

**COVID-19 Pandemic's Impact on Predoctoral Dental Public Health  
Curriculum in the United States: A Qualitative Study**

A Thesis

Presented to the Faculty of Tufts University School of Dental Medicine

in Partial Fulfillment of the Requirements for the Degree of

Master of Science in Dental Research

By

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## ABSTRACT

**Aims:** This qualitative study aimed to understand the perspectives of predoctoral dental public health educators in the United States regarding their teaching experiences during the early outbreak of the COVID-19 pandemic.

**Materials & Methods:** This research used qualitative study methodology. Semi structured interviews with predoctoral dental public health faculty members teaching in the United States were conducted until data saturation was attained. Thematic analysis was utilized to analyze the data.

**Results:** Twenty predoctoral dental public health educators teaching in eighteen dental schools across all the regions of the United States were interviewed. Four overarching topics emerged from the thematic analysis: (1) didactic component, (2) service-learning component, (3) voluntary opportunities, and (4) recommendations, with each overarching topic revealing themes and subsequent subthemes. Educators faced challenges relating to student engagement, understaffing, and technological difficulties. The absence of community service-learning while ensuring that high-quality education was delivered via online platforms presented an additional challenge. Educators also perceived many gained opportunities from implementing distance teaching models, such as increased teaching flexibility and improved pedagogical skills. Many sustained the perceived benefits of online teaching by incorporating hybrid teaching models in their current pedagogical practices. The need for faculty development programs to provide guidance and the support of the Information Technology I.T. staff members to assist in technology navigation was stressed.

**Conclusions:** Despite being faced with challenges due to the unexpected outbreak of the pandemic, this situation revealed many opportunities lessons learned for predoctoral dental public health faculty members, such as the opportunity to improve their pedagogical skills. Educators' experiences and recommendations can be used to optimize future dental public health teaching practices beyond the COVID-19 pandemic's early disruptions.

**Keywords:** COVID-19, dental public health, community dentistry, online learning, distance learning, qualitative study

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**COVID-19 Pandemic's Impact on Predoctoral Dental Public Health  
Curriculum in the United States: A Qualitative Study**

## CHAPTER I

The COVID-19 pandemic outbreak caused devastating disruptions in the academic sectors of the United States. In the year of 2020, educational institutions in the United States were required to rapidly shift to alternative teaching practices in order to minimize the spread of the disease. The shift to alternative teaching models imposed additional challenges on educators teaching dental public health in predoctoral dental programs in the United States. In addition to the suspension of traditional classroom instruction, a prominent challenge was the suspension of the community service-learning requirements which are fundamental components of the education of dental public health in predoctoral dental programs in the United States.<sup>1,2</sup> Dental public health educators faced the reality of developing alternative teaching approaches to compensate for the suspension of service-learning while still ensuring that dental students receive high-quality education.<sup>1,2</sup> In addition, many dental educators were not well-versed with distance teaching practices and faced the challenge of adapting to new pedagogical approaches within a tight time frame.<sup>3,4</sup> Communication, which is a key component for the success of dental education, was difficult to establish through online platforms.<sup>3</sup> With this new reality, there were also many lessons learned and gained opportunities in various dental academic departments worldwide<sup>3,4,5</sup> and in predoctoral dental public health departments in the US<sup>1,2</sup>. Predoctoral dental public health educators, administrators, and I.T. staff members collaborated to ensure that high-quality learning experiences were delivered to the students in this new, unprecedented situation. Dental public health's educators' perspectives on their teaching experiences during the COVID-19 pandemic can help provide excellent guidance on how to improve teaching predoctoral dental public health teaching practices beyond COVID-19 protocols.

This study explored the impact of the COVID-19 outbreak on predoctoral dental public health education in the United States to shed light on the perspectives of involved faculty's distance teaching experiences during that time. It investigated the implemented modifications in the teaching practices of the didactic component, service-learning component, and the supplementary voluntary opportunities. It also examined perceived gained opportunities and faced challenges, as well as strategies incorporated to curb encountered challenges.

### **I.1 Statement of the Problem**

The unprecedented and mandated shift to alternative teaching models during the COVID-19 pandemic highlighted the importance of understanding and incorporating feedback from the teaching experiences of dental educators during the pandemic. Yet according to the literature, there is a significant lack of research that focuses on exploring dental educators' perceptions regarding their online teaching experiences during the COVID-19 pandemic<sup>3</sup>. Some of the few previous studies explored the perspectives of dental educators regarding the abrupt transition alternative teaching practices during the COVID-19 pandemic across different departments.<sup>3, 4, 5,</sup>  
<sup>6</sup> However, there are no empirical studies that explored the perspectives of the predoctoral dental public health educators regarding the unexpected shift to alternative teaching models during the COVID-19 pandemic despite the possible benefits that such research would provide for the academic sector of dental public health education. The few available studies on dental public health education in predoctoral dental programs during the early outbreak of the COVID-19 pandemic<sup>1, 2, 7</sup> only described one of the alternative teaching models that was implemented in their dental schools during the time of the pandemic. Thus, these studies may not be considered as a comprehensive source of information that can help dental public health educators to

successfully transition to alternative pedagogical practices should an unexpected similar situation happen in the future. In addition, these studies do not offer a holistic description of ways for dental public health educators to optimize their teaching practices as they move to post-pandemic teaching.

The importance of understanding the teaching experiences of dental public health educators during the pandemic and the beneficial feedback that these experiences can provide to other dental public health educators and dental institutions as they move beyond the pandemic protocols cannot be over emphasized. Accordingly, the current study presents a holistic understanding of the implications of the COVID-19 pandemic on the predoctoral dental public health education in the United States in diverse institutional contexts, and sheds light on involved faculty's perspectives regarding their teaching experiences during that time.

## **I.2 Research Objectives**

1. Explore the alternative teaching models implemented by predoctoral dental public health educators in dental schools in the United States during the early outbreak of the pandemic.
2. Investigate the faced challenges and the gained opportunities from the incorporation of alternative pedagogical practices to teach dental public health in predoctoral dental schools in the United States during the outbreak of the pandemic.
3. Determine new teaching approaches that would help optimize predoctoral dental public health education beyond the pandemic.

### **I.3 Significance of the Study**

Even though this study focused on dental public health educators' perspectives, the findings of the present study can be valuable for other public health academic fields. In dental academia specifically, it may help dental administrators to understand the challenges faced by predoctoral dental public educators as a result of the implementation of distance teaching models during the early outbreak of the pandemic. This comprehension will be vital for dental administrators to alleviate the obstacles that that dental educators could face as they embark on post-pandemic online teaching models. Besides, the present study will fill the gap in the literature on the views of predoctoral dental public health educators regarding the transition to alternative teaching models during the pandemic. By filling this literature gap, the present study's findings offer ways for predoctoral dental public health educators to optimize their teaching practices beyond the pandemic. Finally, the findings of this study can be used as a useful source for other educators to help equip them for smooth transitions to distance teaching models should such an unprecedented circumstance happen in the future.

#### **I.4 Theoretical Framework**

The present study was grounded on the theory of constructivism, which postulates that individuals actively construct knowledge from experiences and reflections.<sup>8</sup> In the present study, educators being forced to abruptly modify their pedagogical practices during the early outbreak of a global pandemic prompted them to interact and collaborate with colleagues, administrators, students, as well as to reflect upon their new incorporated teaching methods, and thus, acquire knowledge from those interactions and reflections. A constructivist approach also suggests that educators are facilitators, mentors, and guiders.<sup>8</sup> Thus, focusing on content delivery, instruction models, and educators' interactions with colleagues, students, and administrators at the time, are all topics that need to be thoroughly discussed. Using this theory as the guiding force, the present study sought to analyze and understand the pedagogical changes implemented by predoctoral dental public health educators during the early global outbreak of the pandemic, as well as to frame how the educators' experiences with such alternative teaching methods informed their current pedagogical practices.

## **CHAPTER II: LITERATURE REVIEW**

### **II.1 Dental Public Health Education in the United States**

Dental public health is defined by the American Board of Dental Public Health as “the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts. It is that form of dental practice that serves the community as a patient rather than the individual. It is concerned with the dental health education of the public, with applied dental research, and with the administration of group dental care programs, as well as the prevention and control of dental diseases on a community basis.”<sup>9</sup> It is a fundamental component of the predoctoral dental public health curriculum<sup>10 11</sup> which comprises didactic components and service-learning components<sup>11</sup>. The American Association of Public Health Dentistry developed eight dental public health competencies that predoctoral dental students must achieve<sup>10</sup>. They include (1) demonstration of ethical reasoning that promotes proper healthcare for individuals and populations, (2) ability to critique and synthesize and apply information from scientific and lay sources to improve populations’ oral health, (3) identify social and healthcare systems and determinants of health and their impact on the oral health of the individual and populations, (4) assess risk for oral disease and implement proper, evidence-based preventive interventions, (5) ability to access and describe the use of population-based health data for health promotion, patient care, and quality improvement, (6) ability to communicate and work with relevant stakeholders to advocate for policies that impact oral and general health, (7) develop a capacity for lifelong learning and professional growth, and (8) demonstrate the ability to participate in interprofessional care<sup>10</sup>.



## **II.2 Implications of the COVID-19 Pandemic on Dental Public Health Education in the United States**

The emergence of the COVID-19 pandemic caused unprecedented global interruptions in educational institutions in the year of 2020.<sup>3,4,5</sup> At that time, academic institutions, including dental institutions across the United States had to make a paradigm shift from in-person instruction to distance teaching practices where various online platforms were used as educational tools, such as Webex and ZOOM.<sup>12</sup> The imposed transition on dental institutions in the United States to distance teaching approaches entailed various implications on the pedagogy of predoctoral dental public health education<sup>1,2</sup> because in addition to the suspension of in-person didactic courses, service-learning requirements were on pause as well<sup>1,2,12</sup> causing significant hindrance of students' learning which was difficult to overcome. Volunteerism, which is offered through public health education, was also disrupted. Predoctoral dental public health educators in the United States had to pivot and create effective distance teaching practices to compensate for the disruption of service-learning while ensuring that the quality of education was not compromised.<sup>1,2</sup> However, the lack of hands-on service-learning experience was still a significant obstacle. A study conducted at the University of the Pacific School of Dentistry reported the suspension of their community service-learning requirements due to COVID-19 restrictions in 2020 and described incorporating an alternative virtual community experience.<sup>2</sup> In this alternative virtual community experience, dental educators used a blended learning approach where they implemented the flipped classroom strategy.<sup>2</sup> Dental students selected a social organization or a community dental clinic as teams, after which each team took an online tour of their chosen site and created case presentations.<sup>2</sup> The implementation of the virtual community health field project using the flipped classroom technique was an eye-opening experience for

dental educators which opened the doors for its use in the future before the mandatory community rotations in order to provide dental students with a deeper understanding of faced disparities by underserved communities.<sup>2</sup> Another study conducted at University of Iowa College of Dentistry reported the cancelation of their service-learning rotations due to COVID-19 pandemic restrains in 2020.<sup>1</sup> Dental educators were faced with the challenge of rapidly creating an alternative distance teaching approach as a substitute learning experience to compensate for the suspension of service-learning.<sup>1</sup> To shape dental students' clinical reasoning skills, they were required to utilize a Validated Rapid Oral Health Deterioration risk assessment tool where they applied interdisciplinary thinking practices on a presented clinical case of a patient with special needs<sup>1</sup>. Students were able to develop treatment plans based on the given case.<sup>1</sup> The application of the Validated Rapid Oral Health Deterioration risk assessment tool and interdisciplinary practices led to an unforeseen positive outcome where dental students were able to identify proper patient outcomes.<sup>1</sup>

