficiency in the use of technology Creativity in the choice of technology in class

	use a particular platform, I will teach myself to do it."			
Assessment Strategy	"Online quizzes and examinations" (T11) and (T8) "Google Forms/online quizzes via Canvas" (T1) and, "Quizzes through Canvas" (T3) "I asked them to use a double camera. One focusing on their monitor and to themselves while taking the quiz." (T2) T1 reported that he required students to implement the following safeguards against cheating during online assessments: "Two cameras focusing on them (one on the hands/keyboards and one focusing on the monitor), sounds are on, and no books inside the testing area." T2 provided corroboration, reporting similar precautions against cheating: "I asked them to use a double camera. One focusing on their monitor and the other to themselves while taking the quiz." T2 said she had decided to utilize those platforms because, "they are user friendly. " T4 said she chose to use Canvas because, "It was	Online assessment Monitor the conduct of online assessment Online cheating Precautions against online cheating Choice of a more convenient platforms Assessment of platform ease of use University introduced Canvas	Practices in administering quizzes and examinations Safeguard in implementation of assessment Safeguard in the implementation of assessment User friendly Canvas used for assessment	Reshape the assessment practices Maintain integrity of assessment strategy Efficient management of online assessment strategy

	provided by the school and most convenient online platform. " T6 reported in another representative response that she selected Canvas and Google Forms for administering assessments because, "I think that is still the most efficient way still at this moment." T7 explained that he could view the students during examinations through Canvas: "Open camera and monitor the students' performance during the actual exams which can be seen in the Canvas monitor, like changing of websites, etc." T1 said, "I don't know if they are learning or just cheating because even when you have two cameras on it, there are still ways to cheat." T12 agreed that, "The integrity of assessments is not 100% no matter how strictly we implement our rules."	Online cheating	Canvas used for assessment	
Mode of delivery of Instructions	T11 "I would make sure that all the students in my class are inside the Zoom meeting." " T9 "We meet synchronously through Zoom or Google Meet for discussion and exchange of opinions."	Zoom meet for online lectures Exchange of opinions Online students' attentiveness	Online interaction	Effective delivery of instructions through interactions online

	T2 spoke of using teleconferencing to monitor students' attentiveness during lectures: "I can effectively deliver instructions through interactions online to test if they are listening."	Teleconferen-cing	Remote instruction Effective Remote instruction Effective	
	T9 said that instruction delivery was synchronous through teleconferencing platforms: "We meet synchronously through Zoom or Google Meet for discussion and exchange of opinions."	Online communication with students	Remote instruction effective	
	T1, said, "I think my remote teaching during the COVID-19 pandemic was effective. I used clear communication, engaging content, and adapted to challenges."	Recitation in between discussion	Remote instruction effective	
	T12 said, "I think it is effective, since I give the same energy during online classes and make sure to have recitation in between discussions."			
	T11 said of online instruction in general, "I don't think it is 100% effective, I have no clue if there are listening or doing something else."	Remote instruction is not as effective as in-person.	Ineffective remote instructions	
	T4 said, "I think I did my best to deliver, but still, skill-based subjects are			

	best delivered face-to-face.			
Preparation of materials	T12 indicated in a representative response that he gathered teaching materials from, “Reliable online sites. ” T3 gathered teaching materials from, “Journals through Google,” and T4 gathered materials from, “E-books. ” T7 reported that he gathered teaching materials through, “Online resources, books, journals, etc.” T2 said, “We were just introduced to the common platform CEU-LEAPS (Canvas), where we can get the topics that should be discussed in the class.” T4 reported participating in, “An online training in the use of Canvas.” T9 explained that to help teachers prepare for the shift to online learning, “The university provided a learning management system—the CEU-LEAPS—Canvas. They conducted pocket seminars on the use of the system and learning tools incorporated within.”	Reliable online sites to gather teaching materials Use of e-book, journals Available online learning Canvas University introduced Canvas University provided Online training Learning Management System	Online learning materials University introduced Canvas University provided Online training	Learning material development for remote teaching Preparation included gathering materials online and learning Canvas

Table 42
Summary of the Thematic Analysis Teachers' Teaching Practices and Experiences That Teachers Have during COVID-19 and Post Global Pandemic

Aspects	Themes
Technology Usage	The use of technology such as laptops and tablets in time of crisis; Proficiency in the use of technology and Creativity in the choice of technology in class.
Assessment Strategy	Assessment strategies included remote monitoring through platforms chosen for ease of use; Maintenance of integrity of assessment strategy; Reshaping of the assessment practices and Efficient management of online assessment strategy;
Model of delivery of Instruction	Instruction delivery was through online lectures and interactions
Preparation of Materials	Preparation included gathering materials online and learning Canvas

2. **Challenges That Teachers in Dental Education Have Encountered in Terms of Technological Proficiency in Providing Remote Classes, Infrastructural Availability to Effectively Support Remote Teaching, Time Management in Delivering Remote Classes, and Teacher Readiness for Teaching during the COVID-19 and Post Global Pandemic**

Table 43
Thematic Analysis of Teachers' Challenges in Dental Education Responses during COVID-19 and Post-Global Pandemic from the Interview Questions.

Aspect	Illustrative Teacher responses/Initial Code	Code	Subtheme	Theme
Technological proficiency in providing remote classes	T2 stated that she's familiar with some gadgets but it is really difficult to communicate in remote teaching. Emails and text messages were very helpful in conveying instructions and answering inquiries. T1 said "I become more effective in communication to my students both in remote teaching and in-person classes."	Ease of Communication	Ease of Communication	Teachers' challenges with regards to ease of communication using laptops and mobile devices and productivity including poor connectivity, effectiveness and progressiveness using hybrid learning.

	T9 said "My tech skills improved my communication during remote teaching. It helped deliver information clearly, engage to students and lastly it maintains a professional online environment." T5 said that "It is somehow effective because I mix my teaching techniques on how the GenZ would understand the lesson. At first, I was confused because I thought they are not listening to me because they are manipulating their gadgets. But it is their way to write notes on how they understand the lessons being discuss". T1, T2, T3, T4, T8, T9, T11 shared the same sentiments regarding productivity, like T5 mentioned that "I feel more productive since because of technology my work become easy. T9 stated "My tech skills improved my productivity in remote teaching by making tasks more efficient and enabling effective use of online tools and it enhance my productivity during in-	Productivity and ease of use. Internet connectivity	Productivity and ease of use. Internet connectivity	

	person classes that makes practical exams easier, help use technology effectively, and enhance discussion." T7 said "At first, while adapting in the use of technology, there was a little bit of lapses in delivering the lesson. The usual reason of students on internet connectivity affected my management and the decision to accept or not to accept the reason of students." T2 said "Teaching remotely became a challenge mostly because of the internet speed. Technology can be used more effectively if it is coupled with a decent speed of the internet connection." T11 stated "Weak internet signal, disruptions, distraction." T6 said "I have not much adjustments as I also use laptop before, during and after pandemic." T2 said "I am still using my mobile phone in monitoring the class during quizzes zooming-in on each of them with the camera."	Use of laptops, Mobile phones and other tools Hybrid learning experiences	Use of laptops, Mobile phones and other tools Hybrid learning experiences	

	T8 stated "A sudden shift of environment can always trigger challenges, our university somehow prepared us with the use of online platforms like Edmodo before the pandemic. We were prepared somehow." T1 said "The challenge in online learning is the credibility in its assessment. It will be mitigated in doing hybrid classes both onsite and online." T3 stated "My proficiency in technology has transformed my classroom management, enabling me to seamlessly integrate interactive, personalized, and hybrid learning experiences into the traditional face to face environment." T2, T3, T4, T5, T11, T12 mentioned that their skill affects their productivity to work efficiently and make the transition a bit easier.	Effectivity and progressively	Effectivity and progressively	

Infrastructural availability to effectively support remote teaching	T2 said, "Challenges included slow internet connection that results in lagging and even sudden lost [disconnection] in the discussion because of loss of internet connection." T5 said "Very frustrating if no signal or weak connection." T1 said "Not adequate as connections to the internet is unstable and poor signal." T6 said of challenges, "Honestly, the unreliable internet provider is a headache. They will have an unannounced internet interruption in the middle of the day, so my class is also interrupted."	Slow and lost connections No signal or weak connections Weak or interrupted internet connectivity	Slow and lost connections No signal or weak connections Weak or interrupted internet connectivity	I nternet connectivity and reliability
Time management in delivering remote classes	T1 said of the challenges of time management during remote learning, It is easy to manage time when it is face-to-face teaching because we have a structured schedule. However, when it is remote, some of students are not	Poor internet connectivity made time management a challenge	Poor internet connectivity made time management a challenge	Teachers management of time and preparations of tools and lesson plans including internet capacity.

	available or having a problem in internet connection or power outage, so I have to adjust for them to learn. T5 said "Teaching remotely makes us plan much ahead of time because we need to consider the sudden and unusual that could happen online that is beyond our control. we should have plan B if plan A fails because of internet connection" T12 said time management was challenging for a different reason, because, "Sometimes there are distractions since I don't have my own space in conducting online classes." Thus, T12 occasionally struggled with time management because of distractions in the environment from which he delivered his online instruction. T6 said, "Honestly, sometimes the work was piling up due to personal time and working time getting mixed. I managed my time better when in face-to-face classes."	Time management struggle Struggling with work-life balance when working from home. Space privacy in conducting lectures.	Time management struggle Struggling with work-life balance when working from home. Space privacy in conducting lectures.	

