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Satisfaction with Distance Learning in the post-COVID Era as influenced by Learning Environment, Technological Glitches and Course Content in Undergraduate Dental Education

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Abstract

Aim: This study aimed to evaluate learner satisfaction related to the components of Distance Learning (DL) by using mediation analysis in dental students. **Methods:** In this study, 608 dental students were included. Data were collected through the use of an online questionnaire. **Results:** In the multiple mediation analysis, the increase in "Satisfaction score with DL" was directly mediated by the Clinical students (p=0.0250) and indirectly mediated by the increase in the score of items concerning "Relating Theoretical Course to Clinical Practice" (p=0.0009)", "Satisfaction with Course Content" (p=0.0000)" and "Comfortable learning environment" p=0.0000) in Clinical students whereas a poor score was associated with an elevated score of the item concerning "Technological glitches in live lectures" (p=0.0000)" in Preclinical students. **Conclusions:** Satisfaction with DL was associated with the students' clinical experience as well as course content, the learning environment. Unsurprisingly technological glitches were associated with the overall experience of DL.

Keywords: Distance learning; Learning Environment; Technological Glitches; Course Content; Dentistry

Introduction

The educational environment was suddenly changed for dental healthcare professionals in 2020 by the arrival of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1] causing COVID 19 [2]. Through necessity, dental healthcare professionals and clinical students have close contact with patients during dental examinations and therapeutic interventions especially those involving aerosol producing procedures (AGP) resulting in high level of SARS-CoV-2 particle exposure. As a result, only, emergency treatment in dedicated centres was permitted. Stringent new guidelines and precautions relating to infection prevention and control in both general and specialist practice and academic dental institutions were introduced [3-8]. This resulted in both dental healthcare delivery and clinical training of dental students being affected and it is only now with the widespread roll out of vaccinations that dental care and training is being resumed [4,9].

Background

In an effort to avoid prevention of spread of COVID-19 this period, a dramatic shift to online teaching for all didactic and some clinical teaching enabling the maintenance of student safety and reduction in spread by direct contact with

patients and between students, patients and staff and continuation of dental education [2,7].

An enormous amount of effort was put into redesigning teaching and learning activities as Distance Learning (DL) teaching [2, 10-13]. Whilst innovative approaches were adopted to provide some clinical skills teaching because virtual environments cannot fully replace face-to-face clinical or simulation training for the professional development of health science students, most clinical and technical skills have had to be provided in ways other than DL [14-16]. Despite these limitations relating to clinical skills teaching DL is thought to allow more freedom of navigation, and this deepening the scope of the learning process, allowing individual students to learn at a different pace and also encourage self-directed learning both of which are held to be fundamental properties of this method [16] [17]. Course content [18, 19], technical challenges [2] [20] [16], communications between students and lecturers [2, 16] and spending more time on online teaching platforms [21] are held to be advantages of DL. It needs to be pointed out that in terms of Honey and Mumfords (2006) learning styles, DL may not be so ideal for activists who learn by 'doing' but may be better suited to 'reflectors' and 'theorists [22]. In this complex structure, a mediation analysis may help to recognize significant factors in DL [23]. The aim of this study was, therefore, to identify satisfaction related factors associated with DL by using mediation analysis for the effects of DL on professional development in both preclinical students and clinical students.

Materials and Methods

608 dental students (F/M: 405/203) at the Dental School at the Marmara University in Istanbul, Turkey volunteered to take part in this cross-sectional study. The profile of the students is shown in Table 1. The study was performed according to the principles of the Declaration of Helsinki and was approved by the Ethical Committee of Marmara University Medical School (09.2020.1292).