Other studies conducted outside of the United States also described the suspension of their community service-learning requirements in 2020 and the subsequent incorporation of alternative virtual teaching approaches.<sup>7</sup> Their alternative teaching approach involved requiring dental students to answer online questions focused on oral health promotion for underserved communities during the pandemic and using the “rain software” system where they engaged with students and gave live lectures and shared learning material.<sup>7</sup> In addition, dental students created posters and brochures about oral health prevention and promotion.<sup>7</sup>

### **II.3 Challenges to Dental Education During the COVID-19 Pandemic**

Blended learning where some elements of online pedagogical practices are incorporated is considered a successful and efficient teaching approach.<sup>13</sup> However, a complete transition and pivoting from in-person instruction to distance teaching was an unexpected situation that prompted numerous challenges as dental institutions in the United States were not prepared for this unforeseen situation.<sup>12</sup> Dental educators were also challenged and hesitant to accept change as they were accustomed to in-person instruction and had no prior experiences or familiarity with such pedagogy.<sup>3, 4</sup> Academics and dental educators had to rapidly acquire knowledge regarding how to implement new pedagogical practices, as well as improve their technological skills in a short time without precedent.<sup>3, 4, 12</sup> Previous literature classified challenges relating to online teaching into four categories: (1) technological challenges, (2) individual challenges, (3) cultural challenges, and (4) course challenges.<sup>14</sup>

Communication is also considered a major obstacle that educators face with online teaching because the online learning environment lacks the deep and meaningful interactions that educators usually establish with their students in traditional classroom settings.<sup>15</sup> Therefore, it is imperative for educators who are involved in online teaching to ensure that a strong foundation for communication is established by incorporating alternative, robust communication practices.<sup>15</sup>

Dental students were also concerned and faced significant challenges such as technological barriers and lack of motivation to interact or engage due to the isolating nature of online learning.<sup>5</sup> Ultimately, how to facilitate successful implementation of distance teaching practices during a pandemic was a struggle that needed to be solved. A previous study reported that technological competence, technological infrastructure, and self-efficacy are all factors that must be addressed in order to ensure the successful implementation of online teaching.<sup>14</sup> Other studies

found that those who are involved in online teaching should incorporate a constructivist learning approach to help improve the online learning outcomes.<sup>16</sup> Different from traditional teaching practices, constructivism advocates for student-centered learning which allows the student to construct knowledge on their own rather than provided with information.<sup>8,16,17</sup> Although both traditional and constructivist teaching strategies were found effective, the latter helps in advancing the students' eagerness to learn.<sup>17</sup> A constructivist teaching approach can be implemented synchronously and asynchronously. Along the same lines, during the initial disruption of the pandemic, educators implemented the constructivist theory by incorporating collaborative learning practices in order to maximize students' engagement and to improve their learning outcomes.<sup>5</sup>

#### **II.4 Opportunities Gained by Dental Educators from Teaching During the COVID-19**

##### **Pandemic**

After nearly three years of dealing with the COVID-19 pandemic, there are many realized opportunities and lessons learned from implementing distance teaching practices in all academic sectors, and in the dental academic sector in specific.<sup>4,5</sup> The efficiency and flexibility of online teaching was especially appreciated by dental educators.<sup>5</sup> The incorporation of distance teaching at the time prompted predoctoral dental public health faculty to sustain the gained opportunities of online teaching by accepting and adapting blended or hybrid teaching approaches in their teaching practices beyond pandemic restrictions or protocols where the advantages of traditional classroom teaching and online instruction are combined. Although previous studies described dental educators' experiences with distance teaching during the COVID-19 pandemic<sup>3,4,5</sup>, there have been no qualitative studies that explored the teaching experiences of predoctoral dental public health faculty during the COVID-19 pandemic.

Acknowledging the significance of dental public health education for predoctoral dental programs and recognizing that educators play a primary role in the success of education, the current study was conducted to provide a comprehensive understanding of the implications of the COVID-19 pandemic outbreak on predoctoral Dental Public Health education in the United States. It also sought to shed light on the perspectives of faculty members who were involved in distance teaching faculty during that time regarding teaching modifications, faced barriers, gained advantages, and lessons learned.

## **CHAPTER III: VALIDITY TESTING**

### **III.1 Interview Questions: Validity Tests Framework**

For this qualitative study, preliminary semi-structured interview questions were pre-tested for content and face validity. Validity tests were part of research development and were not used for collecting qualitative study interview data. The purpose of content and face validation was to make edits to the preliminary semi-structured interview questions based upon the received feedback.

### **III.2 Target Population:**

**Inclusion Criteria for Content Validity:** Experts in teaching dental public health in predoctoral programs based on the American Dental Education Association (ADEA) section on public health and American Association of Public Health Dentistry (AAPHD).

**Exclusion Criteria for Content Validity:** Dental faculty members with no expertise in teaching dental public health in predoctoral dental programs in the United States and faculty members that were teaching dental public health exclusively in postdoctoral programs.

**Inclusion Criteria for Face Validity:** Experts in teaching dental public health in predoctoral programs based on the American Dental Education Association (ADEA) section on public health and American Association of Public Health Dentistry (AAPHD).

**Exclusion Criteria for Face Validity:** Dental faculty with no expertise in teaching dental public health in predoctoral dental programs in the United States and faculty members that were teaching dental public health exclusively in postdoctoral programs.

### **III.3 Recruitment Methods:**

**Content Validity:** To test content validity, three educators with expertise in teaching dental public health were identified based on the American Dental Education Association (ADEA) section on Public Health and the American Association of Public Health Dentistry (AAPHD) and were contacted through email. When participation was affirmed, the experts received a copy of the preliminary interview questions.

**Face Validity:** To test face validity, three educators with expertise in teaching dental public health were identified based on the American Dental Education Association (ADEA) section on Public Health and the American Association of Public Health Dentistry (AAPHD) and were contacted through email. When participation was affirmed, the experts received a copy of the preliminary interview questions spreadsheet.

### **III.4 Context**

#### **Content Validation:**

The interview questions were submitted to the experts in the form of a Word document with space to enter written comments. Feedback from these experts was solicited regarding the relevance, wording, and quality of the semi-structured interview questions. Based upon the experts' comments, a revised and finalized version of the semi-structured interview instrument was created and formatted in a Microsoft Word document and submitted to the IRB to obtain approval.

**Face Validation:**

Two options were provided: 1) A face-to-face video Zoom meeting facilitated by one or more members of the research study team, or 2) a review and comments on their own time. If a participant chose to do the face-to-face Zoom meeting, the interviews were not recorded, but notes were taken and a cognitive interview (“think out loud”) approach was used to identify sources of response error by focusing on the cognitive process respondents used to answer questions. The respondent was also asked probing questions when needed to ensure that the wording of the questions was clearly understood and aligned with the intent of each question. These pre-test participants were not asked to provide their personal responses to the interview questions, but rather read each question and offered their opinions on the meaning and clarity. Participants were also asked to comment on whether they felt comfortable answering the questions, and if the length or scope of the questions was objectionable. Based upon the experts’ feedback, changes were integrated into the final (edited) semi-structured interview instrument and submitted to the IRB for approval.



## **CHAPTER IV: RESEARCH METHODOLOGY**

### **IV.1 Study Design:**

The present study adopted a qualitative methodology to understand the perspectives of predoctoral Dental Public Health educators about the implemented paradigm shift to alternative teaching models during the pandemic. The main reason that a qualitative study design was chosen was that it allows the researcher to gain an in-depth understanding of individuals' perceptions and experiences regarding a certain topic through non-statistical data<sup>18</sup>, which cannot be provided through other study designs. Although all educators were from the United States, each educator has different perspectives, experiences, and emotions. Therefore, a qualitative study was most suitable to delve into each participants' views and opinions. A semi-structured interviewing approach was adopted to facilitate smooth conversations in which supplemental probing questions could be asked if further clarification was needed.<sup>19</sup>

### **IV.2 Target Population:**

**Inclusion Criteria for Interview Participation:** Dental faculty members who taught dental public health in predoctoral dental programs in the United States during the outbreak of the COVID-19 pandemic were recruited through dental schools' websites and based on the American Dental Education Association section on Public Health and American Association of Public Health Dentistry.

**Exclusion Criteria for Interview Participation:** Dental faculty members without expertise in teaching dental public health in predoctoral dental programs in the United States during the outbreak of the COVID-19 pandemic, and faculty members that were teaching dental public

health exclusively in postdoctoral programs at the time. Participants of either content or face validity were excluded from participation in the qualitative study.

#### **IV. 3 Sampling and Recruitment Methods:**

Considering the present study adopted a qualitative approach, a purposive sampling technique was found as most suitable. Ishak et.al stated, “Purposive or judgmental sampling is the more acceptable sampling procedure for qualitative research, particularly, when it involves selecting participant for special situations.”<sup>20</sup> In purposive sampling, the researcher decides suitable subjects to participate in the study based on their ability in providing answers and explanations to the research questions. Dental educators who taught dental public health in predoctoral dental programs in the United States during the outbreak of the COVID-19 pandemic were recruited for the study through dental schools’ websites and based on the American Dental Education Association (ADEA) section on Public Health and the American Association of Public Health Dentistry (AAPHD). A formalized recruitment email was sent to the potential participants and served as the information sheet which contained all necessary elements for consent. The recruitment email asked them whether they would be interested in participating in a qualitative (semi-structured interview) study about a possible transition to online teaching during the COVID-19 pandemic and its impact on the dental public health curriculum. Follow-up emails were sent to the participants: one week after the initial recruitment email and a second follow up email two weeks after the initial follow up email. Subjects who agreed to participate in the study would receive a brief summary of the interview details, including the link for the Zoom meeting and the script via email in order to let the participants prepare ahead of time for an efficient and short interview. Participants were also provided with the study team and IRB contact information.

#### **IV.4 Data Collection:**

The subjects who were invited to participate in the research study were geographically spread across the United States. Therefore, the semi-structured interviews took place on the Zoom platform using the finalized open-ended semi-structured interview guide while asking supplemental probing questions when needed (**Appendix A**). The interviews were recorded with the participants' permission. Using the information script, a brief introduction reminding the participants about the purpose of the interview was read. Verbal informed consent regarding participation, recording, and publication of anonymized responses was obtained before initiating the interviews. If a participant did not want to be recorded, the researcher did not record the interview and only notes were taken.