	T2 said "Just like any new scheme, you have to be prepared. First thing I did was to find a space for myself, free from noises or ambient sounds, that could affect the conduct of my class. I manage my time by strictly following the time doing lessons and housework but sometimes they still overlap. However, in in-person teaching, you have a fixed schedule to follow, and time management is not a problem. If you are done in school, you go home and do housework." T1 mentioned " There are a lot of disturbances in working home than in-person T8 said " Since I live distant from the university, the usual travel time is 1-1.5 hours and this is saved during work from home.	Commuting, traffics, travel time and meals	Commuting, traffics, travel time and meals.	
	T4 said "The comfort of the home is incomparable. It really is nice to work relatively easier within house premises especially in the idea of traffic during pre-			

	pandemic. My materials are already prepared so a little updating was done. Preparation was almost always fluid." T12 said "Commuting going in and out of school also consumes time."			
Teachers' readiness for teaching	T5 said "I have prepared my gadgets, internet connections, and research about the different apps that I can use for teaching and giving assignments online." She also mentioned "School just prepared for the common platform that both students and the faculty can use, but they did not consider the students and the faculty if they have gadgets and source of internet connectivity." T1 said "Incorporation on the use of technology more than the pre-pandemic time." T12 said "I bought gadgets that will ease my online classes and search additional online material which is interactive." T6 and T9 said "Not much adjustment as I	Adjustments and incorporation of the use of laptops and other tools	Adjustments and incorporation of the use of laptops and other tools	Teachers' challenges concerning health protocols, adjustments and incorporation of mobile devices, inadequate facilities and hybrid implementations.

	also use laptop before, during, after pandemic to present the discussion clearly." T2 expressed "As what has been said, attending seminars and webinars helped a lot in the preparation for remote teaching. The school provided pocket seminars in the use of the LMS they have provided." T8 stated " I attended meetings and seminars to keep me update of new platforms, applications and techniques." T12 said "The school provided support by conducting TETRAOLT and seminars which can help us shift to online classes." T2 said "With the safety measures installed in the school, coming back to in-person teaching has not been a problem. The school made sure to follow the health protocols issued by the national and local government and install the necessary safety measures before	Attending seminars and webinars Health and safety measures and travel time	Attending seminars and webinars Health and safety measures and travel time Hybrid implementation	

	opening it again for in-person teaching." T4 stated " I have to consider routes of travel to meet my classes on time." T5 and T12 said "School is just concerned about the health protocol and not the preparation in teaching in-person. They are conducting seminars and trainings in preparation for the transition." T11 said " I did not prepare anything but I'm more concerned with health protocols." T1 said "The use of hybrid form of classes wherein a combination of online and on-site classes are now being implemented." T11 said, "No facilities were given, the university doesn't have a decent and reliable [internet] connection." T12 agreed, saying, "We are the ones providing our own gadgets and internet connectivity." T4 provided corroboration of T12's response, saying of university facilities that they were, "Not adequate, internet expenses and	Hybrid implementation Inadequacy of facilities	Inadequacy of facilities	

	gadgets upgrade were shouldered by the teacher." T8 said of facilities, "None was provided by the school."			

Table 44
Summary of the Thematic Analysis Teachers' Challenges in Dental Education Response during COVID-19 and Post Global Pandemic

Aspects	Themes
Technological proficiency in providing remote classes	Teachers' challenges with regard to ease of communication using laptops and mobile devices and productivity including poor connectivity, effectiveness and progressiveness using hybrid learning.
Infrastructural availability to effectively support remote teaching	Internet connectivity and reliability
Time management in delivering remote classes	Teachers management of time and preparations of tools and lesson plans including internet capacity.
Teachers' readiness for teaching	Teachers' challenges concerning health protocols, adjustments and incorporation of mobile devices, inadequate facilities and hybrid implementations.

3. Challenges that Dental Students Have Faced in terms of Technological Proficiency in Attending Classes, Infrastructural Accessibility to Effectively Support Learning, and Student Readiness to Comfortably Shift from Traditional Face-to-Face Teaching to Remote Teaching during the COVID-19 and Post Global Pandemic

Table 45
Thematic Analysis of Teachers' Challenges with students' responses during COVID-19 and Post-Global Pandemic from the Interview Questions

Aspect	Illustrative Teacher responses/Initial Code	Code	Subtheme	Theme
Technological proficiency in providing remote classes	T5 said "It made me organize information easily through different apps." T1 stated "The ability to organize is not that much	Organization of information	Organization of information	Teachers' challenges with the students' organization of their

	effective in technological skills, in-person instructions is still the best one." T9 mentioned "Students' technical skills affected how well they organized information in remote classes. Effective students managed online materials effectively, while those with limited skills may have struggled with online organization, influencing their learning experience." T7 said "Critical thinking is not being used anymore because they rely on apps for answers." T1 said "Critical thinking is less in remote classes as students turn immediately to google or internet sources than reading in resource books and materials." T9 said "Efficient students utilized online resources well, analyzed information effectively, and engaged in discussions. Limited skills could have posed problems to critical thinking and active participation." T5 also said "They are not thinking critically anymore since they mostly rely on technology. They will just	Decrease in critical thinking	Decrease in critical thinking	information, their productivity and output in using technological tools and the used of their critical thinking.

	search for the answer online." T2 insisted " they heavily relied on technological skills and forgot to think critically because the answers to every question were just a click away." T11 said "Technological skills of the students are more productive but less effective." T6 stated "They are very skillful, technical savvy, and adjust fast." T2 said "Students are the ones who are technologically savvy. They have been using mobile phones and other devices even before the pandemic hits. Using them to learn might not be new for them, but teaching them how to use these gadgets to learn may be a different story." T5 mentioned "It is a challenge for us teachers to produce quality outputs because our course should be outcome based and we can only achieve it through practical face-to-face teaching and learning." T1 said "The student's productivity is improved as the Canvas has set deadlines for the submission of tasks and quizzes."	Productivity of technological skills Quality output using technological tools.	Productivity of technological skills Quality output using technological tools.	

	T9 stated "Students' tech skills influenced their productivity in online classes. Efficient students used online tools effectively, while those with limited skills may have faced challenges, affecting their productivity and keeping up with class requirements. T7 said "They used apps for easier submission." T2 Said "They have been using mobile phones and other devices even before the pandemic hits. Using them to learn might not be new for them, but teaching them how to use these gadgets to learn may be a different story." T9 said "Students' tech skills affected their ability to produce quality work in remote classes. Proficient students used digital tools well, submitted organized assignments, and had quality interactions. Limited skills may have led to challenges and lower-quality outputs."			
Infrastructural availability to effectively support remote teaching	Majority of the 12 teachers stated that the students have poor internet connections except for T12. He said "Most of my students	Poor internet connections	Poor internet connections	Availability of gadgets and mobile devices and reliability of internet connection

	have a reliable internet connection." T5,T3,T7,T1 and T6 all stated that Unstable and frequent disruption of internet connection is common. T2 said "The students were introduced to the LMS of the school, they easily learned to navigate it, but the problem remained in the speed of the internet connection- so most of the time, synchronous classes were just done once a week, and the rest were asynchronous- submissions of projects and reaction papers." T9 said "Students had challenges with internet connection during the COVID-19 pandemic, affecting their attention and participation in online classes. To resolve this, providing offline alternatives and pushing for improved internet access became important." T5 said "Pandemic was sudden and the students as well as teachers were not really prepared in having the best gadgets for remote teaching and learning." T8 said "Our students have their own gadgets	Struggling with technological gadgets	Struggling with technological gadgets	

	and this is not a challenge." T12 said "Some of the students don't have laptops and mobile phones." T3 stated "The main problem in online classes is unreliable internet connection, especially during typhoons accompanied by thunder and lightning. Another problem is the internet provider itself, they are not delivering their advertised speed." T1 said "Some students cannot afford to have expensive gadgets which has a lot of features to help them navigate and understand the modules developed by the faculty." T9 said "Some students faced challenges accessing gadgets for remote learning during the COVID-19 pandemic, affecting their participation. To resolve this, provide alternative resources." T11 and T7 stated that students have no problem in any form of gadgets but usually internet connections.			