Sample size calculation

In this study, the population parameter to be estimated was defined as "population ratio" and the population was formed in two options "Preclinical" and "Clinical". The size of the population was 778 which comprised 447 Preclinical students (1^{st}-year students, 2^{nd}-year students, 3^{rd}-year students) and 331 Clinical students (4^{th}-year students and 5^{th}-year students). As a result, the ratio of the number of Preclinical responses to the number of clinical responses in the population was 1.35. Prior to commencing the study, α significant level was determined as 0.05 and the sample size was calculated by taking P=0.50. The sample size obtained with the assistance of G-power 3.1 free software program was determined as 329 for preclinical students and 244 for clinical students.

The number of students taking part in the study was higher than these determined numbers. 353 preclinical students and 255 clinical students took part in the study. The response rate was 78% in the entire group, 79% preclinical students and 77% clinical students in the study.

	Preclinical Group (n=353) n (%)	**Clinical Group (n=255) n (%)**
Gender		
Female	235 (66.6)	170 (66.7)
Male	118 (33.4)	85 (33.3)
Total	353 (100)	255 (100)
Academic year		
1^{st} year	114 (32.3)	-
2^{nd} year	128 (36.3)	-
3^{rd} year	111 (31.4)	-
4^{th} year	-	123 (48.2)
5^{th} year	-	132 (51.8)
Total	353 (100)	255 (100)
Accommodation		
Istanbul	172 (48.7)	202 (79.2)
Different cities	175 (49.6)	51 (20)
Different country	6 (1.7)	2 (0.8)
Total	353 (100)	255 (100)
Family house	329 (93.2)	154 (60.4)
Student house	22 (6.2)	94 (36.9)
Dormitory	2 (0.6)	4 (1.6)
No response	0 (0)	3 (1.2)
Total	353 (100)	255 (100)

Table 1: The Profile of the Preclinical Group and Clinical Group.

Online Survey relating to Distance Learning

The routine face-to face educational activities involving theoretical and practical courses on campus were stopped in March 2020 for all students. All didactic courses for preclinical and clinical students were transferred to a DL platform provided by the university immediately. The dental school was only opened to 5^{th} -year students for the continuity of their practical training in October 2020.

The total period of clinical experience was 6 months for 4^{th} -year students (September 2019-March 2020) and 19 months for 5^{th} -year students (September 2018-July 2019; September 2019-March 2020; October 2020-January 2021) in Clinical group (Figure 1). The online survey was undertaken at the end of the fall semester in 2021 (from January 14, 2021 to January 28, 2021) (Figure 1).

Data were collected by using a structured online questionnaire developed by the study group. Satisfaction with DL, its course content (1: not satisfied-10: very satisfied), contribution of course to clinical practice (1: not contributed-10: much contributed) and self-reported technology use (1: very bad -10: very good) were evaluated by using 10-point visual analogue scale. Other DL-related items shown in Table 2 regarding learning environment, communication, technological background was assessed by using 5-point Likert scale in the questionnaire (1: strongly disagree *vs.* 5: strongly agree). Moreover, the effects of distance learning on professional competency were also coded as increased, neutral or decreased by dental students.

Statistical methods

Data were analysed by using SPSS 26.0 statistic program (SPSS Inc, Chicago, IL, USA). Non-parametric analysis

regarding Spearman correlation test and Mann-Whitney U test were applied owing to the non-normal distribution of data. Chi-square tests were used in the analysis of categorical variables. In the study, $p \leq 0.05$ was accepted as statistically significant.

Mediation analysis

Mediation analysis was performed to evaluate both direct and indirect causal effects for satisfaction with distance learning by using PROCESS macro adopted in SPSS [23]. In this conceptual model, the student group (0: Preclinical group *vs.* 1: Clinical group) was an independent variable whereas "Satisfaction score with Distance learning" (continuous data) was a dependent variable. The significant variables determined after preliminary analyses (Table 2) were tested as potential mediators in the multiple mediation analysis. Among them, the items regarding "Technological problems", "Relating the Theoretical knowledge to Clinical practice", "Satisfaction with the contents of the courses" and "Comfortable learning environment" were found significant mediators in multiple mediation analysis.

