

Research Article

Evaluating Dental Faculty's Perspective regarding Emergency Introduction of Online Teaching and Learning: Early Experience during COVID-19 Lockdown in United States

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Objectives. The March 2020 lockdown mandated institution closures and forced educators to provide remote instruction. We intended to gain an in-depth and holistic understanding of dental faculty's experience and perceptions during this mandatory shift. Insights were gathered in 6 key areas: prior remote instruction experience; magnitude of transition and frequency of instruction methods used; training received; preferred teaching methods based on how they promote student learning, interaction, engagement, and performance; social impact; and future of teaching. **Methods.** An anonymous Qualtrics^{XM} survey was distributed to all dental faculties at University of Detroit Mercy in May 2020. Data was collected over a three-week period and analyzed using Statistical Package for the Social Sciences (SPSS) Statistics 26 (IBM; Armonk, New York, USA). Pearson chi-squared test and Fisher's exact test were used to evaluate categorical data. **Results.** Out of the 30 participants who transitioned to online remote instruction, 16 (53.3%) reported an age between 30 and 49 years and 14 (46.7%) reported ≥ 50 years of age. Our analysis revealed that faculty in 30–49-year age range had no prior online synchronous teaching experience. The transition was described as interesting, useful, time-consuming, and challenging. In-person live teaching received highest number of first place rankings (50%), and online asynchronous method received highest number of last place rankings (42.86%). Faculties in >50 year age range expressed maximum satisfaction with online small-group discussions, and those in 30–49 years age group were more satisfied with one-on-one online discussion. **Conclusion.** Our study finds that the faculty tends to gravitate to online methods that are similar to or mimic their past in-person teaching environment. Forced remote instruction gave new content delivery experiences to faculties of all ranges of age and experience in teaching. This exposure is likely to result in a more widespread adoption of a variety of instructional methods in future. Our study strongly suggests that traditional in-person instruction is the preferred method for delivery of content and is likely better for student learning. Majority of the faculties believed that the future of dental education would be a mix of both in-class and online instruction. In summer and fall 2021, our institution adopted hybrid, flexible models for didactic instruction to allow students the opportunity to digest content in their preferred method. Careful planning and systematic, continued training will be required to enhance technological skills and to incorporate newer models into didactic and clinical instruction. For the success of blended learning, courses will need redesigning of assessment methods, commitment, and support from administrators.

1. Introduction

Under the dramatic impact of COVID-19 pandemic, educational institutions underwent mandatory closures in March 2020. To facilitate remote instruction, universities provided multiple tools and resources for both instructors and students.

Historically, remote schooling began in the eighteenth century as correspondence education for rural learners where instructional material was provided through postal services [1]. The first fully online course was delivered through computer conferencing to business executives by Western Behavioral Sciences Institute, California, in 1980s [2].

Since then, distance-learning programs and colleges have continued to grow with most institutions offering part-time online courses. A number of studies and debates have been conducted to understand the pros and cons of online instruction compared with in-person classroom teaching, and yet none have found one to be more effective than the other [3].

In a survey conducted by Babson, on the growth of distance education enrollment, two-thirds of polled academic leaders believed that online education is just as good as or better than face-to-face instruction, while the remaining one-third believed that learning outcomes of online courses are inferior to those of face-to-face instruction [4]. Similarly, half of college presidents (51%) say online courses provide the same value. However, when American adults were polled, only 29% agree that a course taken online provides an equal educational value to one taken in a classroom [5].

Both online and in-class teaching are heavily influenced by multiple variables such as teaching methodologies, classroom management, technology, subject, student concerns, normal fluctuation in student performance, and ability of the instructor to maintain student interest [6,7].

The threat of COVID-19 presented some unique challenges for institutions of higher education. All parties involved—students, faculties, and staff—were asked to do extraordinary things regarding course delivery and learning that have not been seen on this scale in the lifetimes of anyone currently involved [8]. In particular, dental education, viewed as a subject better taught in person due to its practical nature, was upended during the onset of the COVID-19 pandemic. The forced move of all instruction to fully online format in March 2020 offered a unique opportunity to gauge the utility of this format for the future.

The purpose of this study was to assess the utilization of various remote online teaching formats used at a dental school during the early stages of completely remote, online instruction. Dental educators were asked to complete a questionnaire to report their utilization and preference of content delivery during mandatory remote instruction, along with their perception of how each format performs from a faculty and student perspective. These answers were stratified based on teaching experience, age, and level of didactic instruction. Responses given in this questionnaire expose the need for training dental educators in various forms of content delivery and how age and experience alter perspective during use of educational technology.

2. Materials and Methods

An anonymous 30 question survey was created using QualtricsTM to gather qualitative and quantitative data. It was distributed electronically to all dental faculties at University of Detroit Mercy, School of Dentistry, in May 2020, and three week period was given for completion.

The questions (yes/no, multiple choice, and Likert scale options) were designed to induce respondents to represent their true stance. Demographic data gathered included age range, time in dental education, academic rank, and

percentage distribution of teaching responsibility (didactic, simulation, and clinic).

The study was approved by institutional review board as exempt research (IRB-C-#19-20-60). The introductory question defined the purpose and objectives of the study and served as informed consent. Risks and benefits were clearly stated, participation was voluntary, and survey could be ended at any time without penalty.

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) Statistics 26 (IBM; Armonk, New York, USA). Pearson chi-squared test and Fisher's exact test were used to evaluate categorical data.