Students' readiness to shift from face to face to remote learning	T6 said "They have poor time management, always asking for submission extensions." T2 said "Students during the remote class scheme submit their projects and course work in time because they were given ample time to do them. Synchronous classes were just once a week and the rest of the days were devoted to doing assignments. In-person class is different because most of the time students are in school attending classes and it is only during weekends, they have the time to complete assigned tasks and paper works, so mostly they submit them late." T7 said "There were lots of complaints and excuses." T12 said "Some become lax and submit late activities unlike in person they usually submit it on time." T9 said "I think time management is the main challenge for them. In remote teaching, students faced challenges completing work on time due to varied schedules and distractions. In-person classes offer a more structured environment, making it	Students' time management	Students' time management	Teachers' challenges with the students' time management and their dealing with the return of in-person classes due to facilities.

	easier for students to stay on track. Clear communication and support help address these challenges in both settings." T3 stated "Communicating with the students is one of the challenging things on the course work due to outputs that need constant monitoring and observation by us. It is both challenging to us and the student because of how the entire curriculum endeavors. Well if in person settings there are no digital boundaries and the network relationship works roughly to teacher and the student itself making the course more interactive." T1 said "Some students wasn't able to submit their tasks, quizzes, exams due to unstable and frequent disruption of internet connection. In-person classes has more time to complete course work as they are on-site working on the requirements than in remote learning wherein a lot of factors are to be considered in online classes." T5 said "Time management is one of the challenges because			

	students are used to the remote classes where they do their activities at their own pace. Unlike in-person, they need to finish the work at a specific time while on campus." T8 said "Students have different types of behavior in terms of learning. Some may say that face-to-face learning is more effective, some say otherwise." T7 and T11 stated "Some are excited to go back to school after pandemic and they are using being sick if they are not prepared to take an exam." T3 said "The drastic changes in the curriculum means that there is always a sacrificing factor due to the effects of the system and in this case. The interdependence of technological skills without honing to a more hybrid curriculum. We as a teacher can obviously see the changes that result in some students that participate mostly on online set-up maybe or maybe not participative enough on in-person classes." T2 said "The pandemic hit students in different ways, some adjusted well, some took a long time to adjust, and some did not	Coping with the return to in-person classes	Coping with the return to in-person classes	

	adjust at all. This maybe the reason why there were a lot of mental health issues that arose both during after the pandemic. Being isolated from their friends and classmate impacted them emotionally and it somehow also affected their studies." T12 said "I think there's no issue in coping for the return to in-person issue since they have been doing in-person classes for the longest period than online." T1 said "Challenges from shifting from face to face to remote learning is the availability of gadgets to all students in which some cannot afford to buy modern and high technology gadgets and most of all different internet connections as students doesn't have uniform internet connections. Some has stable while others are not stable." T10 said "The return to in-person classes provided an opportunity for students to address these challenges through reconnection, structured learning environments, access to hands-on experiences, immediate feedback, hybrid learning			

	models, and continued integration of technology."			

Table 46
Summary of the Thematic Analysis Teachers' Challenges with Students during COVID-19 and Post Global Pandemic

Aspects	Themes
Technological proficiency in providing remote classes	Teachers' challenges with the students' organization of their information, their productivity and output in using technological tools and the use of their critical thinking.
Infrastructural availability to effectively support remote teaching	Availability of gadgets and mobile devices and reliability of internet connection.
Students' readiness to shift from face to face to remote learning	Teachers' challenges with the students' time management and their dealing with the return of in-person classes due to inadequate facilities.

Table 47
Thematic Analysis Students' Challenges during COVID-19 and Post Global Pandemic.

Aspect	Illustrative students' responses/Initial Code	Code	Subtheme	Theme
Technological proficiency in providing remote classes	S1 said in a representative response, "I struggled with my internet connection because the only available Wi-Fi in our area is only the slowest one and there are many of us using the Wi-Fi at home." S10 said in another representative response, "This abrupt change has highlighted how important it is to have a dependable and easily accessible internet connection in order to continue with educational endeavors. But in the unprecedented moment, a great deal of students,	Poor internet connectivity	Poor internet connectivity	Students' challenges include poor connectivity, inadequate facilities and time management.

	including myself, have encountered various difficulties related to the availability of a stable internet connection." S10 therefore reported struggling with a poor internet connection and further indicated that many students faced this challenge. S11 said, "Having dependable internet throughout the pandemic was a problem for distance learning. I have experienced numerous internet connection interruptions. Some were experienced during discussions and others during finishing activities or even quizzes." S12 said, "I had a hard time in terms of availability of gadgets because my laptop sometimes is not working so I end up using my phone." S2 referred to challenges that interfered with her ability to take online assessments: "There were times that my devices will shut down randomly or freeze unexpectedly. Also, having two or more devices is a must to set up during exams that will show the entire room." Similarly, S3 said, "I had difficulty in taking quizzes and submitting outputs that are time-sensitive because	Technical difficulties with gadgets	Technical difficulties with gadgets	

	the laptop that I was using was quite old and would freeze randomly." S1 said "I was having a hard time maintaining my focus during online classes because of distractions at home. I was also not used to having all the information given to us through online platforms. The experience is really different from when it was face-to-face because even though we are at home, having the classes in school is a whole different experience. There are many factors that hindered me from focusing while studying and it was mainly because I was in the comfort of our home. I admit that sometimes I felt too lazy to study and do my tasks because no one is there to prohibit me from doing other things." S4 said, similarly, "I'm having trouble concentrating due to the environment and the sudden change of set-up in learning." S5 also spoke of facing challenges when it came to focusing on remote learning: "I have experienced difficulty in focusing on discussions and doing my tasks for a long period of time. If the time I've spent in front of my gadget is too long, I frequently find	Struggle to maintain focus on the class.	Struggle to maintain focused on the class	

	myself distracted or doing other things." Similarly, S6 said, "The distracting sounds from the surroundings shorten my attention span during class."			
Infrastructural availability to effectively support remote teaching	S10 said "During the first year of the pandemic, I had difficulty in taking quizzes and submitting outputs that are time-sensitive because the laptop that I was using was quite old and would freeze randomly. I had to send photos to my professors for proof that I truly was having problems with my laptop." S1 said "When the pandemic started, I was using my nearly 5-year-old mobile phone and its battery was quickly draining and it was already slow. It is hard to use it for a longer period of time and I always have to plug it to an outlet." S6 with her exasperations said "I had a hard time in terms of the availability of gadgets. My brother also uses my computer sometimes because our other laptops are not working properly. There are times when our scheduled classes are the same and I'll adjust using my phone. It is quite hard to use cellphones during learning because the screen is tiny. But after one semester, we adjusted quite	Accessibility of gadgets and mobile devices	Technical gadgets' and mobile devices' availability	Availability of gadgets and mobile devices and reliability of internet connection

	well with the remote classes and have our own computers." Likewise with S4, she said "My phones' battery health got lower and my laptop's performance got slower due to a lot of modules that we need to answer and submit in a certain period of time." S9 said "There were times that my devices would shut down randomly or freeze unexpectedly. Also, having 2 or more devices is a must to set up during exams that will show the entire room. S4 with her frustrations said "There were times that we lost our internet connection in our house. What's more difficult is when there's a power interruption. This actually happened during our final exam in Restorative in Dentistry 2. There was a power interruption and I cannot use my compressor and my laptop as well. Then I went to my sister's house and transferred all of my stuff." Similarly, as S6 said "It was frustrating to have problems with the internet connection. When remote learning started, we only had one internet provider. So when my schedule clashes with my brother we're having a difficult time concentrating in class because there were a lot of times that we're being	Reliability of internet connection	Availability of reliable internet	

	dropped automatically in classes because of the internet connection. And we're not the only ones using the internet that time in our house which makes the internet connection slow down. But after one semester, my parents avail another internet provider which makes our learning experience more productive because of the stable internet connection." S9 stated "Unfortunately, it is very common to experience poor internet connection especially when taking exams or even presenting a report. When it is raining, or when everyone in our house is using the same WiFi, the connection becomes poor." S12 complained "Living in a country that really has a slow internet speed, it is disappointing when a remote class requires opening a lot of applications and then suddenly your connection went off due to maintenance, power interruption, and sometimes the speed is just really poor." With the same sentiments as S12, S2 said "At first, I struggled with my internet connection because the only available WiFi in our area is only the slowest one and there are many of us using the WiFi at home. It was also			