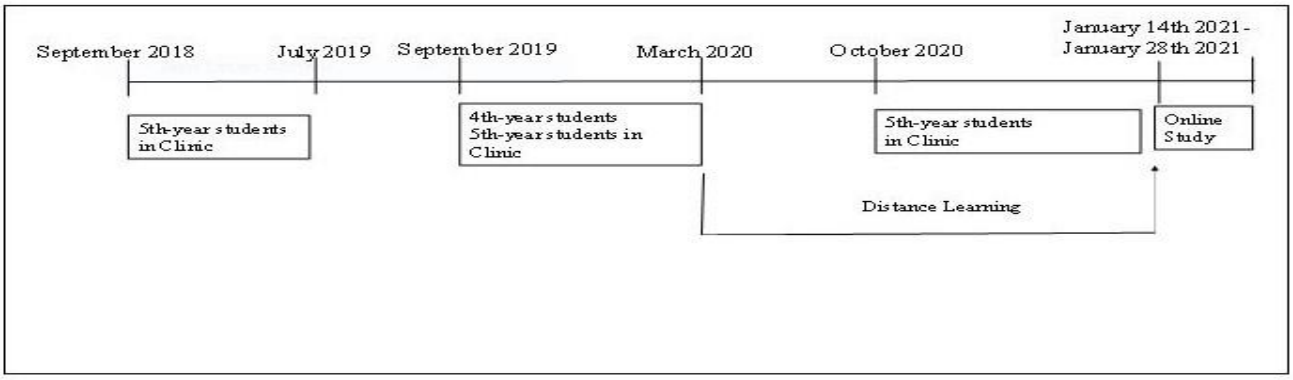

Figure 1: Student's clinical experience and online survey.

	Preclinical Students Mean ± SD	Clinical Students Mean±SD	p*
1. Satisfaction score with the distance education process**.	5.14 ± 3.35	6.4 ± 2.20	**<0.001**
2. Self-reported technology use ability ***	6.33 ± 1.78	6.52 ± 1.82	0.105
3. Satisfaction score with the content of the courses**	5.82 ± 2.24	7.03 ± 1.83	**<0.001**
4. The level of contribution of courses taken in the distance learning process to dentistry practices****	4.31 ± 2.32	5.85 ± 2.11	**<0.001**
5. Access to virtual classrooms is easy on the platform offered by the university for distance learning*****	3.63 ± 0.97	3.97 ± 0.68	**<0.001**
6. I can easily solve the technological problems I encounter on the platform offered by the university for distance learning*****	2.84 ± 1.08	3.27 ± 0.92	**<0.001**
7. Technological glitches experienced in live lectures affect the learning process negatively*****	4.32 ± 0.87	4.12 ± 0.85	**<0.001**
8. During the distance learning process, it is boring to stay in front of a computer/phone/tablet during live lectures*****	3.76 ± 1.11	3.32 ± 1.11	**<0.001**
9. During the distance learning process, I turn to other topics that interest me more on computer/phone /tablet during live lectures*****	3.44 ± 1.07	3.18 ± 0.96	**0.001**
10. Easily getting answers to the questions during the distance education process*****	3.70 ± 0.89	4.04 ± 0.79	**<0.001**
11. During the distance learning process, I was able to relate the theoretical knowledge to the clinical practices I acquired*****	2.63 ± 1.09	3.45 ± 0.91	**<0.001**
12. The distance learning process and virtual classroom applications are equivalent to face-to-face education*****	2.05 ± 1.15	2.51 ± 1.23	**<0.001**
13. Comfortable learning environment compared to the face-to-face education process*****	3.33 ± 1.34	3.68 ± 1.14	**0.004**
14. Maximum time period for online live courses (minutes)	52.80 ± 15.81	47.69 ± 11.14	**<0.001**
15. Minimum class breaks for online live courses (minutes)	12.56 ± 4.47	13.27 ± 5.32	0.07
16. Video duration that used in lecture materials (minutes)	20.86 ± 21.14	19.91 ± 19.90	0.58

*Mann-Whitney U Test;
** Scoring between 1 point (not satisfied) and 10 points (very satisfied)
*** Scoring between 1 point (very bad) and 10 points (very good)
**** Scoring between 1 point (not contributed) and 10 points (very contributed)
*****: Likert scale (1: completely disagree *vs.* 5: completely agree)

Table 2: Outcomes of the distance learning in preclinical and clinical groups.