3. Results

3.1. Study Population Characteristics (Table 1). Out of approximately 200 dental and dental hygiene faculty members (77 full-time, 21 full-time equivalent, and 91 part-time), 36 responded to the questionnaire (18%). Of the 36, 30 made transition to online remote instruction. Five out of the six who did not transition had 80–100% responsibility of clinical instruction. Of the 30, 16 (53.3%) reported an age between 30 and 49 years, and 14 (46.7%) reported ≥ 50 years of age. A significant correlation was found between years of experience in dental education and participant age range. 13 out of 16 (81.3%) instructors in 30–49 year age range had < 10 years, while 12 out of 14 (85.71%) in ≥ 50 year age range had ≥ 10 years ($p < 0.001$) of dental education experience. A significant correlation in distribution of teaching responsibility was identified between the two age ranges ($p = 0.030$). Among those aged 30–49 years, 12 (75.0%) reported $\geq 50\%$ didactic teaching responsibility, while only 5 (35.7%) aged ≥ 50 years reported similar didactic teaching responsibility.

Both age groups had similar experience in live classroom lectures, with or without recording, and online asynchronous (prerecorded) lectures prior to the lockdown. Only 4 of the 30 respondents (13.3%) had online synchronous teaching experience prior to the lockdown. This difference in experience was statistically significant by both chi-squared ($p = 0.022$) and Fisher's exact test ($p = 0.037$).

All 16 (100%) instructors in 30–49 year age range used online synchronous instruction, and 8 (50.0%) reported it as their most frequently used remote instruction method. Only 11 (78.6%) in the age range ≥ 50 years reported teaching online synchronously, and only 3 (21.4%) reported it as their most frequently used method. Overall, the most frequently used method was online synchronous (36.7%), followed by online asynchronous (30.0%), instruction.

24 (80.0%) participants undertook training for transition to remote instruction, and of those 20 (83.3%) received 1–6 hours of training. Almost all (95.8%) instructors received school-provided training. Notably, only 2 instructors had training in remote instruction prior to February 2020. 30% of participants felt that training was less than ideal. On average, participants felt the level of training was moderately close to ideal (mean: 3.00 ± 1.22) on a 5-point Likert scale ranging from extremely close to ideal (1) to not close to ideal (5).

TABLE 1: Experience in dental education, academic designation, and self-reported teaching responsibility distribution of Detroit Mercy dental faculty participants that made the transition to complete remote instruction in March 2020 and their experience with different instruction methods prior to and during the shift, experience with training, and words to describe their transition to remote instruction.

Participant Characteristics	Age range			Total n (col %)	<i>p</i> (chi-squared)	Fisher's exact test
	30–49 years		≥50 years			
	n (row %)	n (row %)				
All participants	16 (53.3)	14 (46.7)	30 (100.0)			
<i>Dental education experience</i>						
0–9 years	13 (81.3)	2 (14.3)	15 (50.0)		<0.001*	
≥10 years	3 (18.8)	12 (85.7)	15 (50.0)			
<i>Academic designation</i>						
Clinical track faculty	8 (50.0)	9 (64.3)	17 (56.7)		0.431	
Tenure track/tenured faculty	8 (50.0)	5 (35.7)	13 (43.3)			
<i>Teaching responsibility</i>						
<50% didactic	4 (25.0)	9 (64.29)	13 (43.3)		0.030*	
≥50% didactic	12 (75.0)	5 (35.71)	17 (56.7)			
<i>Instruction methods: used prior to transition to remote instruction</i>						
Live classroom lecture (face-to-face)	14 (87.5)	11 (78.57)	25 (83.3)		0.513	
In-person lecture, plus online recording	11 (68.8)	10 (71.43)	21 (70.0)		0.873	
Online asynchronous (prerecorded)	8 (50.0)	7 (50.00)	15 (50.0)		1.000	
Online synchronous (live, online)	0 (0.0)	4 (28.57)	4 (13.3)		0.022*	0.037*
<i>Instruction methods: used during period of remote instruction</i>						
Online asynchronous (prerecorded)	8 (50.0)	7 (50.00)	15 (50.0)		1.000	
Online synchronous (live, online)	16 (100.0)	11 (78.57)	27 (90.0)		0.051	0.09
Online small-group discussions	13 (81.3)	10 (71.43)	23 (76.7)		0.526	
<i>Instruction methods: most frequently used during period of remote instruction</i>						
Online asynchronous (prerecorded)	4 (25.0)	5 (35.7)	9 (30.00)		0.288	
Online synchronous (live, online)	8 (50.0)	3 (21.4)	11 (36.7)			
Online small-group discussions	2 (12.5)	4 (28.6)	6 (20.0)			
Other: online one-on-one meeting	1 (6.3)	0 (0.0)	1 (3.3)			
Missing	1 (6.3)	2 (14.3)	3 (10.0)			
<i>Did you participate in training for your transition to remote instruction?</i>						
Yes	14 (87.5)	10 (71.43)	24 (80.00)		0.272	
No	2 (12.5)	4 (28.57)	6 (20.00)			
<i>How many hours of remote instruction training did you receive? (% of those that received training)[†]</i>						
1–3 hours	6 (37.50)	5 (35.71)	11 (45.83)		0.304	
3–6 hours	4 (25.00)	5 (35.71)	9 (37.50)			
6–12 hours	3 (18.75)	0 (0.00)	3 (12.50)			
>24 hours	1 (6.25)	0 (0.00)	1 (4.17)			
<i>Training methods utilized for transition to remote instruction (% of those that received training)</i>						
School-provided professional development	13 (92.86)	10 (100.00)	23 (95.83)		0.526	
Outside webinar	5 (35.71)	9 (90.00)	14 (58.33)		0.070	
One-on-one with instructional design team	5 (35.71)	5 (50.00)	10 (41.67)		0.796	
E-learning tools (e.g., YouTube, Coursera)	7 (50.00)	3 (30.00)	10 (41.67)		0.196	
One-on-one training from colleague	5 (35.71)	3 (30.00)	8 (33.33)		0.544	
Family and friends	3 (21.43)	0 (0.00)	3 (12.50)		0.088	
<i>Words to describe transition to remote instruction</i>						
Interesting	9 (47.37)	10 (52.63)	19 (63.33)		0.919	
Useful	10 (52.63)	9 (47.37)	19 (63.33)		0.919	
Time-consuming	10 (58.82)	7 (41.18)	17 (56.67)		0.491	
Challenging	9 (56.25)	7 (43.75)	16 (53.33)		0.732	
Stressful	9 (75.00)	3 (25.00)	12 (40.00)		0.052	
Straightforward	5 (55.56)	4 (44.44)	9 (30.00)		0.873	
Efficient	3 (42.86)	4 (57.14)	7 (23.33)		0.526	
Cumbersome	3 (60.00)	2 (40.00)	5 (16.67)		0.743	
Smooth	3 (60.00)	2 (40.00)	5 (16.67)		0.743	
Wasteful	1 (50.00)	1 (50.00)	2 (6.67)		0.922	