Participants were assured that their identities would be kept confidential. Each participant was given a pseudo name that was not linked to their real name (e.g., Participant F6). During the ZOOM interviews, participants were referred to as 'You' and not their names. Probing questions were asked when further clarification was needed. The duration of the semi-structured interviews was approximately 20-40 minutes.

#### **IV.5 Data Storage:**

Electronic recordings were transcribed via the Zoom transcription feature and stored temporarily on the Zoom cloud on a password protected computer. Once interview transcriptions were reviewed and checked for accuracy, they were downloaded and saved to the Tufts Box for long-term storage, which is HIPAA compliant. Only the study team members had access to study data. The downloaded transcriptions on Tufts Box had no link between the answers and the individual respondents. All recordings and transcriptions were then permanently deleted from the Zoom Cloud.

#### **IV.6 Data Analysis:**

Participants' transcribed responses were thematically analyzed using the six-step guide proposed by Braun & Clarke 2006: (1) familiarizing with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.<sup>21</sup> This approach categorizes themes, subthemes, and codes that surface from the data, which in turn provides a detailed interpretation of the data.

The analytical process first began by familiarizing and immersing with the entire dataset through repeated readings while searching for meanings, ideas, and patterns.<sup>21</sup> This process was facilitated by ensuring that the transcripts were accurate and maintained the originality of the information needed in order to allow for an in-depth understanding of the dataset. The second phase entailed generation of preliminary codes using an inductive coding approach based on the constructivist epistemology. In this phase, data excerpts that were in harmony and held the same meaning were organized into segmented groups. After doing so, each set of group data was given preliminary codes that adequately reflected their meaning using Microsoft Excel.<sup>21</sup> Thomas et al. stated "The primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant, or significant themes inherent in raw data, without the restraints imposed by structured methodologies."<sup>22</sup>

After the coding phase was finalized, the third phase began which entailed identifying a preliminary set potential of themes.<sup>21</sup> In this phase, a table was created to compile and organize the codes that held the same meaning into potential broader main themes, and all coded data extracts were collected within their identified potential themes. For example, we had several codes that related to the challenges faced educators as a result of implementing alternative

teaching practices during initial outbreak of the COVID-19 pandemic. We collected these codes and organized them in one main broad potential theme. In the fourth phase, the identified potential themes were reviewed.<sup>21</sup> Through this phase, the collected coded data excerpts for each potential theme were re-read to assess if each preliminary theme properly reflected the core meaning of their collected data extracts. The whole dataset was also re-read in order to assess each potential theme's relevancy to the entire dataset, as well as to check the quality of the previous coding. In this step, some potential themes were modified and divided into separate themes, whereas other main themes produced distinct subthemes. The subthemes were collected to their data extracts. Phase five constituted refining the name of each theme and giving each individual theme a brief written analysis describing their core meaning, their relevance to the research question, and their relationships to the distinct subthemes.<sup>21</sup> Some of the collected data excerpts for each theme were included in the brief analysis. This led to the last step of writing a coherent report of the thematic analysis guided by creating a finalized thematic mind map as a visual representation of the analysis. This approach provided an in-depth understanding of the phenomenon under investigation (impact of the COVID-19 pandemic on predoctoral dental public health curriculum in the United States).

#### **IV.7 Trustworthiness and Rigor:**

For this qualitative study, the semi-structured interview questions were developed in an attempt to obtain an in-depth understanding of the participants' experiences with alternative teaching practices during the early stages of the pandemic's outbreak. To establish rigor and trustworthiness in a qualitative study, the literature advised the use of four criteria: (1) credibility, (2) confirmability, (3) transferability, and (4) dependability.<sup>23</sup>

**Credibility:**

The nature of the semi-structured interviewing approach ensured the establishment of the credibility criteria by allowing the researcher to gain in-depth understanding of the received feedback through initiating the interviews with a set of predetermined questions while asking distinct probing questions when additional information was needed. In addition, the credibility was further established through audio recordings of the interviews, as well as taking notes in order to obtain the precise wordings of the participants' responses. Also, to ensure that credibility was further established, full immersion in the analytical process through prolonged engagement with the data was performed. Lastly, as a strategy to build trustworthiness and rigor of the research procedures and to avoid the researcher's bias, analytical meetings with the research team were held for analytical triangulation and in order to ensure that the interpretations of the findings aligned with the participants' 'meaning-making'.<sup>23</sup>

**Transferability:**

Transferability is focused on the degree that the study could be applicable in different settings and circumstances. For a qualitative study to be transferable, a detailed description of the participants and the research process must be provided. Along the same lines, the current study provided detailed descriptions of the research steps and transparent interpretations of the interview transcripts. Detailed descriptions of the study's contextual factors are provided: (1) the number of educators participating in the study, (2) the number of dental schools participating in the study, (3) the methodology of the data collection and (4) the analytical process of the study.<sup>23</sup>

**Dependability:**

Faculty members who participated in the study were experts in teaching dental public health in various predoctoral dental schools the United States during the early outbreak of the pandemic. In addition, validity testing documents, data of the interview transcripts along with written notes, data analysis documents, documents of the findings and conclusions, and a final coherent report along with previous supporting literature were deposited in a transparent manner for accuracy checking.<sup>23</sup>

**Confirmability:**

To ensure that the findings and interpretations were adequately supported by the data, a detailed description of the study's rationale, methodology and procedures were described in Chapter 1 and Chapter 3 which provided an audit trail for the reader.<sup>23</sup>

**IV.8 Compensation:**

Participants had an opportunity to submit their names for a raffle of five \$100 Amazon gift cards once the study was completed. A link to a Qualtrics survey was sent to each participant once the interview was completed where they had the chance to enter their names and email addresses to enter the raffle. Entries were formatted in Qualtrics and exported to an Excel file and five winners were selected using a random number generator. This compensation was offered to those who participated in the qualitative study interviews only, excluding the content and validity testing participants. Contact information (name and email address) was collected using Qualtrics, using a password protected account only accessible to the study team, and kept until the interviews and raffles were completed. Once the raffle data were collected, all data were deleted from Qualtrics and kept solely on Tufts BOX.

## CHAPTER V: FINDINGS

### V.1 Participants' Characteristics:

Participants of this qualitative study were dental faculty that had taught public health in predoctoral dental programs during the COVID-19 pandemic across the US. The participants were working in 18 different dental schools across all geographical regions in the US. Findings of the study were based on qualitative data analysis of 20 interviews where data saturation was attained (i.e., no new information or themes emerged while analyzing the data).<sup>24</sup>

### V.2 Emerging Themes:

The thematic analysis presented themes and subthemes that were clustered around four overarching topics: (1) didactic component, (2) service-learning component, (3) voluntary opportunities and (4) recommendations.

The results of the thematic analysis are presented in the thematic mind map (**Figure 1**).



Figure 1. Thematic Mind Map of Overarching Topics and Themes



### **V.3 Topic 1: Didactic Component**

This overarching topic discusses the implications of COVID-19 pandemic on the instruction of the didactic component of Dental Public health. Five themes surfaced from this broad topic:

#### **1. Modifications in Instruction:**

As a result of COVID-19 restrictions, all educators made a paradigm shift from in-person didactic instruction to online instruction. Seventeen participants described the adoption of synchronous teaching, with only six participants describing incorporating asynchronous teaching practices in addition to the synchronous instruction.

*“Every single one of them went virtual. So, we did live lectures.”*

*“The second option is that we pre-recorded their presentation and allowed the students to view them asynchronously.”*

The transition of the in-person traditional classroom instruction to distance teaching entailed utilizing online learning platforms, such as Blackboard, ZOOM and WebEx.

#### **2. Implemented Assessment Methods:**

As a result of the abrupt shift to distance teaching during the year of the pandemic outbreak, educators modified their previous assessment methods and adapted them to online learning platforms. There were three main implemented assessment approaches described by all participants.

##### **a. Virtual Group -Based Activities ((i.e., collaborative learning):**

Many educators utilized student-centered learning approaches such as team-based activities to evaluate students' performance, as well as to ensure that optimal student engagement was

established during the distance learning period. Before the pandemic's outbreak, educators implemented collaborative learning models in traditional classroom settings. However, due to the pandemic's eruption, educators reported shifting collaborative learning to online platforms where they assigned dental students to various team-based activities that tied to the core objectives of Dental Public Health education. Six participants described incorporating collaborative learning as assessment tools:

*“The assessment has always been a group activity. I was still able to do the assessments or the group activities, but they were just done online on ZOOM using the ZOOM breakout rooms.”.*

*“They had to work in teams and create a project in which we had the students pretend that they were developing something for their future practice.”.*

*“They have big group projects where they all work virtually together, and so, the grading and the assessments were all the same, they were just delivered in a different way.”.*

The opportunity for students to work collaboratively is considered an optimal teaching approach as it ensures that a cohesive learning environment is established. Accordingly, these participants recognized the positive potential that such collaborative learning practices could contribute to the students' learning and academic advancement. Despite the fact that the adaptation of collaborative learning into distance learning environments entailed modifying its implementation, the educators were still able to innovatively incorporate them in a successful, alternative approach.

**b. Online exams & Quizzes:**

Incorporating online exams and quizzes were common assessment methods that were implemented by thirteen participants.

*“I gave them a midterm essay based on a case study and a final based on a case study, specifically for didactic courses.”*

*“We continued our exams using ExamSoft.”*

*“They would take a quiz; it was a quiz just based upon that particular lecture for that class period.”*

In efforts to properly assess the students’ knowledge and understanding, as well as to provide them with formative feedback regarding their performance, participants had to rapidly adapt their previous testing models into virtual learning platforms. Their lack of expertise in examining the students from a distance along with lacking time to evaluate the efficiency of these alternative assessment methods resulted in challenges for educators. Despite these challenges, participants were able to successfully incorporate this alternative evaluation approach.

**c. Assignments and Essays:**

Three participants explained incorporating written assignments which focused on Dental Public Health’s learning objectives. These assignments included answering open ended questions related to the lectures that students took, as well as writing essays which tied with the core objectives of the course. All assignments were submitted through the schools’ web portal.

*“We looked at access to dental care and insurance, so students had to answer questions about Medicare and Medicaid funding.”*

Each participant incorporated the written assignments in a manner that was considered best for the advancement of the students’ learning.

### **3. Negative End Results. (i.e., challenges):**

#### **a. Students’ Engagement:**

Implementing online synchronous teaching while ensuring that proper student engagement was maintained was an inevitable challenge faced by all educators. Fourteen participants agreed that students were more interactive in traditional classroom settings when compared to live online classes. Educators expressed that students’ engagement and interactions were poor during synchronous lectures. The fourteen participants expressed their frustration due to the students’ diminished interest in learning, as many reported that the students were busy doing different things while attending class and refusing to turn on their cameras to interact. Educators reported that teaching synchronously while not being able to see students’ faces or body expressions to gauge their interest was a major obstacle. Besides, interactive strategies that educators could use to boost student engagement in online platforms are limited when compared to the engaging tactics that they could utilize when teaching in-person. Spontaneous interactions and feedback were lost during live classes.