Results

In this cross-sectional study, 608 students (F/M: 405/203; mean age: 21.64±2.07 years) were included. Over one-third of the Clinical students accessed to Distance learning platform in Istanbul (79,2%) whereas most of the students (93,2%) were living in their family house in the Preclinical students (Table 1).

Clinical Students *vs.* Preclinical Students

"Satisfaction score for DL" was found to be high in Clinical students (6.40 ± 2.20) than Preclinical students (5.14 ± 3.35) ($p<0.001$). Elevated scores were observed in items regarding 'Satisfied with course content", "Contribution of dentistry practice", "Easily getting an answer to the questions" and "Relating the theoretical knowledge with clinical practice" and "Equivalent to face-to-face education" in the Clinical group than those of Preclinical group ($p<0.05$). Moreover, scores of items regarding "Comfortable learning environment", "Easy access to the virtual classroom" and "Easily solving technical problems" were also higher in the Clinical group ($p<0.05$) (Table 2).

When responses of 5th -year students and 4th -year students were compared, "Satisfaction score for DL" was higher in 5th -year students (6,91 ± 2,03 *vs.* 6,02 ± 2,29, respectively) ($p=0.003$).

The ratios of "Student-lecturer interactions" increased in Clinical group (22.4%) compared to Preclinical group (14.7%) ($p=0.018$) (Table 3). Moreover, an increasing trend in the ratio of 'Motivation" was observed in Clinical students compared to Preclinical students (25.1% in Clinical group *vs.* 18.4 % in Preclinical group) ($p=0.056$). Yet, the ratios were fairly low in both groups. The other items were found to be similar in both groups ($p>0.05$) (Table 3).

		Preclinical Group		Clinical Group		
		n	**%**	**n**	**%**	**p ***
Self-confidence	Increased	52	14.7	30	11.8	0.336
	Neutral/Decreased	301	85.3	225	88.2	
	Total	353	100	255	100	
Level of Anxiety	Increased	196	55.5	79	31	**<0.0001**
	Neutral/Decreased	157	45.5	176	69	
	Total	353	100	255	100	
Crisis management skills	Increased	80	22.7	48	18.8	0.269
	Neutral/Decreased	273	77.3	207	81.2	
	Total	353	100	255	100	
Teamwork	Increased	61	17.3	47	18.4	0.747
	Neutral/Decreased	292	82.7	208	81.6	
	Total	353	100	255	100	
Professional competencies	Increased	28	7.9	31	12.2	0.096
	Neutral/Decreased	325	92.1	224	87.8	
	Total	353	100	255	100	
Internalizing the professional environment	Increased	54	15.3	41	16.1	0.821
	Neutral/Decreased	299	84.7	214	83.9	
	Total	353	100	255	100	
Motivation	Increased	65	18.4	64	25.1	**0.056**
	Neutral/Decreased	288	81.6	191	74.9	
	Total	353	100	255	100	
Student-Instructor interaction	Increased	52	14.7	57	22.4	**0.018**
	Neutral/Decreased	301	85.3	198	77.6	
	Total	353	100	255	100	

*Chi-Square Test

Table 3: Perceived impact of distance learning on professional development of dental students.