**p* < 0.05 was determined using Pearson chi-squared test, and when cells had expected value less than 5, Fisher's exact test was also applied. [†]Two respondents, out of 24 that received training, indicated that their training in remote instruction occurred primarily before February 2020.

When participants were prompted with words to describe their experience, the top responses were “interesting” (63.3%) and “useful” (63.3%). The next two choices were “time-consuming” (56.67%) and “challenging” (53.33%). Although it did not reach significance ($p = 0.052$), “stressful” was chosen by 9 out of 16 (56.3%) instructors in the age group 30–49 years, while it was only selected by 3 (21.4%) of those aged ≥ 50 years.

3.2. Instruction Method Preferences (Table 2). Faculties ranked four instruction methods (1 = highest rank) based on personal preference or their perceived ability to promote student learning. The in-person (live) instruction was the best ranked method according to both personal preference (mean: 2.14 ± 1.30) and ability to promote student learning (mean: 2.18 ± 1.40). In-person (live) instruction received 14 out of 28 first place rankings (50%) in both categories while also receiving 8 out of 27 (28.57%) last place rankings. The second highest rated method was in-person/recording method (mean: 2.50 ± 0.92). When ranked based on ability to promote student learning, in-person/recording method (mean: 2.56 ± 0.96) was only slightly behind online synchronous method (mean: 2.54 ± 0.91).

Online asynchronous method had the lowest overall mean for both faculty preference (2.72 ± 1.40) and promoting student learning (2.83 ± 1.24). For faculty preference, online asynchronous method received the highest number of last place rankings at 12 (42.9%) while also receiving 9 out of 28 first place ranks (32.1%). Nevertheless, when ranked based on the ability to promote student learning, online asynchronous method only received 6 (21.4%) first place ranks.

3.3. Faculty Perception of Online Instruction Methods (Figure 1). Faculties rated their level of agreement using a 5-point Likert scale on statements related to remote online instruction and remote online examinations. Regarding remote online instruction, 17 out of 29 (58.6%) faculty members answered that they agree/strongly agree that remote instruction promotes interactive and collaborative learning. However, 14 out of 29 (48.2%) did not believe online instruction improved student engagement. Overall, faculties responded neutrally (neither agree nor disagree) in response to whether online instruction improved student performance (51.7%) or whether it was better from a student perspective (44.8%). Faculties responded with agreement that remote online examinations were more time-consuming (69.0%) and could be more prone to errors (41.2%), while remaining generally unsure of whether online examinations improved student performance or were better from the student perspective (Figure 1(a)).

Regarding the likelihood of continuing usage of different instructional methods following safe reopening of schools using a 5-point Likert scale (Figure 1(b)), majority of faculty answered that they are likely/extremely likely to continue in-person (live) lectures (85.7%), in-person exams (84.6%), and in-person small-group discussions (89.3%). To a lesser extent, faculty responded positively to

continuing online synchronous lectures (67.9%), online small-group discussions (67.9%), and online examinations (64.2%). The online asynchronous lectures received the lowest percentage for likelihood of continuation on school reopening (53.6%).

Additionally, faculty self-reported their level of satisfaction with remote instruction methods using a slider scale (Table 3). There were no statistically significant satisfaction level correlations between the two age ranges and various remote instruction methods. None of the methods had a mean satisfaction rating that fell into the dissatisfied range (<50). However, the mean satisfaction with online examinations was the lowest for both age ranges, 30–49 years (57.8) and ≥ 50 years (51.1). The mean (M) satisfaction level was similar in both age ranges, regarding asynchronous (63.9, 63.4) and synchronous (69.9, 68.1) lectures, respectively. Faculties in 30–49 year age range trended toward a higher satisfaction level with one-on-one discussions as compared to ≥ 50 years (85.3 versus 68.6, respectively), and faculties in ≥ 50 year age range expressed more satisfaction with small-group discussions as compared to those in 30–49 year age range (73.1, 67.9), respectively.