*“Students’ engagement. In person, you can call on students and you can gauge their interest, but online students don't have the cameras on, you can't really have a discussion or interaction.”*

*“Engagement, being online giving lectures, even though I tell the students you can stay back after class or email me, I don't know how effective that is.”*

*“Half of the time the cameras were not on, or they are in their car driving, or so. I mean all those challenges that we faced, and so decreased engagement was noticeable for me.”*

The lack of real human interactions played a key role in the minimal engagement, as it delivered a sense of isolation amongst students, and thus, diminished their learning motivations.

Additionally, educators lacked proper pedagogical skills to teach online which hindered the optimization of student engagement via virtual platforms. Educators had to abruptly adapt to teaching online and lacked sufficient time to prepare. Therefore, educators needed proper training to shape their pedagogical skills into online platforms. Looking at the present study's findings, it can be stated that educators who are properly trained and acquired efficient pedagogical skills to teach online will be more accepting of online teaching integration in the future.

#### **a. Technological Challenges:**

Five participants described facing technological challenges when giving lectures synchronously or asynchronously. Some participants lacked technological proficiency, which caused challenges in utilizing technological devices to pre-record lectures. Failure of educators to navigate technology and software is therefore considered a major challenge which could negatively impact the online teaching and learning experiences. Participants also expressed that low bandwidth and connectivity challenges at home were primary obstacles that resulted in audio and video conference screen errors and glitches.

*“Some of the challenges could have been technology. I had not been accustomed to recording lectures, so of course really learning how to manipulate the technology.”*

*“Really technology issues. For me personally, really becoming tech savvy, because I was so used to teaching in person.”*

*“Needing to learn new technology and managing Wi-Fi at home was terrible. It’s terribly embarrassing when you’re trying to deliver a lecture and freeze up.”*

*“I would say sometimes just dealing with technology was not the happiest moment, I would say, for faculty and students.”*

Adequate internet connectivity and technological proficiency are key factors for the success of online education. With the lack of proper internet connections, frustration amongst educators could rise, and thus, hinders the students’ learning experiences. Minimal technological proficiency or lack thereof, along with connectivity issues are challenges that could contribute to negative views and rejection of the future integration of online teaching practices amongst educators. Educators are major stakeholders whose views and concerns should be considered. Therefore, it is crucial for dental institutions to support educators in overcoming such technological obstacles to facilitate successful online education.

**b. Faculty Shortage:**

Three participants described the challenge of being short staffed. The problem of being short staffed was considered a major problem even before the pandemic’s outbreak. However, the abrupt and forced shift to new online teaching models exacerbated this challenge and put further emphasis on the need of additional faculty support and the establishment of a collaborative

working environment to successfully implement new online pedagogical practices. Some educators felt overwhelmed with increased workload related to managing courses and evaluations without support. Such a challenge presented major obstacles in developing efficient and creative teaching practices to optimize students' learning experiences.

*“We have been short staffed; I feel like there's a lot on my plate, and I don't have the time to really think through and make the most effective teachings methods possible.”*

*“I would say the biggest barrier would be not having enough faculty support to be able to provide.”*

*“I think the biggest barrier was the number of courses that I had to manage.”*

Requiring educators to learn new pedagogical practices along with lacking the opportunity for educators to first experiment these new teaching methods is an additional burden for educators. Therefore, it is vital to find a prompt solution for this problem in order to ensure that the best educational environments are established.

#### **4. Positive End Results (i.e., advantages):**

##### **a. Flexibility:**

Although the sudden shift to distance teaching entailed many difficulties and challenges, educators were able to reflect upon various gained opportunities from implementing online teaching. Seventeen participants expressed appreciating the flexible and convenient nature of online teaching.

*“Being able to leverage technology allows me to say, well, you can't drive 40 minutes to the university park and then drive back because the schedule conflict can you participate in a 30-minute window online.”*

*“I've had numerous students able to join remotely from a variety of places and still be a part of class, when otherwise, they would have had to miss that experience. So, that's a silver lining.”*

*“They can have more clinic time and more time out in the community.”*

Teaching from a distance provided the flexibility of instruction at any time and place. The convenience of logistics was especially appreciated during the mandated restrictions period of COVID-19 pandemic where both educators and students were able to stay at home and teach or learn from home. Seamless time management was also a perceived advantage for educators, as it solved the challenge of wasting time on commuting instead of teaching.

Educators also expressed appreciation for the flexibility the online teaching offers for those who can't teach in-person due to unexpected circumstances.

#### **b. Improved Pedagogical Skills:**

Despite facing many challenges with the abrupt transition to distance teaching during the pandemic, educators were able to reflect upon various opportunities and timeless lessons learned. Nine participants expressed appreciation towards this experience as it helped shape and improve their current teaching practices. Educators acknowledged that the abrupt shift to distance teaching helped them discover new strategies to make online classes more interactive and engaging for students. In addition, online teaching helped refine their techno-pedagogical skills.



*“It accelerated the way we're always looking for ways to make things more efficient, engaging, and interactive for the students when giving lectures.”.*

*“I think it helped us instructors to think and say how can I still make this an engaging experience for the students, even though they are all over the country behind their screens?”*

*“I think it has helped stretch our Public Health faculty to not just stand up in front of a PowerPoint and remotely read the PowerPoint.”.*

*“It really reenergized me as an instructor, to be able to do something new and different and learn something new.”.*

The realization that online education could be efficient and engaging prompted educators who had previous negative misconceptions of online instruction to accept its' current integration into their teaching practices.

Mastering online teaching skills and being a competent educator in online teaching also helps in improving educators' self-efficacy towards online teaching and thus, ensures optimal teaching practices are implemented and high-quality is delivered for students. Some educators also reported that this was an eye-opening experience as they gained a deeper insight into dental students' needs and concerns and thus, the educators' problem-solving skills were optimized because of this experience.

It is also worth to not that the participants reported that although they faced challenges relating to students' engagement, the students were able to maintain satisfactory grades in the didactic courses.

*“I feel like everybody did well on the quizzes and they passed the minimum threshold. I would say they did well, even though it was during a pandemic.”*

### **5. Sustaining a Hybrid Teaching Methodology:**

Fifteen participants sustained a hybrid teaching model in their current pedagogical practices. This is because dental students have resumed their in-person clinical activities, as well as their in-person service-learning requirements, and therefore, they adapted a hybrid teaching format to allow students to have more time to spend in finishing their clinical and community requirements. Educators also stressed that the COVID-19 virus is a still existing virus, in other words, we are still living in the pandemic to a certain extent. Hence, the fifteen participants chose to live record their in-person lectures as they take place. This is also because if a student or a faculty was sick or facing any compromising health condition, the student would still be able to attend the lecture online and faculty would still be able to give live lectures virtually.

*“I will sustain a hybrid methodology of teaching because I really like the online component where students can listen to the lectures wherever they are.”*

*“I’m going to have hybrid model mainly because if I have prescheduled events, I can attend them.”*

*“One of the things that we are going to keep is that now we are recording lectures as they take place in person. It’s efficient and accommodating.”*

There are also numerous circumstances other than health conditions that can impede one’s ability from teaching in-person classes. Such circumstances could be family responsibilities, social

challenges and poor transportation among many other factors that could contribute to this dilemma. Therefore, adapting hybrid teaching provides an optimal educational environment when attend in-person is an obstacle. Based on these responses, it can be concluded that online learning has become an integral part of dental schools' education.

#### **V.4 Topic 2: Service-Learning Component**

Service-learning is a key component in dental public health curriculum. Therefore, this topic, along with its themes and subthemes, identifies the service-learning requirements before the pandemic outbreak throughout various dental schools, as well as describes the implications of the early outbreak of COVID-19 pandemic on those requirements.

##### **1. Service-Learning Requirements Prior to COVID-19 pandemic:**

Prior to the suspension of service-learning requirements in the spring of 2020, dental schools provided various activities to advance dental students' civic engagement. These service-learning requirements entailed having the dental\_students to provide dental care to underserved communities such as dental screenings, sealant and fluoride application, restorations, and extractions.

*“Students participated in in-person mandatory public health rotations in a school based dental sealant programs.”*

*“They're practicing dentistry in community settings for underserved communities and that is more hands-on clinical work like fillings and extractions,”*

*“Their rotations are roughly about three to four weeks in the community depending on each site.”*

Another service-learning requirement described by participants is the oral health promotion requirement, where dental students develop lesson plans and engage in oral health education campaigns at various community settings. By participating in oral health promotion campaigns, dental students are given the opportunity to boost their civic engagement, increase their knowledge, and gain a profounder comprehension of oral health disparities and some of the undesirable circumstances that certain communities face.

*“The students must go to public schools and provide oral health education to the kids.”*

*“Students go over to pediatric hospitals, and they talk to parents and caregivers of young children.”*

*“Students would develop educational lesson plans and go into school classrooms to teach oral health education.”*

Two participants reported that in addition, dental students were required to develop oral healthcare disparity programs as a part of their subsequent service-learning activities. Dental students would collaborate in teams and assess the needs of communities that they would subsequently serve in the future, as well as discuss plans on how to improve the oral health of these certain communities. Through these programs, dental students are given the opportunity to engage in creative thinking and improve their communications with each other. Dental students are also given a deeper insight on oral health disparities and some of the undesirable circumstances that certain communities face.

*“The students create a program to address healthcare disparity where they work as a team together to create a program that they then will carry out on the course of the next year in the community.”*

*“The focus is the service-learning, but along with students developing their own service-learning project that they implement and evaluate.”*

The participants reported that all service-learning requirements were suspended during the early disruption of the pandemic. The suspension of these requirements presented complex implications on the service-learning component.

## **2. Implemented Alternatives for Service-Learning:**

During the suspension of service-learning requirements, educators could not assess dental students based their service-learning performance as they had done in previous years.

Accordingly, a variety of teaching practices were implemented as an attempt to provide learning alternatives for the service-learning requirements.

### **a. Online Service-Learning Experiences:**

Online service-learning was a common implemented alternative amongst educators. Nine participants described collaborating with community partners during the year of 2020 and adapting their service-learning activities into virtual platforms. An agreement between dental institutions and their community partners was established during the pandemic which entailed having dental students develop lesson plans and presentations about oral health promotion and oral disease prevention to give to certain communities via online platforms. Students also engaged in public service announcement projects which were shared with communities. In that sense, dental students did not completely lose their service-learning engagement.

*“They attended virtual meetings where they educated the local schools.”.*

*“We made partnerships with our organizations that could have zoom or remote outreach experience and we would give oral health instruction to either senior centers or to children.”.*

*“We were able to expand services by adding a good number of on-line services that exist for the community.”.*

Although the suspension of service-learning present additional challenges, these participants along with their schools’ support successfully pivoted the service-learning activities to online platforms.