Preclinical students had higher scores of items regarding 'Technological glitches", 'Boring to stay in front of the computer' and 'Turning to other topics that interest me during live lessons' in Preclinical group than Clinical group ($p<0.05$) (Table 2). Among them, these scores were significantly higher in 1st -year students (4.49 ± 0.79; 4.16 ± 0.99; 3.71 ± 1.1, respectively) than 2nd -year and 3rd-year students (4.24±0.87; 3.62 ± 1.1; 3.34 ± 1.03 and 4.23 ± 0.92; 3.53 ± 0.15; 3.28 ± 1.05) ($p<0.05$).

Preclinical students desired a longer 'Time period for live courses' (52.8 ± 15.81 *vs.* 47.69 ± 11.14) and had 'Anxiety level" (55.5% *vs.* 31%) compared to those of Clinical students ($p<0.001$ for both) (Table 2 and Table 3). Besides, the minimum period of "Online live class breaks"

and "Video duration as lecture material" were reported similarly in both groups (p=0.299, p=0.327) (Table 2).

The ratios of "Self-confidence", "Crisis management", "Teamwork", "Professional competencies" and "Internalizing the profession environment" were observed almost 20% or less in both group (p>0.05) (Table 3).

"Satisfaction score of "Distance Learning" was also correlated with DL related all items shown in Table 2 in Clinical students (r: 0.26-0.61 p<0.05) and Preclinical groups (r: 0.34-0.71 p<0.05).

Mediation analysis

In the final mediation model, the increase in "Satisfaction score with Distance learning" was directly affected by the Clinical students (B=0.0759 p=0.0250) and indirectly mediated by the increase in score of items regarding "Relating Theoretical Course to Clinical Practice" (B=0.2520 p=0.0009)", "Satisfaction with Course Content" (B=0.4908 p=0.0000)" and "Comfortable learning environment" (B=0.4532 p=0.0000) in Clinical students whereas a decrease in the score was associated with an elevated score of the item regarding "Technological glitches in live lectures" (B=-0.3891 p=0.0000)" in Preclinical students (Figure 2) (Table 4). Percentile bootstrap analysis with 5000 replications was performed to estimate mediation effects and to generate 95% CI in the study group.

	B	SE	t	p	LLCI	ULCI
Satisfaction score with Distance Learning*						
Constant	1.7156	0.4728	3.6285	0.0003	0.7870	2.6442
Student Groups (Preclinical: 0; Clinical: 1)	0.0759	0.0338	2.2469	**0.0250**	0.0096	0.1423
Technological glitches experienced in live lectures affect the learning process negatively**	-0.3891	0.0778	-4.9994	**0.0000**	-0.5420	-0.2363
During the distance learning process, I was able to relate the theoretical knowledge to the clinical practices I acquired**	0.2520	0.0753	3.3466	**0.0009**	0.1041	0.3998
Satisfaction score with course content in Distance Learning*	0.4908	0.0388	12.6437	**0.0000**	0.4146	0.5670
Spending the distance learning process in the environment I want provides a more comfortable learning environment compared to the face-to-face education process**	0.4532	0.0578	7.8426	**0.0000**	0.3397	0.5667

* 10-point visual analogue scale: 1: not satisfied-10: very satisfied).
** Likert scale (1: completely disagree *vs.* 5: completely agree)

Table 4: Mediator analysis of satisfaction with distance learning in dental students.