3.4. Faculty Experience during Remote Instruction (Table 3, Figure 2). Faculties were asked to gauge the level of impact various factors had on their experience during remote instruction using a slider scale (Table 3, Figure 2). Factors that had positive impact for both age ranges, 30–49 years and ≥ 50 years, respectively, were having to adapt to new technologies (+29.23, 39.2) and communicating importance of content to students (+19.3, +10.0). The factors that created maximum negative impact for both age ranges were interruptions at home (-45.5, -23.8), loneliness and lack of human interaction (-33.3, -21.0), and separating home- and work-life (-32.9, +5.56). The only statistically significant factor between the two age ranges was having difficulty with prioritizing work, which was a negative impact (-31.0) for 30–49 years group and a positive impact (+30.0) for the ≥ 50 years group ($p = 0.016$).

Lastly, Table 4 demonstrates faculty's response to questions regarding social aspects of remote instruction during school closure using a 5-point Likert scale. Faculties responded that they missed the space and conversations that they shared with both colleagues and students in the school hallways with “1” (definitely yes) as median and mode response to these prompts. Faculties responded that they felt less sure regarding the relationship students had with their school and their classmates with “3” (might or might not) as the median response for both prompts.

4. Discussion

The current pandemic has prompted unprecedented challenges and massive disruptions for the global education system, with both teachers and students facing a crisis-like situation. As government agencies across international borders enforced lockdown measures, to continue

TABLE 2: Detroit Mercy dental faculty ranked (1–4) in-person lecture methods in comparison with remote instruction lecture methods based on personal preference and on their ability to promote student learning.

	Lecture delivery methods								Total responses	
	In-person (live)		In-person/recorded		Online asynchronous		Online synchronous			
<i>Rank based on personal preference</i>										
Mean rank overall (SD)	2.14	(1.30)	2.50	(0.92)	2.72	(1.40)	2.62	(0.8)		
First place rankings (row %)	14	(50.0)	4	(14.3)	9	(32.1)	1	(3.6)	28	
Last place rankings (row %)	8	(28.6)	4	(14.3)	12	(42.9)	3	(10.7)	27	
<i>Rank based on ability to promote student learning</i>										
Mean rank overall (SD)	2.18	(1.34)	2.56	(0.96)	2.83	(1.24)	2.54	(0.9)		
Asynch. not used during					3.50	(0.97)			10	
Asynch. used during					2.36*	(1.22)			14	
First place rankings (row %)	14	(50.0)	3	(10.7)	6	(21.4)	3	(10.7)	26	
Last place rankings (row %)	8	(28.6)	5	(17.9)	10	(35.7)	4	(14.3)	27	

*Faculty that used online asynchronous lectures during the period of remote instruction ranked online asynchronous lectures significantly higher based on their ability to promote student learning determined by Student's *t*-test ($p = 0.022$). SD: standard deviation.