	inevitable to experience slow internet then and it is frustrating on my part because sometimes it happens during my reporting and even during exams which is very troublesome."			
Students' readiness to shift from face to face to remote learning	S5 said "I believe the shift from face-to-face to remote learning was okay for me overall since I have managed to still learn and pass all my subjects. However, I do not believe I had the best quality of education through online platforms. However, I had physical problems encountered once classes have returned face-to-face because my body has been used to simply being at home. Then all of a sudden, I wake up at 4AM to attend my 7AM classes and go home at 5PM just to study again until 10PM for my exams the following day. My body has taken its time to adjust back to the norms of college." S12 said "The sudden shift to remote class, made it difficult for me to understand certain topics to the point that I have to watch videos on YouTube for me to understand it. Also, learning at home is difficult because there are a lot of temptations like sleep, chatting with friends/family, and even going outside leaving your	Challenges of students' shifting from face-to-face to remote learning and returning to in-person classes after pandemic	Students' challenges and experiences from traditional learning to remote classes and returning to in-person after the pandemic	The ability of students to transition from traditional face - to-face learning to remote learning and back to in-person learning after the pandemic

	gadget alone in the house. In contrast, Actually, my professors didn't do a lot of help in terms of me adjusting to face to face class because I did not struggle in shifting from remote class to face to face class. Face to Face class is better than remote class." S6 commented "I'm having trouble concentrating due to the environment and the sudden change of set-up in learning from traditional to remote classes but then honestly, I adjusted big time when we returned to school. Like, I forgot how things are running inside the campus. I was conscious of people. Due to the pandemic, I'm afraid to socialize. And sometimes I'm having anxiety attacks when we return to face to face classes. Our teachers helped us feel welcomed again and made things lighter." S11 stated "The transition to online learning may have resulted in changes to the structure and expectations of works, thereby raising my workload and stress as I adjust to new forms and standards however, when we returned in face-to-face classes, I experienced anxiety and tension and concerned about my health and safety returning in face-to-face classes given the			

	ongoing pandemic-related uncertainties." S4 said "The subjects we're currently taking then during the transition of face to face classes to online classes were actually the foundation of our dental program, but since we do not have a choice, we struggled a lot and when we became clinicians, there are a lot of times where we are not that confident to perform certain procedures because we're not sure if we're doing it right or not. It was a big challenge for me when we returned to full face to face classes because I have to wake up earlier to drive to school and on the first week of our face-to-face class, I got sick but I believe it was all part of the transition. Since our teachers also know our struggles during online classes, they are very considerate enough when they notice that we do not know something and so they have to repeat the lesson for us to understand it better." S9 mentioned "Setting up a good work place is a bit challenging since I spend my time for almost the whole day there. It should be comfortable and peaceful for me. I should also have enough space to do other activities as well. It was a huge adjustment since we already got the hang of			

	studying remotely. It was also terrifying at first since there are still cases of COVID that time and we are quite afraid to be the one infecting our family members."			

Table 48
Summary of the Thematic Analysis Students' Challenges during COVID-19 And Post Global Pandemic

Aspects	Themes
Technological proficiency in providing remote classes	Students' challenges include poor connectivity, inadequate facilities and time management.
Infrastructural availability to effectively support remote teaching	Availability of gadgets and mobile devices and reliability of internet connection
Students' readiness to shift from face to face to remote learning	The ability of students to transition from traditional face -to-face learning to remote learning and back to in-person learning after the pandemic

4. How do teachers and students in dental education adjust from face-to-face teaching to remote teaching and learning during the COVID-19 and post-global pandemic?

Table 49
Thematic Analysis of Teachers' in Dental Education Adjustment from Face-to-Face Teaching to Remote Teaching and Learning during the COVID-19 and Post-Global Pandemic

Aspect	Illustrative Teacher Responses/Initial Code	Code	Subtheme	Theme
Adjustments of teachers from face-to-face teaching to remote learning	Six teacher participants reported that they engaged in preparation activities to adjust to online learning in addition to gathering teaching resources online and learning how to use Canvas, as reported under Theme 3. Two participants reported that they engaged in online communication with	Effective study and scheduling habits Online communication with students Updating lectures and quizzes	Effective study and scheduling habits Online communication with students Updating lectures and quizzes Using different tools	Adjusting to remote learning that involved learning new study habits and tools.

	students through platforms in addition to Zoom or Google Meet. T2 said in a representative sample response that she engaged in, "Communication with the students online such as group chats and video conferencing." Two participants reported that they prepared and uploaded videos for their students to watch. T7 said in a representative response that he engaged in, "The use of actual demonstration online and the use of online videos to enhance online learning." T3 reported that she participated in "updating lectures and quizzes" to make them suitable for online delivery.	Using different tools Using videos	Using videos	

Table 50

Summary of the Thematic Analysis Teachers' Adjustments from Face-to-Face Teaching to Remote Learning during COVID-19 and Post Global Pandemic

Aspects	Themes
Adjustment of teachers from face-to-face teaching to remote learning during Covid-19 pandemic	Adjusting to remote learning that involve learning new study habits and tools

Table 51

Thematic Analysis of Students' in Dental Education Adjustment From Face-to-Face Teaching to Remote Teaching and Learning during the COVID-19 and Post-Global Pandemic.

Aspect	Illustrative Teacher responses/Initial Code	Code	Subthemes	Theme

Adjustment of students from face-to-face teaching to remote learning	S2 said she adjusted to online learning by, "Knowing what study habits suit me. It is very important to be aware of how to manage my time and to know what methods are effective for me. Having a schedule to follow is helpful. Also, having backup plans." S3 said in a representative response, After the school put out an official schedule of the synchronous and asynchronous classes, I also made my own schedule. I made my own routine during the remote classes. I decided what time I will wake up during the weekdays just like I would in face-to-face classes. I also organized the subjects each day so I would know which subject I would be focusing on that day. Creating a personal schedule to manage her time therefore helped S3 to adjust to remote learning. Similarly, S9 said, "Since I had my own time, I used to schedule all the activities that needed to be submitted." S5 said of scheduling, "I made sure that I sleep on time and	Effective study and scheduling habits Online communication with students Updating lectures and quizzes Using different tools Using videos	Effective study and scheduling habits Online communication with students Updating lectures and quizzes Using different tools Using videos	Adjusting to remote learning that involves learning new study habits and tools

	wake up on time in order to properly prepare myself before going to in-person classes." Regarding changes to study habits to make remote learning more effective, S5 spoke of rearranging his study space: I adjusted my study table and moved it near the window to have a better view and lighting while studying. I also organized my room and study area so that it is clean and neat which helps me focus on studying or listening during discussion. Thus, S5 organized his study area to minimize distractions and maximize comfort to enable himself to focus.			

Table 52

Summary of the Thematic Analysis Students' Adjustments from Face-to-Face Teaching to Remote Learning during COVID-19 and Post Global Pandemic

Aspects	Themes
Adjustments of students from face-to-face teaching to remote learning during Covid-19 pandemic	Adjusting to remote learning that involves learning new study habits and tools

5. What thoughts and comments do teachers and students including those who will be approved for limited face to face by CHED have concerns on how to effectively deliver remote teaching and enhance remote learning in dental education during the COVID-19 and post global pandemic?

Table 53

Thematic Analysis of Teachers' Thoughts and Comments on How to Deliver Effectively Remote Teaching and Enhance Remote Learning in Dental Education during the COVID-19 and Post-Global Pandemic

Aspect	Illustrative Teacher responses/Initial Code	Code	Subtheme	Theme
Teachers' thoughts and comments with the delivery of effective remote teaching and enhancement of remote learning in dental education during Covid-19 and post global pandemic.	Five teacher participants contributed data to this theme. The remaining participants did not make recommendations regarding how to enhance remote learning. Three teacher participants recommended ongoing teacher training to enhance online education. T11 said, "The university's role in this scenario is very crucial; [I recommend] more preparations and familiarization among all faculty with the use of different types of platforms." Similarly, T2 stated, "It is important to have constant training to update the teachers for the latest trends in education so that both remote and in-person classes can be done smoothly." Two teacher participants recommended that the school provide more technology to teachers. T4 said in a representative response, "Technology should be provided by the school."	Changing length of subject course Improving access to tools More university-provided technology Ongoing teacher training Online delivery of instructions Time management	Changing length of subject course Improving access to tools More university-provided technology Ongoing teacher training Online delivery of instructions Time management	Feedbacks and recommendations

Table 54

Thematic Analysis of Students' Thoughts and Comments on How to Deliver Effectively Remote Teaching and Enhance Remote Learning in Dental Education During The COVID-19 And Post-Global Pandemic For Students

Aspect	Illustrative Teacher responses/Initial Code	Code	Subtheme	Theme
Students thoughts and comments with the delivery of effective remote teaching and enhancement of remote learning in dental education during Covid-19 and post global pandemic.	Six student participants contributed data to this theme. The remaining participants did not make recommendations regarding how to enhance remote learning. Three student participants recommended changing the length of courses to enhance online learning. S5 recommended increasing the length of face-to-face classes after the return from the pandemic shutdowns: I think that allotting more time to do face-to-face classes will greatly help us, especially with our course requiring lots of time to be spent on the laboratory practicing our skills, as we have already spent plenty of	Changing length of subject course Improving access to tools More university-provided technology Ongoing teacher training Online delivery of instructions Time management	Changing length of subject course Improving access to tools More university-provided technology Ongoing teacher training Online delivery of instructions Time management	Feedbacks and recommendations

	our time learning online. S5 therefore believed that after remote learning, more time should be spent on activities that were harder to accomplish remotely, such as laboratories. S9, in contrast, recommended shortening classes: "After experiencing remote classes, I frankly believe that work hours should be lessened; this would help not only the mental health of both students and teachers, but also their physical and general wellbeing." Two student participants recommended improving student access to gadgets. For example, S12 recommended that the university engage in, "Improving access to education technologies for all their students." Four student participants recommended that students who participate in remote learning in the future engage in effective time management practices.			