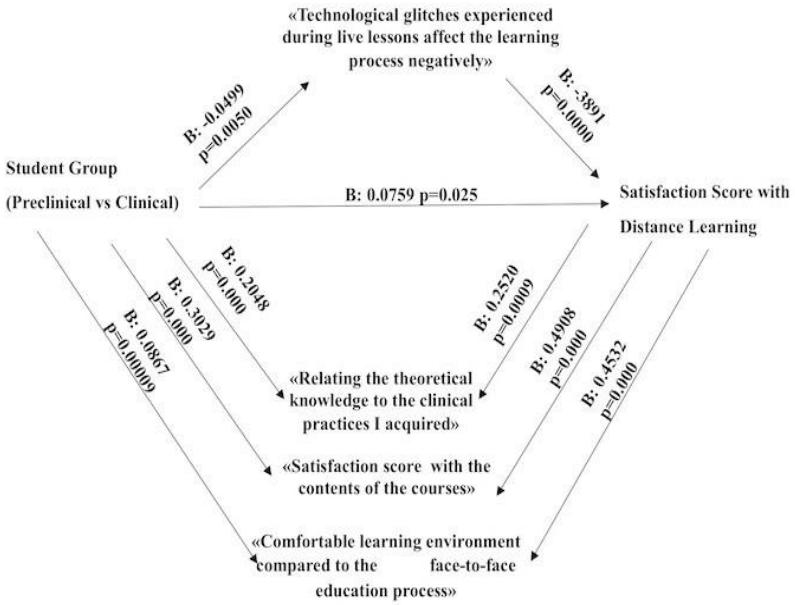

Figure 2: Mediator analysis for satisfaction score of distance learning in the dental student's perspective.

Discussion

Even though the traditional structure of dental curriculum covers theoretical learning and preclinical courses in laboratories with manikins and clinical courses regarding patient treatments strategies, DL was a well-accepted strategy during the limitations for training during the pandemic period [11]. The rapid transition from face-to-face teaching to DL is a new concept in dental education although in medicine it has long been envisaged [24]. Remote web technology-based learning environment will be an essential part of the future curriculum [11, 25]. One would expect that the professional development of the dental students was inevitably affected [16,17]. This study aimed to explore learner satisfaction with various components of DL and the efficacy of DL on the professional development of preclinical students and clinical students.

The clinical group was more satisfied with 'Distance Learning and its Course content', 'Contribution of courses to practice', 'Getting answers to their questions', 'Comfortable learning environment compared to face-to-face education", 'Associating theoretical knowledge with practice', and 'Distance Learning being equivalent to face-to-face education'. Among them, "Comfortable learning environment", "Satisfaction with course content", "Relating course content to clinical practice" were found to be significant mediators for increased "Satisfaction with DL" in clinical students. Of the clinical group, 5th –year students were most "Satisfied with DL".

Clinical students appeared able to use the advantages of the DL effectively and readily adapted to the rapid transformation from face-to-face to DL in dentistry [20]. It appears that the 19 months of clinical experience for 5th-year students and the six months for the 4th -year students underpinned these results since they already experienced more educational infrastructure, professional competence, and clinical experience during their clinical studies to date [20]. It seems likely that the advantages of DL were enhanced for the clinical students by having already undertaken face to face dental examinations, diagnosis and treatment planning, as well as a foundation of appropriate treatment protocols, clinical skills training, clinical case scenarios and group discussions aimed at improving clinical skills and clinical reasoning [26,27]. In addition, easily accessible, well-structured and reusable course content [28-30], is advantageous for experienced learners in terms of time management [2], comfortably adapting to technology [31] and offers the possibility interacting with other learners through chat rooms or dedicated social media. The latter might, to some extent, replace the opportunities for social interaction offered by traditional face to face learning allowing the development of a DL community of practice [32] and knowledge translation. In terms of social constructivism educational theory [33], social interaction is important in allowing learners to construct their knowledge and understanding and strategies to enhance learner interaction in DL are important [28-30].

The ratios of positive effects of DL on "Student-Instructor interaction" and "Motivation" were higher in clinical students than the preclinical students. In DL, lecturers and students communicate with each other through the use of information and communication technologies from physically different locations, diminished eye and nonverbal communication, reduced interaction and limitation of discussion with lecturers are thought to be the main disadvantages of DL [2,16,34-36].

An increased level of motivation was found in one fourth of Clinical students and one fifth of Preclinical students. Motivation as a personal experience is the centre of learning process [2] [28]. In a study carried out pre-qualification dental students and dental residents, students found it difficult to be motivated and focus on their academic work when using DL [31]. Interactivity, students' interests and their positive experiences during courses may improve both their motivation and the ability to use course content [2,28,37].