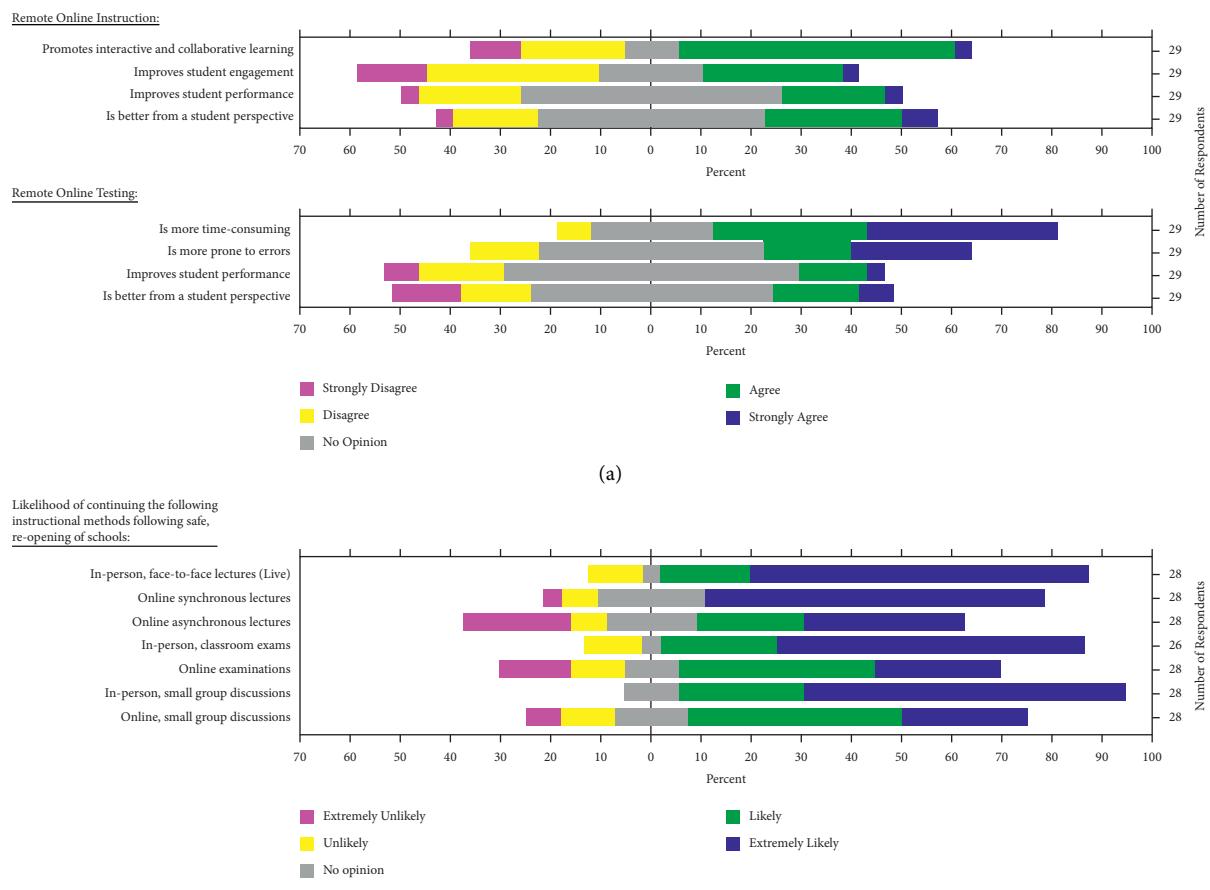


FIGURE 1: Faculty perception of online instruction methods.

education, universities introduced emergency remote instruction options. Various studies have been published since then regarding online teaching experiences of faculties [9–12].

To investigate the experiences of dental faculty, we designed a survey to draw opinions around 6 main points of inference, as discussed as follows.

As a collateral finding, our study demonstrated a significant correlation between the dental education experience and age range. Those with higher clinical teaching responsibility were in ≥ 50 -year age range. For dental schools, universities tend to hire faculties with more professional experience for clinical teaching, as apart from the theoretical knowledge, dental and dental hygiene education requires

TABLE 3: Self-reported satisfaction with instruction methods used during remote instruction and the impact of various factors on the experience of faculties during this time.

	Age range										<i>p</i> (<i>t</i> -test)	
	30–49 years					≥50 years						
	<i>M</i>	(SD)	Min.	Max.	<i>n</i>	<i>M</i>	(SD)	Min.	Max.	<i>n</i>		
Satisfaction with remote instruction methods												
<i>0 (extremely dissatisfied) to 100 (extremely satisfied)</i>												
Asynchronous	63.88	(25.83)	30	100	8	63.40	(29.73)	20	100	10	0.972	
Synchronous	69.93	(26.98)	12	100	15	68.08	(25.70)	7	100	13	0.854	
Online examinations	57.85	(33.15)	0	100	13	51.08	(25.58)	10	95	12	0.576	
Small-group discussions	67.92	(26.70)	10	100	13	73.08	(22.69)	35	99	12	0.609	
One-on-One	85.30	(23.26)	23	100	10	68.55	(28.72)	4	100	11	0.161	
Impact of factors on experience during remote instruction												
<i>-100 (greatest negative impact) to +100 (greatest positive impact)</i>												
Technology												
Internet connection issues	7.69	(55.70)	-70	100	13	17.50	(70.08)	-90	100	12	0.701	
Having to adapt to new technologies	29.23	(59.08)	-60	100	13	39.17	(54.52)	-60	100	12	0.667	
Delay in resolving technical problems	-19.09	(38.59)	-100	50	11	-13.00	(46.44)	-80	70	10	0.746	
Academic												
Connecting with students	-2.14	(62.66)	-100	100	14	-5.45	(57.16)	-70	90	11	0.893	
Communicating importance of content to students	19.29	(52.10)	-60	100	14	10.00	(52.70)	-50	100	10	0.673	
Remote examinations	-5.00	(55.02)	-100	90	12	0.00	(56.21)	-100	80	11	0.831	
Work/life balance												
Feeling like you have too little work	-21.00	(49.09)	-100	40	10	-10.00	(12.25)	-30	0	5	0.636	
Feeling like you are working too much	0.71	(55.12)	-100	100	14	11.00	(51.74)	-60	100	10	0.649	
Separating home-life and work-life	-32.86	(57.03)	-100	100	14	5.56	(56.59)	-60	100	9	0.129	
Prioritizing work	-31.00	(54.86)	-100	100	10	30.00	(43.30)	-10	100	9	0.016*	
Interruptions at home	-45.45	(40.34)	-100	20	11	-23.75	(51.53)	-100	70	8	0.317	
Loneliness/lack of human interaction	-33.33	(49.97)	-100	80	12	-21.00	(58.96)	-100	100	10	0.601	

*Significant difference ($p < 0.05$) between the two age ranges was determined using Student's *t*-test. *M*: mean, SD: standard deviation, Min.: minimum, Max.: maximum.

students to develop strong hand-eye coordination, technical, and decision-making skills through apprenticeship learning [10, 11, 13, 14].

4.1. Did Faculties Have Prior Remote Instruction Experience and What Was the Magnitude of This Transition? There is a lack of sufficient data to determine how many dental schools in the US transitioned to remote online teaching and how popular this method was prior to lockdown. At our school, all teaching faculty transitioned to remote instruction. None of our younger faculty had live online synchronous teaching experience prior to lockdown whereas 28.50% of the older faculty did have this experience.

Not every instructor considers online teaching as effective as didactic and in-class instruction for hands-on clinical skills. Though the discussions around flip classrooms and prerecorded lectures gained interest in the past, healthcare professions primarily find in-class didactic teaching a necessity for developing proficiency in practical clinical skills.