	S3 stated, "Keeping a schedule for the completion of tasks would be helpful." Similarly, S9 said, "I believe that time management is important in adjusting."			

Table 55

Summary of the Thematic Analysis of Teachers' and Students' Thoughts and Comments with the Delivery of Effective Remote Teaching and Enhancement of Remote Learning in Dental Education during COVID-19 and Post Global Pandemic

Aspects	Theme
Teachers' and students' thoughts and comments with the delivery of effective remote teaching and enhancement of remote learning in dental education during Covid-19 and post global pandemic.	Feedbacks and recommendations

Q6. The factors identified after harmonizing the Quantitative and Qualitative findings

Table 56. Summary of Quantitative and Qualitative Findings

Research Question	Quantitative Findings	Qualitative Findings
1	Teachers primarily used laptops for remote learning during the pandemic and also since they have returned to in-person classes. Teachers relied on Wi-fi, Fiber Internet, Mobile Data, and Cable Internet, with some schools providing connectivity for online teaching, Teachers used platforms like Google Classroom, Canvas, and Zoom for instruction and assessed students through various methods, including oral reports,	Teachers preferred Canvas and Google Forms online. Assessments due to their ease of use. Teachers used laptops and tablets for delivering lessons via Zoom and Google Meet, while also preparing for remote teaching through online materials. Teachers adopted remote learning during the pandemic and when they returned to in-

	group presentations, and video projects. Teachers also utilized Canvas, Google Forms and Open Camera for administering quizzes and exams confirming both quantitative and qualitative findings.	person teaching afterward, addressing the study's research questions.
2	Teachers showed moderate proficiency in using platforms like Google Classroom, Canva, Canvas, and Zoom, with infrastructure like laptops and internet moderately available for students. While teachers managed their time well and were ready for both remote and in-person teaching, the qualitative findings highlighted challenges such as unreliable internet and poor connectivity, which disrupted remote learning.	Teachers struggled with time management during remote learning due to frequent interruptions from students' poor internet connectivity. Despite moderate proficiency, teacher's faced challenges like poor connectivity, time management issues, and limited resources, hindering effective remote learning during the pandemic.
3	Students were moderately proficient in using Google Classroom, Canva, Canvas, Zoom, MS Word, and MS Powerpoint for both remote and in-person learning. Students also had moderate access to necessary infrastructure, such as laptops, tablets, mobile phones, and internet connectivity, indicating	Students faced challenges like poor internet connectivity, technical issues with devices, and frequent distractions during remote learning. Problems encountered during remote teaching disrupted assessments, hindered timely submissions, and affected students' ability to focus and stay accountable.

	readiness for both learning formats.	
4	Both teachers and students were moderately effective in technology use and time management during remote learning. Challenges included the sudden shift to remote teaching, technological issues, internet connectivity problems, outdated hardware and home distractions. These factors hindered student engagement, while also impacting time management.	Both teachers and students adapted to remote learning tools like Canvas. Students implemented new study and scheduling habits, while teachers gathered resources and learned Canvas. The adjustments made helped address the study ‘s research questions showing how adopting new skills and routines facilitated the transition to remote learning.
5	Both students and teachers found remote teaching and learning to be moderately effective and that in-person learning was an effective modality. Teachers expressed readiness to transition back to traditional in-person teaching.	Key recommendations highlighted from students and teachers to improve remote learning. Students suggested shortening course modality length, improving access to devices, and offering time management training. Teachers emphasized the need for ongoing training and familiarization with online platforms, along with better access to technology, to enhance the effectiveness of remote education.

In RQ1, the quantitative findings converge with qualitative findings with the consistency of the previous research findings which demonstrate that online platforms, such as EXamsoft and Canvas which have been used previously by schools for online learning to the onset of the COVID-19 pandemic in crises in Africa, Afghanistan, and Far-eastern countries (Ghani, 2020). Software, such as EXamsoft and Canvas has allowed examinations to be conducted remotely including monitoring of the assessment. Concurrent with current study findings, previous research indicated that two other tools that were useful for remote assessment are online open book examinations (OBEs) and Objective structured clinical examinations (OSCEs) which help teachers in monitoring online exams (Emami, 2018; Remtulla, et al., 2020). However, these do not meet the requirements for the assessment of clinical skills competency needed for awarding the final degree (Haroon, et al., 2020). The current study findings address this gap by identifying Canvas, Google Meet, Google Forms, and Open Camera for monitoring students' performance during the actual exams during remote learning.

The use of online platforms for remote learning has also been reported in previous research which reveals that the policies put into place to provide opportunities for online learning using platforms, such as TV broadcasts; Google, resources, guidelines, video lectures, and online channels enhance online classes (UNESCO, 2020). For higher education, the strengthening of blended learning using such platforms as Messenger, Zoom, Google Classroom, Facebook, YouTube, and Edmodo (CHED, 2020). However, the current study findings refute previous research findings which indicated that teachers and students did not enjoy Zoom meetings and were strongly against remote learning and teaching because of the economic costs that accompany the implementation of remote learning (Mansoor, 2020). Mansoor (2020) found that students expressed the greatest displeasure with remote learning and Zoom conferencing used for remote teaching. The discrepancy in findings could be due to the different sample sizes, settings and methodologies used in these studies.

The current study's findings show that the majority of students and teachers prefer in-person teaching and learning. Teachers believe that in-person teaching produces the best engagement between teachers and students; hence better academic performance. In-person teaching gives teachers enough time to prepare. For students, Ross, et al. (2024) argue that in-person learning presents a sense of community and friendship that is missing in online learning. Students can make connections with like-minded peers who have similar academic interests. Online learning lacks a sense of friendship and togetherness usually present in traditional in-person classes. Engagement and focus play a vital role in students' learning process. Physical interactions with professors and other students enhance focus and concentration during classes.

The findings of the current study in RQ2 have also been reported in other studies. Disconfirming current study results, previous research indicated that remote teaching can improve communication skills, time management, critical thinking skills, and knowledge, which can be applied beyond face-to-face classrooms (Wang, et al., 2020). Professors developed new modalities promoting student creativity instead of the traditional teacher-centered teaching consisting primarily of lecturing, thus learning online encouraged self-learning independence and improved their capacity to utilize online resources (Barabari & Moharamzadeh, 2020). The divergence in findings could be due to differences in sample size, study settings and the research methodologies adopted in these studies.

Current research findings confirm those of Haroon, et al. (2020) who reported that remote learning would pose a great challenge to developing countries where there were poor Internet connections and frequent power outages, so it was not a practical answer to addressing the consequences of the pandemic. Aligning with the current study findings, previous literature, reveal that lack of technological devices due to

financial constraints, and poor to no internet access, as well as affective or emotional support, are key challenges faced by teachers and students when transitioning to remote learning (Remtulla, 2020; Alvarez, 2020). The current findings are inconsistent with those of Sasere and Makhasane (2020) who revealed that lecturers and students lacked proficiency and technical knowledge required for effective remote learning and teaching. In addition, the current results refute those of Hebebci, et al. (2020) who underscored that students were dissatisfied with how content was delivered in remote learning which to them was of poor quality and non-engaging compared to in-person classes. This discrepancy in findings could be because of the use of different participants, sample sizes, diverse study settings and methodologies.

The findings are also consistent with the result of Hebebci, et al. (2020) who indicated that the students felt disconnected from educational activities, and time was highly limited in Zoom conferencing leading to some failure to understand the subjects being taught. Consequently, Mansoor (2020) reported that students and teachers did not enjoy Zoom meetings and were strongly against remote learning and teaching because of the economic costs that accompany the implementation of remote learning.

The current study results in RQ3 concur with previous research findings of Deery (2020) who asserted that the lack of skills on how to use technology to facilitate distance learning and the unavailability of infrastructure pose a serious challenge to remote learning among students and teachers. As highlighted in the findings of the current study that students and teachers face poor internet connectivity which previous research also revealed that there have been many challenges of online learning and teaching, especially for developing countries, because of unreliable internet and lack of finances to purchase needed technology for remote learning, (Alvarez, 2020; Amadora, 2020; Njoku, 2018; Roberts & Hernandez, 2019). The current research results concur with those of Hebebci, et al. (2020) who underscored that the lack of infrastructure to effectively support the program limits the delivery of content online.