**b. Webinars and Case-Based Discussions:**

As all instruction shifted to online platforms, educators relied heavily on webinars and case-based discussions which tied with the core objectives on dental public health and service-learning. Four participants described implementing this alternative teaching approach during the year of 2020.

*“We allowed webinars and along the same concept with respect to community outreach or service-learning and public health.”.*

*“They had to develop case discussions based on some basic information that was provided.”.*

Engaging the students in webinars and case-based discussion helps in advancing their cognitive processes, and thus, improve their learning outcomes. Accordingly, this teaching approach could be supplementally implemented in future settings.

**c. Simulation Exercises:**

Five participants described incorporating simulation exercises as an alternative teaching approach for the service-learning component. Simulation is widely accepted in healthcare education. Educators saw great benefit from simulations and felt that it improved student-centered learning outcomes.

*“We did our poverty simulation; we did that across three different departments.”.*

*“I would have them have a simulation exercise about let's say tobacco cessation. So, how would you respond to a patient who is in need of tobacco cessation services?”.*

*“We had to frame case scenarios around these learning objectives and offer it as simulation assignments that the students had to think as to how these objectives would have been met.”.*

The incorporation of such a creative learning alternative only reaffirms the significant role the educators play in the success of education even during unprecedented situations. Therefore, ensuring the educators are well supported is vital in advancement of educational settings.

**d. Presentation Assignments:**

Presentation assignments which tied with the objectives of service-learning were provided as alternatives for the service-learning component.

*“They had to do an oral presentation of their lesson plan to faculty members online via ZOOM and they were evaluated.”.*

*“They did presentations.”.*

These participants reported that students would receive credit hours for service-learning when working on presentations in teams or individually.

**e. Alternative In-Person Service-Learning Opportunities:**

Interestingly, two participants from the West and Southeast regions explained that they continued their in-person service-learning requirements. They explained creating alternative in-person service-learning activities.

*“We still asked them to come up with some type of an opportunity, whether it's going to a school classroom and just doing some oral hygiene instructions there in front of the class, handing out goodie bags.”.*

*“We started reaching out to community organizations and started doing our prevention sealant programs in those environments.”.*

Such alternatives entailed lessening the number of students in order to follow the social distancing precautions and following the healthcare guidelines.

**f. Oral Health Virtual Projects:**

Other educators reported incorporating oral healthcare projects as an alternative teaching method.

*“We incorporated a project where the students get into groups and create programs that will target a particular community.”.*

Dental students would collaborate in teams and assess the needs of certain communities and discuss plans on how to improve the oral health of these communities. Through these programs,



dental students improved their creative thinking and critical reasoning skills, as well as improve their interactions amongst each other.

### **3. Negative End Results (i.e., challenges):**

#### **a. Lack of Real Service-Learning Experience:**

Dental students lost the valuable component of engaging in service-learning activities in the year of 2020. Accordingly, educators reported that although that the implications of the pandemic's outbreak on the service-learning requirements revealed an opportunity for them to think outside the box and implement various teaching alternatives, the practical content of community engagement was replaced by substitute activities that may not have provided equal learning experiences for the students. Nine participants reported this challenge.

*“There's only so much that they could do to get real life experience to get data through Google searching and putting it on a PowerPoint.”*

*“In no way does it make up for the actual service-learning opportunity.”*

*“It affected the learning opportunities for our students in community settings, students wanted to go back.”*

*“Students just had no real opportunity.”*

This challenge raises the question of how to ensure that students receive a satisfying learning experience should a similar situation happen in the future?

#### **4. Positive End Results (i.e., advantages):**

##### **a. Simulation Helped Advance Student-Centered Learning:**

Participants who incorporated simulation exercises expressed that these simulation activities fostered a more advanced student-centered learning environment. It also provided the students with instant feedback which was a key advantage. Simulations also shaped the students' critical reasoning skill.

*"I feel like the simulation exercises gave the students a chance to really see what it's like to have a leadership position, to work in the community and have to respond to a public health crisis."*

*"I think students do better with simulation online, it's more intimate. They were able to get more formative feedback about questions they asked. It's one on one, it's very personal."*

*"I prefer that from learning so that it gives the students an opportunity to practice to truly practice and to get feedback."*

The advantages gained from simulation exercise may be sustained through implementing them beyond the pandemic's settings.

##### **b. Encouraged Thinking Outside the Box:**

Despite the challenging experience of creating alternative teaching approaches to compensate for the loss of the service-learning component, participants reflected upon gained benefits from this experience such as the opportunity to be creative.

*"What it did provide for us, though, was an opportunity for students to think outside of the box a little bit."*

*“We definitely pushed ourselves to be creative as possible with these community alternatives.”*

*“I feel like we were very innovative incorporating those alternative service-learning programs.”*

Some participants also acknowledged that the rapid transition to distance learning was a challenging situation, participants expressed that the students did their best with alternative service-learning requirements and sustained satisfactory performance with the implemented alternatives.

*“The pandemic took a toll on different people differently, and so what would seem like an ordinary effort might have really been an extraordinary effort and we need to acknowledge that.”*

The experience of the abrupt suspension of service-learning activities along with creating alternatives in a quick manner only puts more emphasis on the educators’ persistence to deliver the best education and their ability to adapt in unexpected circumstances.

## **5. Sustained Aspects:**

### **a. Sustaining Simulation Exercises and Online Service-Learning:**

Educators who incorporated simulation exercises during the year of 2020 found it greatly beneficial for students as it helped advance their clinical reasoning skills and improved student-centered learning outcomes. Educators appreciated the instant feedback that simulation exercises facilitated for dental students. Others reported sustaining online service-learning per community organizations requests.

*“I think the one thing that we would consider keeping would be the simulations on zoom.”*

*“I will be keeping the simulation as a backup regardless of if we have surge again or not.”.*

*“We still do use them, we still do some virtual outreaches, as requested by organizations, we do offer that.”.*

Sustaining these alternatives sheds light on the fact that the disruption of the pandemic also revealed many gained opportunities that educators could sustain in their pedagogical practices.

### **V.5 Topic 3: Voluntary Activities**

Volunteerism where dental students are provided with opportunities to participate in community improvement activities plays a key role in Dental Public Health education. This overarching topic along with its themes and subthemes is therefore aimed to understand offered voluntary opportunities across various dental schools, as well as to understand the implications of COVID-19 pandemic on those offered opportunities.

#### **1. Offered Voluntary Activities Prior to COVID-19 pandemic:**

Participants explained that dental students had the option to provide dental clinical services in various community sites. Participants also explained that dental students could provide these services through interprofessional practices. These services range from dental screenings, sealant and fluoride application, restorations, and extractions.

*“We had three free clinics prior to COVID-19 in the area where our students would rotate, and they could go out for a week at a time and volunteer their services at the free clinics.”.*

*“Our dental students have the opportunity to work alongside nursing students, pharmacy and medicine.”*

*“One of the last popular opportunities for community-based activities are interprofessional activities.”*

Other participants reported opportunities for dental students to engage in oral health promotion campaigns at various community settings. For example, elementary schools, geriatric centers, and communities in despair. Participants were from all regions of the United States.

*“There are school-based activities where students can go to elementary schools and do Oral Health Promotion.”*

*“Students also go to various Elementary schools and provide oral health education and give out goody bags that would have a toothbrush, toothpaste and floss.”*

Lastly, another reported option was that students had the opportunity to travel outside of the U.S and participate in global service-learning activities.

*“We also have global opportunities, to be able to go to worldwide international sites.”*

It is no surprise that the early outbreak of the pandemic severely limited and disrupted the opportunity for dental students to engage in such voluntary activities.

## **2. Alternative Learning Opportunities Offered:**

As voluntary activities were suspended during the spring of 2020 due to COVID-19 pandemic, most dental schools did not officially offer alternative voluntary opportunities for dental students to engage in. Very few reported providing alternative voluntary activities during the pandemic. Other dental schools may be inspired by the reported alternatives should a similar unexpected circumstance occur in the future.

**a. Webinars:**

Two participants described offering the students an opportunity to attend educational webinars with guest speakers as an alternative for the disruption of volunteerism.

*“In lieu of that, there were some activities that we opened up virtually specifically for our dental students and that mostly involved opportunities from American Dental Education Association.”.*

*“I think their main activities were just continuing monthly meetings virtually with guest speakers. It was mostly just kind of meeting virtually.”.*

Although that the in-person volunteerism was suspended at the time, educators showed determination in providing students with alternative webinars in which students had the opportunity to improve their understanding and learning.

**b. Online Service-Learning:**

Three participants reported having opportunities for dental students to engage in online service-learning as substitute experiences.

*“They went virtual, they attended virtual meetings where they educated the local schools.”.*

*“We offered virtual outreaches.”.*

Educators reported that prior to the pandemic’s early disruption, students were usually eager to engage in voluntary opportunities, and thus, providing them with the opportunity to engage in virtual outreaches compensated for the loss of traditional voluntary experiences.

### **3. Challenge in Re-establishing Partnerships:**

The COVID-19 pandemic presented various negative impacts on the extracurricular community activities. Five participants described that their dental institutions still continue to face obstacles in re-establishing their previous extracurricular until the present day.

*“It was just very, very difficult to reestablish the partnerships. The extracurricular volunteer efforts have really been impacted by COVID-19.”*

*“Unfortunately, some of the clinics didn't survive COVID-19 and we had to kind of rebuild this a little bit.”*

*“To date, some programs have reopened whereas some have remained unavailable.”*

*“Dramatically changed and still continues to change to this point. Only recently that we've been getting any requests for health fairs.”*

Since volunteerism plays a major role in dental public health education as it advances students' civic engagement and shapes their knowledge and skills, this continuing challenge is considered a major obstacle to dental students' learning experiences. Accordingly, dental institutions must promptly find a solution to re-establish their extracurricular community partnerships.

### **V.6 Topic 4: Recommendations**

It is important to emphasize that educators play a key role in establishing proper and successful education. Therefore, their recommendations and suggestions for future pedagogical improvement were essential to delve into and understand.

## **1. Avenues to Consider:**

### **a. Investing in Faculty Development Programs:**

Educators stressed that successful online teaching implementation is a product of two elements: technological competency and skillful pedagogy. Each element plays a key role in online teaching outcomes. Educators emphasized that online teaching requires modifying the teaching methodology and pedagogy, as well as advancing the technological competencies. Accordingly, three participants voiced the need for institutional support to help improve their online teaching models by investing in faculty development programs.

*“For the dental schools or universities to invest in training for faculty, we need to be trained on how to host online courses.”*

*“Having more training and to get them bring in the experts to show us what our options are would be helpful. We're all dentists and most of us are not formally trained as teachers.”*

*“This is just my opinion, faculty development is necessary, you still have to get faculty who are really used to just standing up and talking all the time to be able to shift a little bit.”*

These faculty development programs would help provide proper guidance on quality assurance of online instruction. In fact, some stressed the need of incorporating faculty development programs regardless of if the teaching was conducted in-person or online. This is because some felt that many educators had no prior training in teaching and therefore, optimal teaching practices were not achieved in-person or online.