Notably, studies done in China and Europe have shed some light on the emergency transitions to remote instruction during the early months of the pandemic.

In a study on teachers' perceptions of large-scale online teaching as an epidemic prevention and control strategy in China, Yang investigated 15,438 schoolteachers' readiness to

deliver online teaching in May 2020 "finding that most teachers already had experience with learning from e-learning platforms." The study found that almost half used online learning platforms frequently and about a third did so occasionally before the pandemic, further concluding that prior experience with e-learning platforms resulted in increased acceptance toward remote teaching [9].

Furthermore, a nationwide survey of online teaching strategies, conducted in 42 dental schools in China by Wang et al., found that the primary methods used by instructors were live broadcast (74%), recorded broadcast (68%), MOOC (massive open online courses) (50%), and video conferencing (45%) [10].

In Europe, most dental schools adopted online pedagogical software tools, with 72% using live or streamed videos. Almost half used various other online materials with even more conducting virtual meet-ups [11].

4.2. Which Instruction Method or Methods Did They Use during Remote Instruction and How Often? Despite lacking previous experience with live online teaching, the greater utilization and preference of the live synchronous method by younger faculty can be related to younger faculty perceiving online live instruction to be the closest replacement for in-class lectures and asynchronous methods, posing a greater risk of disconnecting them from students, thereby assuming

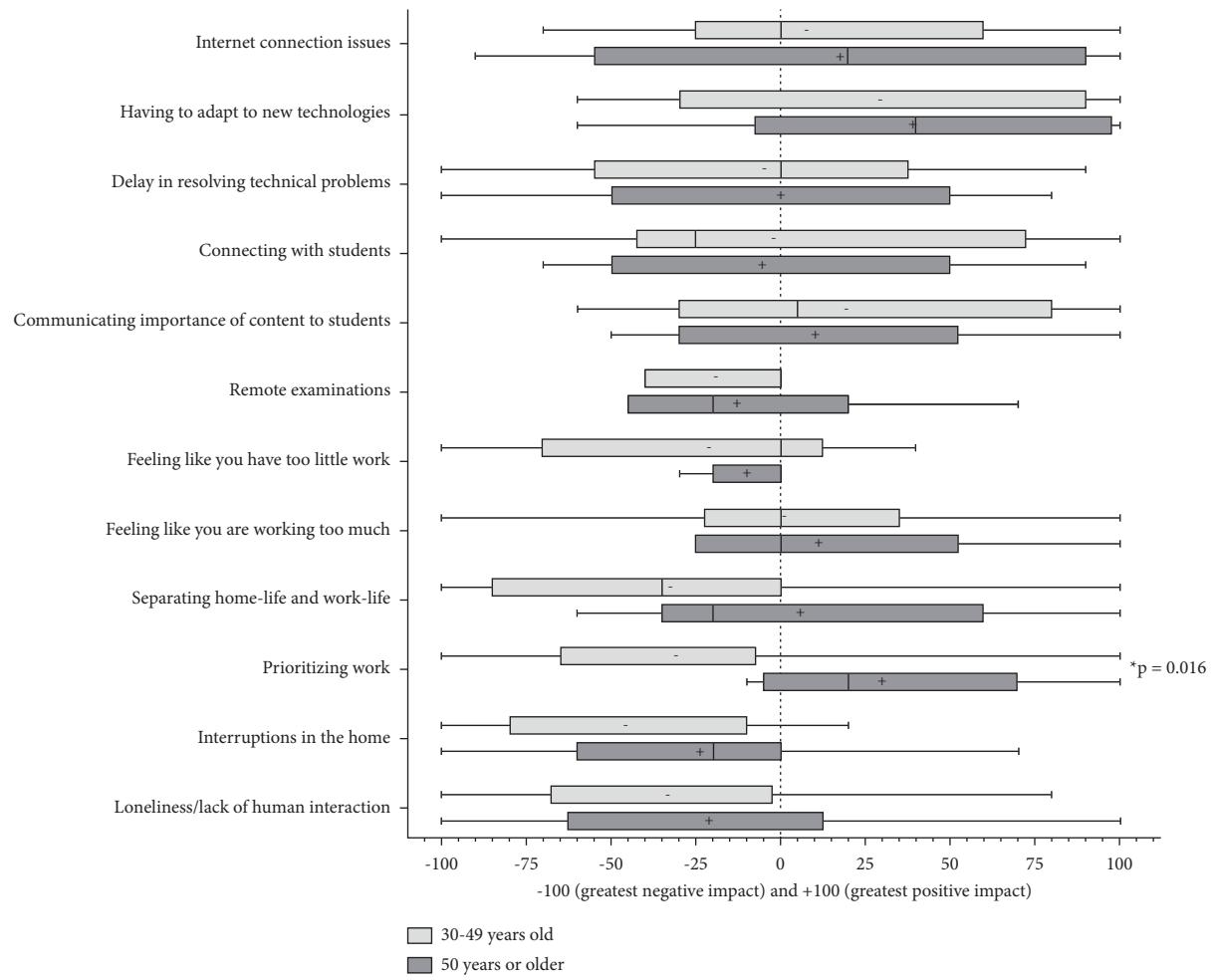


FIGURE 2: Faculty experience during remote instruction.

TABLE 4: Responses of Detroit Mercy dental faculty to questions regarding social aspects of remote instruction away from the institution.