Technical difficulties provide insight into the need for availing technical infrastructure to facilitate virtual with gadgets which is a significant problem for students and teachers in online learning were also reported by Sasere and Makhasane (2020) who posit that most schools globally lack the technical infrastructure to facilitate virtual education. In addition, there has been limited knowledge among teachers and students on how to use the available technology to facilitate virtual learning, especially in disciplines that are traditionally taught in-person, such as dental education (Akinkugbe, et al., 2020). The current study's results include training teachers and students to address the various challenges as highlighted in this research.

Similar to the current study findings in RQ4, previous research indicated that professors should develop new modalities that can promote student creativity and innovation instead of the traditional teacher-centered teaching consisting mainly of lectures; learning online encourages self-learning independence and improves teachers' and students' capacity to utilize online resources (Barabari & Moharamzadeh, 2020).

The current study findings show that the majority of teachers and students choose the in-person because the transition of remote to in-person teaching and learning improve technological proficiency; the integration of blended learning techniques, and efficient time management strategies enhance student engagement; better assessment and feedback processes, and greater resources accessibility improve communication; ongoing professional development and the effective use of classroom management tools enrich the in-person educational experience and make it more effective and productive. In terms of strategies employed by students, the most frequently used are resource management and utilization, help-

seeking, technical aptitude enhancement, time management, and learning environment control (Barrot, et. al., 2021). Students can adapt abruptly in using technology as a new tool for their learning that requires skills and familiarity with different platforms.

Deery (2020) emphasizes the need for dental schools to adapt their curricula and policies to online teaching and learning to incorporate effective distance learning methods. Several institutions are adopting diverse e-learning tools like flash multimedia, digitized images, virtual patient simulations, and virtual reality (VR) simulators (Rao NL, et al., 2024). In Rao NL, et al., (2024) research, students and educators acknowledged the benefits of flexibility, improved online teaching skills, and efficient time management. Students view their practices involving technology and time management as very effective in enhancing their learning experience and organization when transitioning back to in-person learning. However, their overall productivity remains moderate due to the need to readjust to structured schedules, face new environmental dynamics, manage increased social interactions, and cope with emotional and mental aspects of returning to a physical classroom.

As indicated in the findings, teachers learn how to gather teaching resources online and how to use Canvas in their efforts to adjust to remote learning, the findings confirm previous research which indicated that online and blending learning was used for training teachers to implement the new instructional format to transition to the new normal (Toquero, 2020; Haroon, et al., 2020). The current study findings contribute to the previous literature by establishing that students and teachers adjust themselves to remote learning and teaching new study and for students, scheduling habits and learning how to use Canva among the teachers.

Aligning with the findings in RQ5, previous studies indicated that there is a need to constantly train and retrain students and lecturers and to succeed in remote learning equip them with the required knowledge in addition to equipping them with the infrastructure for online learning to (Sasere & Makhasane, 2020). Similar to the current research, Deery (2020) reported that enhancing teacher training, student knowledge and skills in technology-facilitate remote learning. Current research indicate that students and teachers find remote teaching and learning to be moderately effective. Confirming the current study findings, previous research findings indicate that despite the challenges in knowledge, technological equipment and infrastructure for teachers and students, students and teachers in dental schools should embrace available technology to wade off the educational challenges caused by the pandemic by engaging in constant training and practices in using diverse online learning platforms, such as Canvas (Chang, et al., 2020; Pavlakou, et al., 2019).

Current study results confirm other past studies. The findings support Deery (2020) who suggests that it is high time for schools to permanently incorporate remote learning in their curricula to aid student and staff preparation for phenomena that may result in the closure of schools in the future by implementing various training and mentorship programs. Remote learning has been a challenge for students and teachers and may need effective preparation by schools through ensuring the availability of technology and the training for enhanced technical skills to help teachers and students adopt online learning modalities.

To effectively deliver remote teaching and enhance remote learning in dental education during and after the COVID-19 pandemic, several awareness teachers and students can share such as by embracing technology that utilize advanced digital tools and platforms to facilitate interactive and engaging learning experiences which includes virtual simulations and online collaborative projects that mimic hands-on dental practice. Furthermore, developing flexible and adaptable curricula can seamlessly transition between online and offline formats that assure continuity in education despite disruptions. Another way is

by fostering open communication channels between teachers and students to address challenges and provide timely feedback in a way that it can improve understanding and support student learning. Moreover, encouraging a culture of resilience by incorporating training on adaptability and problem-solving skills that prepares teachers and students for future disruptions. Finally, establishing strong support systems, including mental health resources and technical assistance can help students and educators manage stress and technical difficulties. The implications of these takeaways for dental education include improved readiness for unseen challenges and a stronger and unrefined educational framework that can withstand future disruptions. By integrating these practices, dental education can maintain high standards of learning and skill development, even in uncertain times.

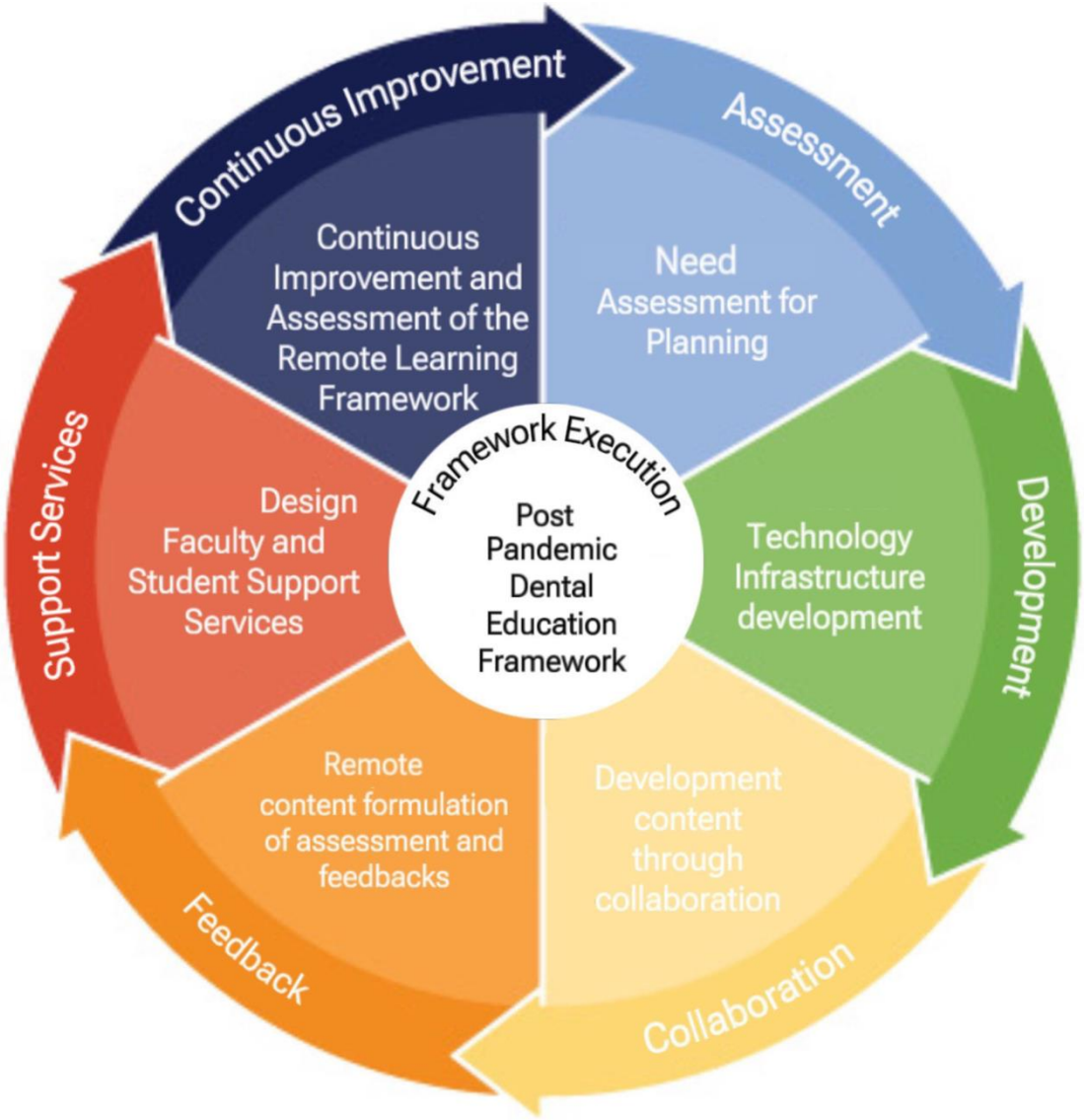
The key factors that are identified from the merging of the quantitative and qualitative findings are the followings:

1. Conducting a need assessment for planning.
2. Developing a technological infrastructure and teaching considerations.
3. Cultivating a content and communication of the content through collaboration by establishing clear challenges of communication.
4. Establishing assessment and feedback approaches.
5. Designing faculty and student support services.