Preclinical students, particularly 1st academic year students, graded high scores on the items regarding 'Boring to stay in front of the computer' and "Technological glitches" and 'Difficult to concentrate' in lectures. As predicted, unlimited options of the virtual world could also be the reason for the distraction of students as digital natives [38] from the DL [17,38]. However, some students do not like to spend long periods of time in front of a computer [28,29,31]. In addition, there may also be an impact on eye health e.g., dry eye and blepharitis. If DL courses are found to be less appealing [28,39] and technical problems are encountered [20,40], remote learning becomes difficult for students. Enhancing interactivity in DL by incorporating small group discussions using breakout rooms and ungraded, formative quizzes to check student performance and encourage deep learning and may encourage student engagement. Lecturers must create intriguing and well-designed interactive courses to keep quickly bored, easily distracted novice learners [28,29,31,39,40].

Preclinical students felt "Anxiety" about their professional development and desired a longer 'Time period for live courses'. Even though anxiety level of students is a critical issue in DL [28], dental students face different stressors and academic pressures. Clearly, uncertainty associated with the pandemic and challenges in practicing may also have been associated with anxiety. It follows that providing a less stressful learning environment could be of benefit to the students [16,27,31]. It is also likely that the reduced opportunity for students to learn dentistry traditionally in face to face manner will contributed to their perceived stress during DL [28,29,31]. Even though long courses and short breaks lead to fatigue, concentration problems and diminished learning [39], preclinical students most probably felt insufficiently experienced in dental education and desired longer courses. Similarly, Preclinical medical students are also spending more time on online teaching compared to clinical medical students [21]. When the effects of e-learning were evaluated in health sciences students, more than half of them thought that e-learning was not an efficient method for the improvement of their clinical skills [16].

In the DL process, the clinical group "Easily accessed virtual classroom" and solved "Technical problems easily"

whereas Preclinical group struggled with 'Technological glitches'. Moreover, 'Technological glitches" were found to be a significant mediator for poor satisfaction with DL for preclinical group in the mediation analysis. In addition, both student groups had similar scores in self-reported technology use ability. Technical skills may dramatically affect students' experience of DL process and are core elements of the system [28,29,41] [16]. Clinical group who was familiar with the university environment, course contents and instructors easily overcome these problems during the DL. Being familiar with information and communication technologies and keen on using them can boost the adaptation whereas technological glitches can act as a distractor especially for inexperienced students [17,34,38,41] [40].

Almost all preclinical students accessed the courses from their family home in different cities during the DL. One significant underestimated aspect of DL is the associated economic advantages for students especially those in low economic areas. In a study performed in the UK covering 39 medical schools, saving time in traveling and cutting costs are highlighted as advantages of online teaching for medical students. One often overlooked but critical point is that family could have a distracting effect during the DL lessons due to living conditions [21]. There also may be issues with the quality of home internet coverage.

In conclusion this study has evaluated satisfaction related factors for DL and the effects of DL on professional development in both clinical and preclinical groups. Furthermore, mediation analysis was performed to demonstrate complex relationships for both groups in DL. The potential for DL to play a significant role in healthcare studies has long been recognised [24] and results of this study confirm its potential as an effective medium to deliver high quality teaching to dental students. It is, perhaps, ironic that this recognition and development was precipitated by a global pandemic. DL is not without its disadvantages, and it is essential that it is imaginatively designed and interactive. In a craft specialty such as dentistry, DL cannot replace the 'hands on' aspects of dental clinical skills training and patient interaction but its inclusion in a blended approach has the potential to be highly effective.

Limitation

The main limitation of the study was performed was the cross-sectional design in a single dental school. The study would be enhanced by considering students' experience in different environments and other cultures to explore whether DL has universal appeal and generalisability. We are currently designing longitudinal studies in dental schools in different geographical areas including addition to those in low- and middle-income environments (LMIE) where much needed outcomes and learning objectives in DL need to be considered.