**a. Hiring Instructional Designers to Help Faculty with Online Teaching:**

Educators relied mainly on online platforms for content sharing and instruction. Therefore, three participants emphasized the need for institutions to hire more instructional designers to provide technical support for educators who wish to pursue online teaching models beyond the pandemic.

*“We need to work with I.T designers to make our PowerPoints more attractive and work on management system in a more professional way. I think the visuals are very important, creating graphics with certain software.”*

*“We had designers that helped create a more robust online course page that students can navigate easily and know what they have to complete, I think this is essential to have.”*

This recommendation reaffirms the significance of building a collaborative workface in order to support faculty members, as well as to ensure that the best teaching models are implemented.

**b. Engaging in Student-Centered Learning:**

Dental students’ learning motivations and cognitive needs shifted during the distance learning period of 2020. Therefore, participants adapted new student-centered learning approaches where they engaged in stronger interactions with the students in order to improve their engagement and obtain their feedback to ensure that a well-designed course content was delivered throughout that period. Eight participants stressed the need for other educators to engage in student-centered learning.

*“I did convene a little advisory group of students and asked them to help me, help me help you. Try to be accommodating to the learner.”*

*“I think just willing to see the students’ needs a little bit more broadly, is what is probably our biggest takeaway from this experience.”*

This recommendation puts emphasis on the need of engaging students as they are the receivers of education. Supporting students through advisory groups or engaging them in interactive activities and discussions provides an opportunity for them to engage in active learning, as well as an opportunity for the educator to ensure that optimal teaching is implemented.

**c. Encrypted Online Learning Platforms for Content Storage:**

Relying on online platforms for data storage and content sharing poses risks for losing documents. One participant expressed concerns about losing learning materials due technical problems. Considering the possibility of such situation, a participant suggested the need for utilizing encrypted platforms for content sharing and material storage.

*“The alternative methods that we use with online learning and using our online portal, I think we have to make sure that it's managed in a way that we can access it if technology fails us.”*

Applying secured and encrypted online platforms for resource sharing and storage can prevent losing materials and facilitates ease of access at any time and thus, improves the teaching experience for educators and the learning experience for students.

**d. Implementation of a Hybrid Teaching Methodology in Future Settings:**

The abrupt transition to distance teaching practices during the pandemic was an eye-opening experience for all educators. The majority reported various advantages to online teaching and recommended sustaining and building on those gained advantages through the implementation of hybrid teaching models in future settings. In fact, some noted that a hybrid mode of instruction

for the didactic component is more efficient compared to traditional classroom settings as it allows more time for dental students to complete their service-learning and clinical requirements. For example, recording videos and allowing students to watch them asynchronously at their own leisure while having few in-person classes on a weekly basis was a common recommendation amongst participants. Nine participants encouraged for dental institutions to accept the integration of hybrid teaching practices moving forward.

*“I would say, moving to a hybrid online platform is doable. I think it can be very easily done online and I think lessons or lectures could be recorded and kept online and maybe kept a depository so that it can be used.”*

*“The hybrid mechanism, I feel, is the best. Give them lectures online and then meet in person to discuss or review important aspects of the lectures.”*

*“Maybe a hybrid model is what we should have. Maybe a hybrid type is the future. We don’t need to go back exactly to how we were. All lectures need to be recorded for students’ access.”*

Whilst there was some initial hesitance towards the acceptance of online instruction, educators reported that the experience of distance teaching revealed numerous potential positive outcomes. The educators were pleasantly surprised by the flexibility of online instruction. Besides, the educators’ experiences with distance teaching at the time improved their current pedagogical skills. Based on the perceived gained benefits from online instruction, educators sustained hybrid teaching and recommended for other dental faculty members to follow suit.

## **CHAPTER VI: DISCUSSION**

The goal of this study was to understand the implications of the early outbreak of the COVID-19 pandemic on the predoctoral Dental Public Health curriculum in the United States, as well as to grasp an in-depth understanding of involved faculty's insights and teaching experiences. The curriculum of dental public health comprises two official components: (1) didactic component and (2) service-learning component, as well as an extracurricular voluntary component.

Accordingly, the discussion of the findings of the current study will be clustered around three categories: (1) didactic component, (2) service-learning component, and (3) voluntary opportunities.

### **VI.1 Didactic Component:**

The didactic component of Dental Public Health is a vital component, as it provides the students a holistic understanding about the basic principles of public health and the social determinants that affect oral healthcare access for individuals and communities. Students learn about public health competencies, comprehend the concept of prevention and oral health promotion, identify trending dental diseases amongst certain populations, understand how to establish proper patient communication, learn about the role of professional organizations in promoting oral health, as well as recognize the leadership position that dentists hold in oral healthcare promotion. Across the 18 dental institutions, the didactic instruction was mostly reported to be taught from year one until year three. Very few reported didactic instruction in year four.

As a result of the COVID-19 restrictions during the spring of 2020, all predoctoral dental public health educators had to make a rapid paradigm shift from in-person didactic instruction to distance instruction. Most educators gave online synchronous lectures, while very few had the second option incorporating asynchrony into their teaching practices. It is granted that requiring

educators to swiftly transform their in-person pedagogical approaches to online platforms was not easy. Educators reflected upon challenging aspects of abruptly adapting to online teaching. Although educators had adequate skills to properly teach in traditional classroom settings, most educators lacked prior experience with online teaching, and thus, lacked technical proficiency. Minimal technical skills severely impeded the implementation of effective online teaching approaches. Similarly, previous studies that aimed to explore educators' experiences with online teaching during the COVID-19 pandemic agreed that forced and rapid integration of pedagogical practices to online platforms constituted significant technological obstacles for those who lacked prior experience in online teaching.<sup>3, 4, 25,26</sup>

Both who incorporated online synchronous or asynchronous instruction faced technological challenges such as low bandwidth and software defects. Such technical struggles disrupted live classes or prerecorded classes, and subsequently the students' learning experiences. Some also reported that the students faced the same technological challenges as well. This is supported by previous literature which identified various challenges faced with online teaching in healthcare education during the pandemic; they recognized that poor Wi-Fi and software defects were common struggles faced by educators.<sup>27</sup> Accordingly, the study emphasized the need for academic institutions to establish robust digital infrastructure in order to facilitate effective online teaching practices even beyond the pandemic.<sup>27</sup> Similarly, another study stressed the need for having solid infrastructure to optimize online education during the pandemic and in post-pandemic settings.<sup>28</sup> Along the same lines, educators recommended that dental institutions should support faculty by hiring skilled information technology specialists to assist educators with online teaching, and to overcome any potential technological challenges. Such recommendation is supported by a previous scoping review which focused on several aspects

that must be established in order to help higher education faculty who are involved in online teaching.<sup>29</sup> The results of this study indicated that facilitating technological support through the help of I.T. staff members to assist educators with course design, infrastructure, and connectivity is one of the fundamental elements for successful online teaching practices.<sup>29</sup>

Furthermore, utilizing technology to teach proposes the possibility of losing learning resources. Due to this possibility, the idea of utilizing secured platforms as repositories of learning material was recommended. This would also facilitate flexible engagement between student and student, as well as ease of the engagement between student and educator. This is needed now more than ever as there is a growing integration of some online learning elements into dental education. This recommendation is aligned with previous literature that highlighted the need for utilizing cloud storage platforms in education to facilitate material storage, provide group-based learning, and minimize cost.<sup>30</sup> Security is another primary advantage of such encrypted services in online education, as authentication is always required in order to ensure that only the students and educators are accessing the web portal.<sup>30</sup> It is worth noting that such a recommendation made by some of the educators may indicate that until this day, not all dental institutions are properly prepared to adapt online teaching models in their current pedagogical practices.

Moreover, previously mentioned technical challenges could be easily exacerbated in the case of absence of proper faculty development programs. Accordingly, educators stressed that it is crucial for university administrations to support faculty who are involved in online teaching by investing in faculty development programs in order to overcome technological obstacles when implementing online pedagogy, and thus, ensure optimal teaching is implemented. Such training programs would help advance the educators' professional development with online teaching

where new and efficient technological and pedagogical skills can be acquired, which would subsequently improve the quality of the students' online learning experiences.<sup>31</sup> Previous literature also emphasized the vitality of faculty training for those who are involved in online teaching in the academic sector of dentistry<sup>3</sup>, as well as in other academic sectors.<sup>29, 32</sup> Along these lines, a study that compared faculty who received training in online teaching before the mandated shift to distance teaching due to the initial outbreak of COVID-19, and their counterparts who had to swiftly adapt to distance teaching models without any prior training in online teaching concluded that faculty members that underwent previous formal training had a more pleasant distance teaching experience when compared to their counterparts.<sup>32</sup> Therefore, it is imperative for educators to receive formal training in order to facilitate smooth transitions from in-person teaching to online teaching in case of any future emergencies<sup>32</sup>, and to overcome any potential technological obstacles.<sup>31</sup> To put more emphasis on the significance of faculty development, a study conducted to investigate the factors that play key roles in improving educators' self-efficacy when teaching online found that receiving formal faculty training in online teaching is one of the vital components that contribute to boosting the educators' self-efficacy in online teaching.<sup>33</sup> Acknowledging the vitality of faculty development for those who are involved in online teaching, an argument can be raised that faculty development training programs should not only focus on guiding educators to smoothly navigate technology but should also guide educators on how to implement proper and practical pedagogical practices via online platforms.<sup>3,34</sup>

The unforeseen and rapid transition to online education resulted in minimal student interactions and focus during live lectures. This was deemed a predominant obstacle for educators involved in didactic component teaching, where students would turn off their cameras during lectures and

not interact. Along the same line, previous literature reported that students faced difficulties in staying active and engaged with their colleagues and instructors during live virtual classes, which presented a key challenge for educators.<sup>4,35</sup> This challenge could be because educators lacked prior experience and proper skills to teach online which resulted in hindering communication and interaction between the educators and their students. This emphasizes our previous point that in order to ensure quality of online education, faculty development programs are important and should also focus on guiding educators on how to apply effective online teaching models, rather than only focusing on improving educators' technical skills<sup>3,34</sup> in order to optimize students' learning experience.<sup>31</sup>

Moreover, in order to optimize student engagement, educators reported incorporating student-centered learning approaches such as collaborative learning and recommended future incorporation of such student-centered strategies to overcome the challenge of poor student engagement and to maximize the students' learning experiences. This finding is in accordance with previous literature that explored factors that boosted student engagement in online learning based on healthcare educators' and students' perspectives reported the vital need for educators to incorporate student-centered learning approaches such as collaborative-learning in order to maximize student engagement<sup>31</sup>. Additionally, breaking the students in smaller groups and using the flipped classroom strategy may improve student engagement in online learning.<sup>27</sup> On the other hand, in an attempt to boost students' cognitive processes and engagement, some participants incorporated written assignments that focused on the learning objectives of Dental Public Health, complemented by online exams and quizzes.