Recommendation for Remote Learning and Teaching Implementation Framework Post Pandemic in Dental Education

Developing an effective framework for remote teaching and learning in dental education is essential. Key factors have been identified to shape recommendations for deigning this framework. For successful implementation, a structured approached is needed to guide and support the integration of online learning in dental education. There are a number of relevance in the proposed remote teaching and learning framework for post-pandemic education to the present situation, for instance, bridging educational gaps because the pandemic highlighted inequalities in access to education and training. A remote teaching and learning framework can address these gaps by providing flexibility and accessibility for students and educators, especially in underserved areas. The current trend in education is the integration of in-person and remote learning (hybrid models). Dental education, with its reliance on both theoretical knowledge and practical skills can benefit from such a framework by combining virtual lectures with limited in-person clinical training. A remote framework also allows institutions to maintain continuity in education without being entirely dependent on physical spaces, reducing the risk of disruption during emergencies. Remote learning minimizes the need for constant commuting and dependence on physical infrastructure, aligning with current efforts to adopt more sustainable practices. Additionally, it reduces costs for both institutions and students. Conclusively, the rise of digital dentistry post pandemic demands that dental graduates be proficient in using digital tools for diagnosis, treatment planning, and patient communication. A remote framework can integrate training in these technologies, making students industry ready. By aligning with these contemporary needs and challenges, the framework becomes a vital component of modern dental education and assures resilience and innovation in teaching practices. Figure 5 shows the recommended remote teaching and learning framework in dental education.

Figure 5: Proposed Remote Teaching and Learning Framework Post Pandemic in Dental Education



The **first phase** is to conduct a needs assessment for planning. In this phase, institutions should identify if there is a need for remote learning in dental education and develop specific goals for the program. They should also be able to evaluate the availability of infrastructure to both the students and educators and establish if students and teachers are ready for the change. Finally, there is a need to set clear objectives and the expected results of remote learning before moving on to the next phase which is infrastructural development

The **second phase** of the remote teaching and learning implementation framework is the development of technological infrastructure and teaching considerations. Learning institutions should ensure both students and tutors have the needed resources including computers and all suitable devices with stable internet connectivity, and suitable tools for content delivery including video conferencing. In addition, teachers

and students should be trained to enhance their readiness as well as create adapting learning and teaching online strategies.

The t**hird phase i**nvolves the development of content and communication of the content through collaboration by establishing clear challenges of communication. This can be done by developing quality and interactive learning resources aligned to remote learning.

The **fourth phase** should be the development of assessment and feedback approaches by designing suitable assessments that can assess dental concept understanding among students including providing timely feedback.

The fifth phase should be to design faculty and student support services by offering professional development for teachers and continuous training of students on how to use various digital devices and software in remote learning. There should be support services for students, such as academic and career counseling which align with the needs of the students.

The last phase involves the continuous improvement and assessment of the remote learning framework and system, as well as accreditation and quality assurance including getting feedback for improvement and consistent updates of the remote learning framework.

Quality assurance can be enhanced by ensuring the system complies with guidelines and accreditation standards for dental education through online learning modes. This framework can help institutions implement remote learning for not only dental education but also for other courses of interest.

CHAPTER 5

Summary, Conclusion and Recommendations

The problem addressed was the identification of key factors necessary for the development of a framework that would guide the efficient and effective integration of remote teaching and learning in dental education in the Philippines. To address this problem, the researcher aimed to determine the factors that established the effectiveness and efficiency of remote teaching and learning integration in dental education. In this study, mixed methods and the sequential explanatory design were used. The target population included dental students and instructors in the Philippines. The quantitative research instrument used in the current study was a structured questionnaire. In the qualitative phase of data collection, the main research instrument is interviews. Quantitative analysis was conducted using SPSS AMOS software for structure equation modelling, while thematic data analysis was used for the qualitative research method phase. Chapter 5 presents the summary of findings, discussion of findings, implications, conclusion and recommendations.

Summary of Findings

The **quantitative results** indicated that most teachers engaged in remote learning only during the pandemic and then returned to in-person classes. The result indicated that teachers used laptop devices to complete remote learning tasks. The internet connection types utilized were primarily Wifi, Fiber internet, mobile data, and cable internet. However, the majority of teachers indicated that the school primarily did not provide the internet connection. Some revealed that the school provided the interconnect connection. The majority of the teachers indicated that remote teaching/learning was an effective teaching modality, and the types of assessments including oral reports, group presentations, research reports, and video presentations were somewhat effective in online teaching.

Most teachers and students also revealed that they were moderately proficient in using Google Classroom, Canva, Canvas, and Zoom for remote learning and in-person learning. Teachers indicated that they were

moderately proficient and somewhat effective in time management when completing the tasks related to remote and in-person classes and that they were ready to return to in-person classes. The quantitative findings also indicated that students were proficient with technological skills for attending remote classes. The majority of students stated that they were proficient with the technological skills for attending in-person classes.

Most students stated that they were either extremely or moderately proficient in using Google Classroom, Canva, Canvas, Zoom, MS Word, and MS PowerPoint. Students acknowledged that specific forms of infrastructure needed for remote learning were moderately available including laptops, tablets, mobile phones, affordable internet plans, internet connectivity, and free/low-cost software for students. Students and teachers were both in the opinion that remote teaching/learning was somewhat an effective modality, but in-person teaching/learning was an effective modality of learning, and teachers indicated that they were ready to shift from remote teaching/learning to traditional face-to-face teaching/learning.

The majority of the teachers strongly agreed that in-person teaching and learning was an effective modality in delivering methods of instruction after the pandemic. Students who chose in-person learning over online learning cited Zoom fatigue as the main reason. According to Mohzana, et al. (2022), in-person learning helped students and teachers follow a set of routines that created a stricture in their lives. Furthermore, students were more motivated to complete school assignments away from home distractions. While many students initially appreciated the convenience of online classes—such as not having to commute and the flexibility to attend from their homes—an emerging phenomenon known as "Zoom fatigue" became a significant issue. The fatigue was a result of prolonged video conferencing and the lack of physical interactions. As highlighted by Ross, et al. (2024), in-person learning benefits students in different ways, including hands-on labs, access to important facilities and services, and study groups in the library.

The q**ualitative findings** revealed that assessment strategies used by teachers included remote monitoring through platforms chosen for ease of use including cameras. The technology used for remote learning by teachers and students included laptops and tablets; preparation for online learning and teaching by teachers included gathering materials online and learning Canvas. Regarding delivery of instruction, teachers reported that they delivered instruction through online lectures and interactions using different platforms including Zoom and Canvas. Further, the results indicated that challenges teachers faced included poor connectivity, and inadequate facilities due to limited resources and time management, while student challenges included poor connectivity, struggles with gadgets, and maintaining focused. Students recommended changing the length of courses to enhance online learning. Teacher participants recommended ongoing teacher training to enhance online education. Teachers therefore believed that ongoing training and gadget provision for faculty would promote more effective online learning.

Implications for Practice

The current study findings are important for teachers, students, schools and policymakers at large in dental education. Teachers may use the findings to implement training programs on remote learning for the improvement in delivering online e instructions in remote classes. The findings would be significant to the needs of the teaching force in dental education in the sense that the results can prepare them for the challenges they are likely to encounter when offering remote learning. Additionally, the solutions to the observed challenges would not only improve their delivery of dental content but also stimulate their minds to devise new ways of ensuring that students maximize remote learning during and after the pandemic. The education policymakers can use these findings to determine teachers' and students' preferred modes

of teaching and learning. As highlighted in this study, the majority of students and teachers preferred in-person learning and teaching over online learning and teaching.

The current study findings are also significant for dental students. The results may equip students with the knowledge they need to prepare for remote learning as well as help them identify the challenges that they are likely to face during remote learning and how to overcome them. Given the uncertainty surrounding the end of the coronavirus pandemic, the current study findings provided dental students with the opportunity to address the challenges they face in remote learning by expressing what they thought should be incorporated into the new teaching model to enhance their learning experience remotely.

Policymakers may also benefit from the study's findings. Current study findings are significant to policymakers in the Commission on Higher Education and stakeholders of different dental school levels. Although the pandemic forced a shift to remote learning, Garcia, et al. (2020) reported that schools and the Commission on Higher Education were unprepared both financially and infrastructurally to facilitate the rapid shift to remote learning. Therefore, the current study provides insights and a reminder to policymakers that schools need to prepare for any eventualities. As a result, policymakers in education may use the current study findings to create and implement effective policies that can enhance remote learning.