Conclusions

Satisfaction with DL was associated with the enhancement of students' clinical experience as well as course content, positive effect on professional competence. Negative associations were associated with technological problems with instruments used in the learning environment However these students had already had significant face to face patient contact prior to introduction of DL which probably had an impact on how they perceived DL

Conflict of interest

None

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Supplement 1:

Distance Learning-Dentistry-Questionnaire

Dear Students,
Due to the COVID-19 pandemic, your education process had to continue with the Distance learning method. Receiving feedback(s) about this process is of great importance in terms of conducting education activities more efficiently for you.
Thank you for your participation.

Gender : Female ◯ Male ◯
Term : 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯

Please read the questions carefully and mark the most appropriate answer.

1. Where do you take the distance learning process from ?

1. Istanbul ◯	2. Different city ◯ City: ……	3. Abroad ◯ Country: ……

2. What type of residence do you follow the distance learning process from?

1. Family house ◯	2. Student house ◯	3. Dormitory ◯	4. Other: ……

3. Please mark the number that best expresses your satisfaction with the distance learning process.

1 I am not satisfied	2	3	4	5	6	7	8	9	10 I am very satisfied
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

4. How would you evaluate your technology use?

1 Very bad	2	3	4	5	6	7	8	9	10 Very good
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

5. Please mark the number that best reflects your level of satisfaction with the contents of the courses you have taken in the distance learning process.

1 Not satisfied	2	3	4	5	6	7	8	9	10 Very satisfied
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

6. Please mark the number that best reflects the level of contribution of courses taken in the distance learning process to dentistry practices.

1 Not contributed	2	3	4	5	6	7	8	9	10 Very contributed
○	○	○	○	○	○	○	○	○	○

7. Access to virtual classrooms is easy on the platform offered by the university for distance learning.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

8. I can easily solve the technical problems I encounter on the platform offered by the university for distance learning.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

9. In the distance learning process, technological glitches experienced during live lessons affect the learning process negatively.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

10. During the distance learning process, it is boring to stay in front of a computer/phone/tablet during live lectures.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

11. During the distance learning process, I turn to other topics that interest me more on computer/phone /tablet during live lectures.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

12. I was able to get answers easily to the questions I asked in the courses during the distance learning process.

1. Strongly Disagree	**2. Disagree**	**3. Neither disagree nor agree**	**4. Agree**	**5. Strongly Agree**
○	○	○	○	○

13. During the distance learning process, I was able to relate the theoretical knowledge to the clinical practices I acquired.

1. Strongly Disagree	2. Disagree	3. Neither disagree nor agree	4. Agree	5. Strongly Agree
○	○	○	○	○

14. The distance learning process and virtual classroom applications are equivalent to face-to-face education.

1. Strongly Disagree	2. Disagree	3. Neither disagree nor agree	4. Agree	5. Strongly Agree
○	○	○	○	○

15. Spending the distance learning process in the environment I want provides a more comfortable learning environment compared to the face-to-face education process.

1. Strongly Disagree	2. Disagree	3. Neither disagree nor agree	4. Agree	5. Strongly Agree
○	○	○	○	○

16. Online live class duration should be maximum …… minutes without a break.

17. Online live class breaks should be minimum …… minutes.

18. The video duration that used in lecture materials should be maximum …… minutes.

Please mark how the distance learning process affects the professional processes described below.

In the distance learning process, my …… for the profession	Increased	Neither disagree nor agree	Decreased
19. Self-confidence	○	○	○
20. Level of anxiety	○	○	○
21. Crisis management skills	○	○	○
22. Predisposition to teamwork	○	○	○
23. Professional competencies	○	○	○
24. Level of internalizing the professional environment	○	○	○
25. Motivation	○	○	○
26. Student-Instructor interaction	○	○	○