	M	Median	(Mode)	Min.	Max.	n
During school closure, remote instruction:						
Did you miss the space and conversations shared with colleagues in college/school hallways?	1.61	1	(1)	1	4	28
Did you miss the space and conversations shared with students in college/school hallways?	1.57	1	(1)	1	4	28
Do you feel like your students have a relationship with their school?	2.89	3	(2, 3)	1	5	28
Do you feel like your students have a relationship with their classmates?	2.82	3	(3)	1	5	28

Min.: minimum. Max.: maximum. 1: definitely yes, 2: probably yes, 3: might or might not, 4: probably not, and 5: definitely not.

it to be not as effective as the prior experience. Older faculty who had prior experience of both synchronous and asynchronous methods are seen using both methods.

The satisfaction level was higher in small-group discussions category among faculty in older age range as compared to younger one. Since the older faculties are seen to have higher clinical teaching responsibility and during the lockdown there was no in-person clinical teaching, the higher satisfaction may be attributed to the fact that, in clinic, faculty often interact with students in small groups and perceived this format as the closest in nature to the teaching environment in a clinical setting.

Conversely, faculty in the younger age category were more satisfied with one-on-one discussions which could be

due to them feeling socially connected and willing to provide as much support to students as was possible.

Quinn et al. found that the lockdown resulted in half of the schools postponing examinations or holding them online. A small proportion of dental schools were looking to hold in-person exams, and most (72%) aimed to delay clinical competency evaluations [11].

While designing our study, we did not anticipate the extended lockdown and did not incorporate enough questions related to examinations. At our school, all examinations for didactic courses were held remotely as scheduled, although examinations for clinical courses and sim lab were postponed. Further research is warranted on the impact of remote learning in conjunction with examination procedures and outcomes.

4.3. Did They Receive Training for Online Teaching and Testing, Who Provided It and for How Long, and How Would They Rate It? Most of our faculties received up to 6 hours of school-provided training and gave mixed ratings on its quality. Additionally, one-third (33–44%) of them utilized colleagues, e-learning tools, and one-on-one assistance from instructional design teams.

In our opinion, training was a necessity, although due to uncertainty of the situation not much emphasis was laid on the ways to increase the proportion of interactive materials for content delivery.

Training regarding the use of technology is a key factor leading to the success of an online environment, as inconsistent or unreliable technology can become a distraction and negatively impact student success [12].

In addition, Yusuf and Ahmad (2020) underscore that aside from a technological aspect, it is imperative “to provide workshops or training for teachers and students to improve their technological and pedagogical competencies in online learning” [15].

In schools in China, Yang’s study findings (2020) reiterate the relevance and importance of training prior to transition to remote instruction. In Yang’s study, the teachers who had received relevant training reported that the training improved their skills particularly in the application of live streaming technologies and available platforms (48.70%), multimedia slide show techniques (44.30%), information search and resource integration skills (41.31%), and online teaching strategies and methods (38.13%), as well as lecture recording and production techniques (32.80%). Most teachers experienced a short interval between receiving training and delivering online courses. While this short window is not conducive to the comprehensive absorption of the training content, it does allow for the immediate application of the learned knowledge and skills and indeed provided support to teachers [9].

4.4. What Method or Methods of Remote Instruction Did They Prefer and Which One Promotes Student Learning, Interaction, Engagement, and Performance? Based on personal preference, the in-person live teaching method was preferred the most and the online asynchronous one the least.

It is likely that these results were influenced by the lack of interaction with students experienced in the asynchronous online method. Moreover, it is generally accepted that in-class lectures promote student learning, interaction, and teacher satisfaction. Although in-class teaching has its challenges, studies have found that there is no difference in student performance between the two methods and the asynchronous method gives more flexibility [15].

During the rapid and abrupt transition, time was a binding factor that hindered instructors from using techniques and working on changing teaching material to better suit remote teaching as student motivation and attention remain the key challenges.

According to Rivoltella (2020), “it is necessary to create the content and to also give precise indications to the students through the use of synchronous communication (chat

and video communication) to interact, clarify doubts and discuss problems” [16].

The time factor, combined with the training factor, may have triggered variation in preferences and adoption rates for different remote teaching methods assessed as a part of this study.

Since student motivation and attention are the key challenges, the experiences of teachers need to be compared with those of students to think critically and creatively for future online study plans.

Indeed, research shows that “most students experienced barriers to their learning due to the pandemic, including distractions, increased anxiety, and feeling less motivated, especially for non-white, female, and first-generation college students” [17].

4.5. How Did Faculties Rate Their Overall Experience, Which Methods Were More Time-Consuming, and Which Methods Are Prone to Errors? Most faculty members felt that remote testing is more time-consuming and more prone to errors while others were unsure.

In Wang et al. (2020) investigation on dental education in China during the pandemic, the convenience and flexibility of online education are emphasized. However, an inconsistency factor with the execution of online courses was a concern [10].

Online teaching, parallel to in-person instruction, requires a different or alternative approach depending on the subject and the course. Flynn et al. (2021) conducted a study during lockdown at London School of Medicine and Dentistry. Over 250 hours of synchronous online anatomy teaching were delivered via small-group webinars. According to the study, “faculty consensus was that most students engaged well in sessions, and sometimes better than generally occurs in F2F teaching.” This success was attributed to the use of 3D models and group learning activities during webinars [18].

In our study, most faculties agree that remote online instruction promotes interactive and collaborative learning but have a mixed opinion on whether it improves student engagement.