The current research findings may also help policymakers address the challenges faced by students and teachers in remote learning. The challenges encountered in terms of network coverage, skills and availability of computers to facilitate remote learning would serve as the basis for policymakers to prioritize enhanced network coverage for easy learning. Policymakers would use the study findings to formulate policies that would encourage the government to set funds for infrastructure developments in schools and also to help dental students acquire laptops and other devices for remote learning as well as promote mentorship and training for both teachers and students.

Theoretical Implications

Transformative learning theory by Mezirow's (1991, 2000) guided this study. Transformative learning happens when one changes their perspective and occurs infrequently, usually resulting from a major life transition or life crisis, yet may also result from the accumulation of transformations of meaning schemes over time (Mezirow, 1995). However, some dramatic situations can also promote transformation, such as those which teachers create (Torosyan, 2007). The current study aligns with the theory by establishing diverse challenges associated with the transition to remote learning among teachers and students.

The pandemic outbreak contributed to sudden change and transformation of learning modalities as schools transformed their learning modalities from in-person classes to remote classes. Students simultaneously develop their professional identity reflected in the language of informal conversations in the atmosphere of the clinic while still learning (Zahra & Dunton, 2017). The model of transformative learning was found to encourage self-examination as well as promote the construction of new knowledge through problem-solving and story-telling, thus making meaning. The current study has provided ways through which remote learning may be transformed to enhance learning among teachers and students. Furthermore, trans-disciplinary, informal learning improves critical thinking skills, advocacy, reflexivity, delivery of person-centered holistic care, and understanding of the sociocultural determinants of health (Zahra, 2018). The implication is that this study supports this theory encouraging the transformation of remote learning among students through training and mentorship of teachers and students as well as availing technological resources for online learning in schools.

The principle of transformative learning theory in dental education enhances both teachers' and students' practices by fostering adaptability, resilience, and forward-thinking approaches that prepare them for future disruptions, such as pandemics, climate change or natural disasters. The strategies for building resilience and preparedness in dental education were conceptualized based on Mezirow's (1991) Transformative Learning Theory and adapted to address modern disruptions such as pandemics and natural disasters. The initial strategy is by building resilient mindsets. It encourages critical reflection on past practices, enabling educators and students to identify limitations in traditional methods and adopt flexible, innovative solutions and it fosters a mindset that views disruptions as opportunities for growth, enhancing resilience to future challenges. This makes the students and faculty participate in a simulation of a natural disaster that disrupts clinical access. They brainstorm ways to provide remote patient consultations via tele-dentistry. Another way of strategizing is by enhancing problem-solving skills thru collaborative learning projects that is by assigning group tasks that involve designing solutions for potential disruptions, such as digital alternatives to clinical training like for example a group of students designs an app that stimulates dental procedures, which can be used for skill development when in-person practice is available. In addition, by integrating technology and innovation, using virtual reality and augmented reality platforms can stimulate clinical environments, ensuring students continue learning despite disruptions and that makes a faculty member integrates VR headsets into training, allowing students to practice crown preparations in a virtual clinic. Furthermore, by valuing dental practice and education that include ethics-based decision-making and crisis management in the curriculum like for instance, an ethics course explores case studies where dental professional balanced safety and care during a pandemic. Lastly, by preparing for future disruptions such as developing a flexible curricular design of modular courses that can easily transition between in-person and online formats which the dental school needs to implement a flexible semester structure that can accommodates interruptions, such as a sudden campus closure. By adopting these strategies, dental educators and students not only guarantee continuity of education and practice but also establish a culture of resistance and innovation that can adapt to any future disruptions.

Conclusions

This study aimed to determine the factors that established the effectiveness and efficiency of remote teaching and learning integration in dental education. The study findings indicate that while remote learning is effective in addressing learning challenges during the pandemic, the modality is associated with diverse challenges including lack of technical resources and other technological infrastructure. Students and teachers acknowledge facing various obstacles while in remote learning.

Most students and teachers lack important skills and technological resources to actuate remote learning including limited access to gadgets and limited skills on how to use platforms, such as Canvas and Google Meet for online classes and examinations. In this study, we learn that students and teachers prepare to adjust to remote learning by learning how to use diverse online platforms, such as Canvas to enable them to access online classes and learning resources. To address the remote learning-related challenges, students and teachers recommend training and learning how to use technological devices and software for learning. The study provides significant insight that developing nations, such as the Philippines lag, in terms of technological infrastructure due to a lack of capacity to avail such important facilities needed by schools for remote learning modalities. This study calls for action among education stakeholders and policymakers in the Philippines to ensure adequate resources are available for schools as a preparation for future events of pandemics.

Recommendations for Future Research

The current study findings provide materials for future research on the implementation of remote learning beyond the pandemic to higher learning institutions, to developing countries, such as the Philippines. However, this study should be expanded in future research to be conducted in different developing nations to guarantee an efficient and effective integration of remote learning in dental education post-pandemic that can be developed in these countries. The assumption that all developed countries have limited infrastructural development for the implementation of remote learning. By only using one country, it may limit the generalizability of the findings to other nations as different nations may have diverse infrastructural development abilities. A future research should conduct a comprehensive comparative analysis of remote learning models used in dental education across different developing countries. This could include a synchronous, asynchronous and hybrid methods. Key areas of focus should be the effectiveness of this models in delivering theoretical knowledge and clinical training and student and faculty satisfaction levels. Furthermore, future research should also examine the role of technological infrastructure in establishing equitable access to remote learning for dental student in developing countries such as the impact of internet speed, reliability and affordability on student participation and outcomes and also the ability of digital tools such as simulation for dental training. And lastly, to investigate the role of government and institutional policy that support funding and infrastructure development for remote learning in dental education and the integration of remote learning into national dental education curricula and accreditation process. Hence, this study should

access the readiness of faculty and students to adopt and effectively utilize remote learning in dental education.

The current study focused on higher learning institutions to explore the use of remote learning modalities during and after the pandemic, yet all levels of schools were equally affected by the pandemic in the Philippines. Future researchers are requested to consider expanding this study to other levels of learning institutions including high schools using a qualitative research method with teachers and students as participants. The researchers should adopt a phenomenological research design to collect data on the lived experiences of teachers and students who had firsthand experience with remote learning during the COVID-19 pandemic in high schools. This study promotes the generalizability and transferability of findings across the education sector affected by the pandemic. Moreover, Future researchers are requested to consider expanding this study to other levels of learning institutions including high schools using a qualitative research method with teachers and students as participants. In addition, a future research should also focus on adapting and expanding the post pandemic framework for dental education to other levels of learning institution in the Philippines and this includes primary, secondary, and vocational education, as well as the allied health training programs. Given the areas to be investigated maybe done by exploring the modular approaches in bridging gaps between secondary education, and professional education through research on how the framework can guide the alignment of curricula across educational levels to create a seamless transition into dental education post pandemic. By expanding the framework to other levels of education, this research can contribute to holistic approach to improving dental education and oral health in the Philippines,

fostering a culture of preventive care and lifelong learnings.

The setting of this current study was in a developing country with presumably low infrastructural development in terms of technological development. As a result, the findings may not be applicable in developed countries as they may have different resources and facilities, as well as different challenges

compared to a developing nation like the Philippines. Based on this limitation, future research is conducted with data from a developed country such as the United States. Thereby, a future research should investigate how specific infrastructural innovations used in the US dental education can be adapted and applied to address the unique challenges of dental schools in developing countries. Areas of focus could include the use of online learning platforms like the LMS (learning management systems) – Canvas or blackboard that are commonly used in the US, to suit institutions with limited internet connectivity as well as to assess how advanced simulation technologies used in US dental schools such as virtual reality can be adapted for training in clinical procedures and to develop a framework for integrating remote learning and teaching into dental curricula in developing countries. Therefore, by contextualizing these infrastructure resources for the unique socio-economic and technological realities of developing countries, this research can create transformative improvements in dental education fostering equity, accessibility, and sustainability.

A current study needs to create or establish a specialized committee or department for pre-pandemic training in remote learning. Future research could explore the establishment of a committee or department within educational institutions that focuses on training teachers and students in remote learning methodologies as part of pandemic preparedness and broader educational resilience. And this may include by researching the structure,

roles and responsibilities of such committee or department that will create training modules for digital literacy, remote teaching strategies, and student engagement techniques. In addition, the committee needs to evaluate the impact of training programs on the readiness of teachers and students to transition to remote learning during emergencies. Also, to explore the policy requirements and support the sustainability and establishment of the committee.

The final recommendation is the validation of the proposed framework for post dental education pre and post pandemic. Future research should focus on validating a proposed framework for post dental education in the pre and post pandemic by implementing this proposed framework in selected dental schools to assess its feasibility and effectiveness in real-world settings through evaluating its impact on teaching methods, student outcomes and institutional adaptability, and by collecting qualitative and quantitative data from the key stakeholders like the faculty, students, administrators and policymakers-regarding the framework's relevance, practicality and areas of improvement.

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