The critical period of the early outbreak of the COVID-19 pandemic imposed a complex process for faculty members to learn new teaching methods, thus, teamwork and faculty support was needed in order for educators to properly transform their previous pedagogical practices into online platforms. However, some faculty members reported being short staffed and being overworked at the time as they managed many courses and evaluations while learning new teaching models at the same time.

The exhausting process of learning new pedagogical practices while still ensuring that the best education is delivered may ultimately result in faculty burnout, and thus, affect the educators' teaching efficiency and ultimately, the students' learning experiences. Although the reports of such challenges were minimal, but it is essential for dental institutions to find a solution for this problem as educators play a fundamental role in the success of online education, and thus, students' learning outcomes. In fact, educators play a key role in the success of education in its entirety.

Despite acknowledging that the rapid shift to online teaching was accompanied by several obstacles and challenges, educators perceived favorable outcomes from implementing online teaching during the pandemic and in the present day. The use of technology and online platforms for didactic instruction provided seamless flexibility and convenience for the educators and students when compared to traditional educational settings. Logistical and timing flexibility was especially appreciated, as online education provided a convenience factor where educators and students could teach/learn from the comfort of their homes and avoid wasting time on commuting from home to campus. The flexibility in logistics that teaching/ learning from home offered was particularly valued as there are many factors which could impede one's ability to

teach/learn in person, such as health related conditions, family circumstances and more. In addition, educators explained that the asynchronous teaching model provided the students the flexibility of watching and rewatching the recorded lectures at their own leisure. Additionally, it saves time for the students to engage in service-learning activities and finish their clinical requirements. Along the same lines, previous literature indicated that flexibility is one of the main and significant advantages of online teaching and suggested that it was a primary factor for students' pleasant experiences with online learning.<sup>36</sup> Similarly, another study which explored the advantages and challenges of online learning during COVID-19 based on the perspectives of dental and medical faculty and students reported that online education provided convenience and flexibility for students and educators.<sup>37</sup> Furthermore, educators explained that the flexible nature of online learning allowed the students to maintain similar satisfactory grades when compared to their prior in-person learning grades and ensured adequate learning outcomes. Moreover, educators found that online teaching gave them a key opportunity to improve their pedagogical skills, as it encouraged them to innovatively develop and discover new and interactive online teaching approaches. Educational institutions, therefore, should leverage the advantages of online teaching, as well as recognize its barriers when incorporating such teaching model.

Acknowledging all the advantages of online teaching, as well as recognizing its limitations, educators reported that their dental institutions sustained the gained benefits and advantages of online teaching through modifying their current didactic pedagogical practices to hybrid teaching models. Moreover, educators recommended that other dental institutions should follow suit and implement hybrid teaching practices. The revolution of the growing acceptance of hybrid teaching in dental institutions beyond the pandemic is in concordance with previous literature that explored dental educators' experiences with online teaching during the pandemic and found

that dental educators preferred the implementation of hybrid teaching in future settings.<sup>3</sup> Another study indicated that there is a growing future shift to hybrid learning in the dental academic sector.<sup>6</sup> Academic institutions outside of the dental field also preferred incorporating hybrid teaching beyond the pandemic.<sup>26, 38</sup>

A hybrid learning approach can help improve the students' learning experiences by combining the advantages of students' self-directed learning as well as face-to-face learning<sup>38</sup>. In addition, hybrid teaching would satisfy those who appreciate online learning and their counterparts who appreciate traditional learning settings. Dental institutions, nevertheless, must engage dental educators in faculty development programs and provide them with useful resources and funding to ensure best hybrid teaching.<sup>3</sup>

## **VI.2 Service-Learning Component:**

Service-learning plays a key role in dental education where students are required to participate in civic engagement.<sup>39</sup> It provides dental students a deeper comprehension about the oral healthcare disparities that certain populations face while providing dental care for such communities and reflecting upon these experiences.<sup>39, 40</sup> Before the emergence of the pandemic, dental students were able to engage in civic responsibilities by providing dental clinical care for underserved communities, shadowing at community sites, participating in oral health promotion campaigns at various community settings, and working on oral healthcare disparity programming projects.

The early implications of the COVID-19 pandemic entailed causing severe disruptions to the dynamics of service-learning requirements, as dental schools' community partners closed their facilities in compliance with the government mandated restrictions. In fact, some reported that

students are still not permitted to engage in oral health education activities. The suspension of service-learning presented a key challenge for educators as it was imperative for them to urgently create alternative teaching approaches to compensate for the suspension of these community requirements. Nevertheless, educators were able to curb this challenge by pivoting and innovating alternate teaching approaches. Similarly, many studies reported the abrupt suspension of their service-learning requirements during the emergence of COVID-19 pandemic in the year of 2020 and the subsequent incorporation of alternative online teaching practices.<sup>1,2,7</sup>

Acknowledging the vital role that service-learning plays in Dental Public Health education<sup>39</sup>, educators still wanted students to interact and engage with communities. Therefore, dental institutions curbed the challenge of the abrupt disruption of service-learning requirements by implementing a variety of online service-learning approaches. Some dental institutions worked with their community partners and pivoted the in-person service-learning experiences to synchronous online service-learning experiences. These virtual service-learning experiences entailed requiring dental students to promote oral health education and give feedback synchronously to various communities through online platforms.

Others also incorporated online service-learning requirements but used different approaches to implement them, where some reported that students were required to do public service announcements and record PowerPoint narratives that focused on raising oral health awareness, which were subsequently shared with communities and schools to promote oral health education. Along the same line, a study which aimed to explore the outcomes of adapting online service-learning during the pandemic considered such adjustment as a suitable, efficient, and practical learning tool which reinforced the value of collaborative work and gave the students a deep

understanding of the disparities faced by underserved communities.<sup>41</sup> Accordingly, some educators recognized the advantages of online service learning and reported sustaining them as a complementary teaching approach to the service-learning component. Such pivoting of in-person service-learning into online service-learning corroborates previous literature which indicated the rapid growth of various online platforms seamlessly facilitated the integration and acceptance of online service-learning.<sup>42</sup> Moreover, previous literature suggested that service-learning is not limited to face-to-face experiences but can rather be incorporated virtually as well.<sup>43</sup> In addition, online service-learning offers great benefits, such as boosting learning experiences, collaborative work improvement, and an opportunity for students to engage with various communities with no geographical restraints.<sup>43</sup> Furthermore, a study that examined the efficacy of online service-learning amongst students found that students who took service-learning via online platforms were more pleased with the experience when compared to the satisfaction levels of students who took service-learning in person.<sup>44</sup> To the contrary, another study indicated several challenges involving online service-learning such as increased workload which hinders educators from establishing proper interactive and engaging teaching strategies, and less student-to-student interactions.<sup>45</sup> Lack of proper networking opportunities for the students when compared to those who conduct their service-learning in person is a possible disadvantage of online service-learning.<sup>43</sup>

Moreover, to compensate for the service-learning disruption, others incorporated virtual simulation exercises where they framed case scenarios which met the learning objectives of service-learning. Some reported implementing the simulation exercises across different departments to improve interprofessional education. These simulations were focused on poverty and oral health awareness where the students worked in teams. Educators reported that

simulation improved student-centered learning and reaffirmed the sense of leadership position that the dentist holds in the community. The implementation of virtual simulations in healthcare education holds many other advantages, such as refining students' clinical appraisal skills, improving their collaborative work skills<sup>46</sup>, and prompting readiness for future clinical experiences.<sup>47</sup> However, data which confirm that students' skills and learning are more optimized with virtual patient simulations when compared to traditional education are sparse.<sup>46</sup> Accordingly, educators recognized its advantages as well as its limitations, and therefore, reported sustaining simulation as a complementary educational tool in the service-learning component even beyond the pandemic. Along the same lines, a previous study which aimed to explore the use of virtual simulation to evaluate clinical competence in health professions education reported that virtual simulation is an increasingly accepted teaching approach in health professions education.<sup>47</sup>

In an attempt to make up for lost service-learning experiences, some educators incorporated webinars where students participated in case-based discussions. According to the literature, case-based learning is an efficient learning approach which enhances the students' learning enthusiasm and advance their interactions.<sup>48</sup> Others, on the other hand, incorporated oral health virtual projects which entailed having the students target underserved communities through these programs.

Interestingly, some dental institutions were well prepared since the early stages of the pandemic regarding incorporating emergency measures at their schools to minimize the spread of the virus. Therefore, they did not rely on online platforms and rather created alternative in-person service-learning requirements. This is because dental students expressed their desire to help communities

in need, especially during the critical time of the COVID-19 pandemic, as it resulted in care inaccessibility for various underserved communities. This entailed shifting from school-based to off-site programs where dental students engaged in dental sealant programs in community settings. On the other hand, others explained that students participated in oral health promotion and instruction campaigns in local schools. Moreover, educators reported that students searched for alternative community facilities to provide oral health education and raise awareness. This was done with an emphasis on strictly following governmental guidelines of social distancing, masking, and minimizing the number of participating students. Resorting to alternative in-person service-learning activities only reaffirm the significant role that service-learning holds in dental education, especially during the pandemic.

Although some dental institutions put forth great efforts to be creative, including online service-learning approaches which kept the students engaged with communities through online platforms, educators reported that students were disappointed because all the alternative learning models could not replace the rich real-life experiences of interacting with communities and providing dental care. This was deemed a challenge for educators, because students' motivation affects their cognitive process and learning outcomes.<sup>49</sup> Along the same line, previous studies which explored challenges of online dental education during the initial outbreak of the COVID-19 pandemic also reported that no online experiences could replace the experience of providing dental care for patients.<sup>12, 50</sup> To the contrary, another study reported that students' views about the advantages of online service-learning were the same when compared to their counterparts who were engaged in face-to-face service-learning.<sup>51</sup> Furthermore, a study conducted to describe the evolution of online service learning in online education stated that "online learning is a facilitator rather than a barrier to service-learning" and stressed that online service-learning

should be supported as the shift to online education adaptation is growing.<sup>43</sup> The results of this study indicate that online service-learning should take place in a hybrid format, which can be classified into four categories: Hybrid Type I where service-learning occurs in-person and instruction occurs virtually; Hybrid Type II where instruction occurs in-person and service-learning occurs virtually; Hybrid Type III where service-learning and instruction both occur in-person and online; and Hybrid Type IV where service-learning and instruction occur entirely online.<sup>43</sup> Therefore, it can be stated that some online elements could be incorporated in future service-learning education. However, educators must take caution and avoid incorporating extreme distance learning measures in the service-learning component, and rather find a common ground where hybrid teaching is integrated within this component.