McDaniel et al. reported that student’s ability to work with peers, maintain interest in their classes, and feel a sense of belonging in the campus community suffered during the spring 2020 term [19].

In the past, skeptics have claimed that online courses cause a decrease in student learning outcomes; that the time required to teach them is far greater than face-to-face classes; that student persistence or success is decreased in online environments; and that faculty are not as satisfied with the online teaching experience as they are with the face-to-face teaching experience [20].

4.6. What Kind of Social Impact Did the Remote Instruction Have on Faculty’s and Student’s Lives? Our faculty responded with “definitely yes” to missing interactions with colleagues and students. While working remotely, social challenges are mainly related to the lack of human interaction between

teachers and students as well as among the latter, the lack of physical spaces at home to receive lessons, and the lack of support of parents who are frequently working remotely in the same spaces [21].

According to Fox et al., faculty perceived their students' biggest obstacles to be balancing home, work, school, reliable Internet access, and their mental health [22].

4.7. Which Instruction Method or Methods Are They Hoping to Use Once School Reopens? Most faculty members felt in future they aim to use a mix of teaching methods, though online asynchronous lectures and online examinations were rated extremely unlikely. A follow-up survey would help to understand if the prolonged continuation of online instruction has resulted in faculty viewing it in a more positive or negative light and provide insight into whether this perception was impacted by the sudden transition and challenges of adapting to new technology.

According to Ferri et al., the opinion that remote methods that were adopted more widely during the pandemic will make up a greater proportion in the mix of content delivery in future is a prominent discussion, as this would reflect whether digitally available education will have a greater presence, or in-person teaching will continue to play the most important role [23].

Haridy et al. invited dental educators from around the world to investigate procedures outlined by dental faculty members to maintain quality dental education in a safe bioenvironment and adequately control the risk of cross-infection. Their survey results suggested adoption of a future dynamic hybrid strategy that combines online distant learning, virtual simulation, and haptic labs together with traditional direct clinical training on real patients [24].

Karabulut-Ilgı and Jahren designed a multiple case study and recommended that faculty members who are considering implementing hybrid learning could start with the courses they have taught before. They also indicated that hybrid learning has both advantages and challenges, but advantages outweighed the challenges. Moreover, participants in this study had access to an instructional design team, who lifted some of the production work for the instructors [25].

5. Conclusion

Our study finds that faculty tends to gravitate to online methods that are similar to or mimic their past in-person teaching environment. Forced remote instruction gave new content delivery experiences to faculty of all ranges of age and experience in teaching (Table 1). Faculty's exposure to various online instructional methods is likely to result in a more widespread adoption of a variety of instructional methods in future. Perceptions of faculty from this study, collected in June 2020, strongly suggest that traditional in-person instruction is the preferred method for delivery of content and is likely better for student learning (Figure 1). While the majority of faculty ranked in-person content delivery highest (Table 2), most believed that the future of

dental education would be a mix of both in-class and online instruction (data not shown). The latter came to fruition in summer and fall 2021, when the School of Dentistry, along with many institutions, adopted hybrid, flexible models for didactic instruction to allow students the opportunity to digest content in their preferred method. Careful planning and systematic, continued training will be required to enhance technological skills and to incorporate newer models into didactic and clinical instruction. For the success of blended learning, courses will need redesigning of assessment methods, commitment, and support from administrators.

5.1. Current and Future Trends. The current study was able to evaluate dental faculty perception at the onset of forced remote instruction, during a time where online instruction was brand new to many of the faculty (Table 1). It would be worthwhile to investigate how faculty perceptions have changed after almost two years of completely online instruction and hybrid course delivery. Faculty have gained insight on their own abilities to incorporate and utilize technology and have new and changing perception of student preference for classroom or online learning and performance through each medium. It is possible that students may express preference for methods based on their learning habits and other external variables like commute times, family obligations, and sleep patterns. Student attendance and timely viewing of content are highly variable, and overall class performance seems to be suffering. Identification of faults in hybrid learning models and ways to improve student consumption of material will greatly impact the future of these models. Various methods of teaching, assessment, and feedback are actively being devised by faculty to enhance student participation, motivation, learning, and performance. It is obvious that more time is being utilized in content delivery, as well in the implementation of these newer methods for providing additional experiences to dental students and for assessments. With the quick adaptation to these newer methods, faculty's preferences are likely to change, and we foresee some drastic changes in future education, especially in graduate schools. It would be more meaningful to explore faculty's experiences on benefits and challenges of hybrid learning.

Moreover, there is mixed feedback from students regarding their preferences. Therefore, it would be worthwhile to do survey-based studies on students to understand their perspective and preferences and then compare their performance to find out the actual outcome after utilization of newer methods. In the long run, the most successful teaching methods will be those that best support student learning and have ability to reach and surpass curriculum objectives and professional goals.

5.2. Limitations of Our Study. The main limitation of this study is the sample population size. Faculties who completed the questionnaire were from a single institution and had variability in didactic, simulation, and clinical teaching responsibilities. These confounding factors were separated in

our analyses to account for methods that are inappropriate for remote instruction such as clinical experience and simulation laboratories. Future studies will be conducted to include a greater number of faculty members representing more than a single institution.

Data Availability

The raw data are available from the corresponding author upon request.

Ethical Approval

The study was approved by institutional review board as exempt research (IRB-C-#19-20-60).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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