Despite recognizing that the abrupt suspension of service-learning and the subsequent rapid development of alternative teaching approaches imposed many challenges for the educators and students, educators reported positive and meaningful outcomes. They indicated that this experience helped them and the students to think outside the box and boosted their creative capacity by thinking of alternative teaching approaches in which students can gain proper learning and help communities as well. Moreover, some of the alternatives can be leveraged in future settings. Some also stressed that it is important to keep in mind the severe restrictions that the COVID-19 pandemic imposed on students, and thus, educators must acknowledge and appreciate students' efforts in engaging with the provided service-learning alternatives at that time.

### **VI.3 Voluntary Opportunities:**

Volunteerism is a significant component of dental education where students have the option to increase their civic engagement by engaging in extracurricular community-based activities.



Volunteering comprises many advantages for students, such as shaping teamwork skills and obtaining valuable experiences.<sup>52</sup> Prior to the pandemic's outbreak, dental students had the option to participate in various voluntary activities, such as global service-learning, provide dental clinical care for underserved communities, participate in oral health promotion campaigns, and engage in interprofessional collaborative practices.

The COVID-19 pandemic outbreak in the spring of 2020 ended up abruptly suspending all voluntary activities. Most educators reported that the suspension of such opportunities was not accompanied by any offered alternatives. The reason for this was because, different from mandatory didactic and service-learning, many voluntary activities are student-led projects; thus, no formal evaluation of students' performance with the offered alternatives was implemented. Very few reported creating alternative virtual opportunities, such as an opportunity to attend educational webinars with guest speakers which were opened specifically for dental students. Through these webinars, dental students were able to engage in interactive discussions about various oral health issues. Some provided an opportunity for dental students to participate in online service-learning activities where students would give oral health educational presentations to schools and communities via online platforms. Despite the fact that most dental institutions did not offer alternatives to the voluntary activities, the reported alternatives may inspire these dental institutions to implement similar voluntary alternatives should such unexpected crises happen in the future. Additionally, some educators reported that the suspension of volunteerism still remains to this day. This is because dental institutions faced significant challenges in re-establishing their previous partnerships, as the COVID-19 pandemic severely impacted the ability of extracurricular community clinics to reopen after the year of 2020. Acknowledging the crucial role that volunteerism plays in students' educational experiences, dental institutions must

promptly overcome this challenge by finding a solution to rebuild their extracurricular community partnerships.

## **CHAPTER VII: LIMITATIONS, CONCLUSIONS and FUTURE RESEARCH RECOMMENDATIONS**

### **V11.1 Limitations**

1. The study consisted of a small sample size. Therefore, the findings of the present study may not be generalizable for all universities in the United States. Accordingly, additional potential advantages and challenges faced by other dental public health educators in the United States might emerge.
2. The context of the study is restricted to dental educators from the United States. Therefore, the present study's findings may not be generalizable to dental schools in other countries because the experiences and insights of dental educators across the globe may be different. Nonetheless, it should be noted that generalizability is not a goal of qualitative research; transferability is.
3. Previous studies that explored dental public health educators' teaching experiences during the pandemic are sparse. Accordingly, the present study lacked rich literature background regarding the topic. Nevertheless, this presented an opportunity for the present study to identify the knowledge gap and advance the literature.
4. The present study employed a qualitative methodology where semi-structured interviews were conducted to collect data in which the researcher interpreters the findings in a subjective manner. This could be regarded as a limitation to the present study as researcher bias might be present.
5. The study design does not establish causality but rather suggest potential associations. For example, technological challenges faced by some educators could be related to the absence of faculty development programs at their institutions prior to the pandemic, or alternatively

attributed to the minimal I.T staff support at their institutions. This could be regarded as a limitation to the study.

## **VII.2 Conclusions**

Previous literature had explored dental educators' teaching experiences during the COVID-19 pandemic across different departments. However, there were no qualitative studies that explored the teaching experiences of predoctoral dental public health faculty during the COVID-19 pandemic. The current study adds to the body of literature by identifying several implemented alternatives specific to the service-learning component of Dental Public Health, such as online service-learning. In addition, the current study recognizes additional challenges specific to the education of Dental Public Health, such as challenges in re-establishing community partnerships two years after the pandemic outbreak. Therefore, the present study's findings offer ways to optimize future Dental Public Health teaching practices beyond the COVID-19 pandemic.

Furthermore, the results of this study can be used as a useful source for other educators to help prepare them for smooth transitions to online teaching in case of similar future circumstances.

This study highlighted technological challenges faced by educators such as low bandwidth and software defects and the possibility of losing learning material and documents due to such technological challenges. In addition, these technological challenges were exacerbated due to some educators' minimal technical proficiency. The students' cognitive process and learning outcomes were negatively impacted by such challenges.

Another challenge worth mentioning was poor student engagement during online classes. The lack of online teaching experience by educators further hindered establishing proper student engagement. In an attempt to overcome this challenge, educators applied great efforts to modify their teaching practices by incorporating student-centered learning approaches. Educators also

faced the challenge of being short staffed and managing many courses with no proper support to facilitate smooth transitions to online teaching.

To overcome these challenges and to ensure optimal online education is delivered, it is crucial for dental administrators to support educators by investing in faculty development programs. This would help improve their pedagogical skills as well as their technical skills to effectively teach online. Dental administrators must also hire instructional designers and invest in high-quality secured online learning services to avoid technological challenges when teaching online. In other words, it is important for dental administrators build a collaborative workforce where educators, administrators, and I.T. staff members work simultaneously while establishing continuous and strong communication to ensure optimal online teaching practices are implemented and to overcome faced challenges. Students also play a key role in achieving proper teaching methods as they are the recipients of education and implemented teaching practices may positively or negatively affect their learning outcomes. Therefore, educators must engage in student-centered learning approaches and create robust communication with students in order to obtain informative feedback. Implementing these recommendations during the pandemic outbreak would have greatly helped lessen the challenges faced with online teaching, and thus, would have facilitated smoother teaching transitions to online platforms.

There is no doubt that the unforeseen transition to online education resulted in many challenges to the teaching practices of dental public health educators. Nevertheless, the adaptation of online teaching was an eye-opening experience for dental educators which revealed many unexpected positive outcomes. Such opportunities included acquiring new skills and a chance for educators to think outside the box by finding and creating new alternative teaching approaches. In fact, this

experience helped educators to improve and refine their pedagogical skills where new interactive and efficient teaching approaches were applied to ensure optimal education was delivered.

Another predominant advantage was the logistical convenience and time flexibility that online instruction provided for the educators and students. In addition, educators sustained the gained benefits and advantages of online teaching through modifying their current pedagogical practices to hybrid teaching models.

Moreover, this experience unveiled many lessons learned. The takeaway from educators' online teaching experiences during the COVID-19 pandemic was that high-quality pedagogical practices could be achieved regardless of their mode of instruction. The use of online teaching practices during the pandemic made its current incorporation and embracement in most academic sectors an inevitable reality. Therefore, as we move beyond COVID-19 restrictions, it is imperative for dental administrators to embrace the current change and sustain its advantages while recognizing the complexity of properly leveraging technology in teaching practices.

Another important learned lesson is that dental institutions must be well equipped to swiftly shift their in-person teaching practices to remote teaching models in case of any similar unexpected future situation.

As a final remark, the COVID-19 pandemic reaffirmed the significance of volunteerism and its contributions to Dental Public Health education and communities in need, especially during unexpected adversities. Although some voluntary activities returned, others have not.

Recognizing the vitality of volunteering as a complementary component of Dental Public Health education and its contributions to students' learning experiences, as well as its impact on the community, dental institutions must promptly find solutions to rebuild their community

partnerships to allow students to advance their civic engagement, and benefit communities in need.



### **VII.3 Future Research Recommendations**

As the current study identifies several implications of the pandemic's outbreak on the predoctoral dental public health education, it also identifies potential directions for future research:

1. It would be great to build upon the findings of the present study by conducting an objective analysis of predoctoral dental public health educators' teaching experiences during the outbreak of the pandemic in the United States. Such objective analysis may provide a rich set of data of pedagogical tools that educators could use to ensure that more effective learning environments are established moving forward.
2. Most educators reported the embracement of hybrid teaching after the year of 2020. Therefore, a study exploring effective institutional strategies implemented by dental administrators in the United States that support the adaptation of hybrid teaching by faculty members may provide a valuable source of information for other dental institutions regarding how to successfully incorporate such hybrid educational environments.
3. It is also worth to conduct a qualitative study on international dental public health educators' teaching experiences and perspectives to compare the results with the current study. Identifying the differences in the experiences and views of educators across the globe may provide valuable findings on how to manage the teaching practices should a similar future crisis is encountered.

## APPENDIX

### Appendix A

#### Finalized Semi-Structured Interview Guide

##### 1) Didactic Courses

- a. Could you please describe what Dental Public Health didactic courses are offered in year 1, year 2, year 3, year 4 in the DMD/DDS curriculum at your institution that you are aware of?  
For example, Tufts Dental School requires taking Oral Health Promotion in year 1 and Epidemiology in year 2.
- b. Were there changes made in the didactic classes' mode of instruction with the COVID-19 pandemic? If so, what were they?
- c. Were you able to assess students' performance with online classes compared to in-person teaching? For example, did you see grades change in online teaching compared to in-person teaching? If so, could you describe how those assessments were made?

##### 2) Service-Learning Requirements

- a. Please describe what mandatory community-based activities that are offered in each year in the DMD/DDS curriculum at your institution that you are aware of?
- b. Did COVID-19 change how these mandatory community-based activities were run at your school? If so, can you please share some examples?
- c. Given the changes made, were there any specific strategies used to evaluate the students' level of engagement in these alternative teaching strategies for mandatory community-based activities?

- d. How would you describe the students' engagement with the implemented alternatives compared to pre-pandemic teaching strategies? And on a scale of 1 to 10, with 1 being "no engagement" and 10 being "excellent engagement", how would you rate the students' level of engagement?

### 3) **Voluntary Initiatives**

- a. Does your school offer dental students the option to participate in voluntary initiatives? If so, please mention some of the voluntary activities that students were usually engaged in prior to the COVID-19 pandemic.
- b. Did COVID-19 change how students could participate in these voluntary activities? If so, explain and give examples substitute experiences were offered.
- c. Were there any assessment tools used to gather data about how changes or alternative activities impacted the student outcomes? For example, did you see a change in student engagement or participation?

### 4) **Challenges of Alternative Teaching Strategies**

- a. In your opinion, what are some of the challenges and barriers that you faced when implementing alternative teaching strategies (especially when implementing online teaching – if that was the case)?

### 5) **Opportunities of Alternative Teaching Strategies**

- a. In your opinion, what are some of the opportunities and lessons learned from implementing alternative teaching strategies to teach dental public health (especially with online teaching – if that was the case)?
- b. Is your school considering maintaining any of these changes? If so, why?

c. Do you have any thoughts on what other than online teaching are alternative teaching methods that you would like to explore?

6) **Future Recommendations**

a. What would be some recommendations and suggestions for alternative or online teaching methods used during the pandemic's outbreak that will inform your teaching practice moving forward in the future?

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