

SATISFACTION OF DENTISTRY STUDENTS WITH VIRTUAL EDUCATION IMPLEMENTED DURING COVID-19 PANDEMIC

Salvador Reyes Fernandez^{1,2} , Alicia García Verónica¹ , Natalia Hernández Treviño¹ , Xenia Teresa Cobos Cruz¹ , Daniel Sandoval Guevara¹, Víctor Othón Serna Radilla¹, Norma Samanta Romero Castro¹ 

¹Faculty of Dentistry, Autonomous University of Guerrero, México

²Maxillofacial Surgery Service, Secretary of Health Guerrero, General Hospital of Acapulco, México

ABSTRACT

INTRODUCTION: Different authorities of dental education have issued recommendations for teaching modalities during and after the COVID-19 pandemic. The role of public universities has been fundamental to apply these education strategies.

OBJECTIVES: The aim of this research was to estimate the satisfaction of university's dentistry students with virtual education implemented during the pandemic.

MATERIAL AND METHODS: A cross-sectional study was carried out using an online survey applied to 722 students from the Faculty of Dentistry of Autonomous University of Guerrero (UAGro) as a measurement instrument.

RESULTS: When asking about satisfaction with virtual classes, 68% of students ($n = 491$) were satisfied, and 32% ($n = 231$) were dissatisfied.

CONCLUSIONS: We concluded that home schooling could be permanently adopted for careers in health area to cover theoretical contents, and it is essential that universities support their students by providing necessary tools.

KEY WORDS: education, COVID-19, virtual teaching, public universities, home schooling.

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INTRODUCTION

Consequences of COVID-19 pandemic affect different aspects of daily life of the population, including health, social, economic, political, and personal as well as an area that concerns work and education, which is firmly linked to the rest of the afore-mentioned areas [1]. The American Association for Dental Education (ADEA) took a lead role in recommendations for teaching modalities during and after the pandemic. They recommend online education and other creative teaching methods, applying technology to teaching-learning practices [2].

The Wuhan University in China, the city where the COVID-19 pandemic began, issued some recommen-

dations on dental education, among which readings, case reviews, and online classes can be found as well as promotion of self-learning, and due to an increase in stress and anxiety derived from the situation that this phenomenon generates, the university began to provide psychological support to their students [3].

In order to carry out a safe clinical dental practice, measures aiming at the application of infection control methods were recommended, such as physical barriers, adequate management of treated areas, and antiseptics and sterilization measures [3, 4]. During the COVID-19 pandemic, the Occupational Safety and Health Administration (OSHA.gov) classified dentists into very high-risk group due to potential exposure to coronavirus

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ADDRESS FOR CORRESPONDENCE: Norma Samanta Romero Castro, Coordinación de Posgrado e Investigación Facultad de Odontología, Universidad Autónoma de Guerrero, Ruiz Cortines, Acapulco, Mexico, phone: +52-744-1603449, e-mail: 10908@uagro.mx

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through aerosol-generating procedures [2]. Because this virus was identified in the saliva of infected patients, dentists were obliged to take necessary measures to prevent contamination, and thus avoid or reduce the spread of the disease [5]. The significant limitation of clinical and surgical activities in medical and dental fields provides even more negative impact on the economy of the staff of this sector. However, these drastic measures did not impair possibility to protect health and safety of patients and elimination of the spread of the virus [6]. However, several authors believe that it is not necessary to suspend dental care during pandemics, such as COVID-19, as long as strict safety protocols are followed within clinical facilities. The deferral of dental care can lead patients to worsen their oral health conditions, and transform a mild or moderate condition into a serious one [7]. The spread of this coronavirus has posed significant challenges for dentistry and medicine as well as for schools and colleges, in all affected countries [8].

For many dental schools in the world, virtual education, although abrupt, meant a huge area of opportunity to move forward and enter the world of virtualization as a teaching-learning experience, such as home schooling, with universities providing necessary tools to the students to achieve this goal [9, 10].

The situation experienced during the COVID-19 pandemic has led to changes in different areas of daily life, and one of them is the permanence of remote online education [11]. Some authorities in oral health area consider crucial that dental schools continue to create contingency plans to accommodate the permanent post-pandemic effects, and while fully virtual study programs in dental schools are not possible, this modality should be considered as a very important part of these plans [12].

Dental schools proposed virtual education schemes within the time of the pandemic. Such is the case of the University of Costa Rica that presented an emergency academic plan, where the subjects were analyzed and classified according to the viability of virtualization depending on the content (only theory or with practical content), evaluated capacities of the students and teachers in the sense of handling electronic tools, and finally performed the implementation of the program [9].

A study by Di Giacomo *et al.* [13] reported that some elements the university offers to students, such as a good learning environment and an adequate platform, are covered according to what was answered by the majority of students surveyed. Recent studies support the idea that virtual dental and medical education for theoretical content can remain after the pandemic [14-16]. However, it was reported that students involved in these virtual education methods perceive inability to read body language of group members as a defect, due to small video images viewed, which makes communication difficult. The difficulty of controlling distractors, such as telephones and other devices during virtual sessions that require greater attention from the teacher,

was also mentioned [17]. In the opinion of various researchers, dental education can play an important role in the training of dentists, helping them to adopt the appropriate knowledge and attitudes related to infection control measures [18].

The COVID-19 pandemic will have a lasting impact on dental education, but it will also influence changes in the way one exercise dental practice. This pandemic has caused a paradigm shift in the way dental education to be developed as well as oral health services to be delivered in the future [19].

The COVID-19 pandemic has generated an increase of the level of stress and anxiety in the society. Social distancing and difficulties of academic continuity have a direct impact on the state of mind of students at all educational levels and in all areas, especially in health students, who due to the nature of their studies are considered more vulnerable group [1]. Recent studies reported that more than half of university students present moderate-to-severe level of anxiety, while other show high levels of anxiety derived from social confinement due to the COVID-19 pandemic [1, 2, 20]. Sclezdz *et al.* [16] found a positive perspective on the implementation of online learning, showing a chance to use this learning modality beyond COVID-19 in the future curriculum.

OBJECTIVES

The purpose of the present study was to estimate the satisfaction level of students of the Faculty of Dentistry of the Autonomous University of Guerrero with the virtual education implemented in the university during the COVID-19 pandemic, and the factors associated with that satisfaction.

MATERIAL AND METHODS

An analytical cross-sectional study was conducted using an online survey as a measurement instrument. A questionnaire was sent online to all students of the faculty. 722 responses (79%) out of 912 were obtained. Socio-demographic aspects were collected, and the choice of studied variables was based on factors that could influence the satisfaction of students with virtual education in the time of COVID-19 pandemic.

Using statistical program Stata 13, simple frequencies and χ^2 difference analysis were reported for categorical variables in those satisfied and not satisfied with virtual education. Subsequently, tabulating with different factors involved in that satisfaction, a bivariate analysis was carried out, resulting in a variable of the satisfaction of students with virtual teaching method and factors that intervene in this satisfaction, to obtain unadjusted OR (95% CI) and *p*-value. Finally, for a saturated model, those variables that were statistically significant were considered to obtain a definitive logistic regression

model adjusted for age and sex, obtaining adjusted OR (95% CI) and *p*-value.

The university authorities provided the necessary tools for remote (online) teaching of the students, including Google Classroom, Meet, and Zoom. The activities were primarily performed synchronously; however, classes were recorded, and there was a possibility of consulting them asynchronously. In this research, anonymity and confidentiality were respected, and ethical principles were not violated because no interventions were carried out that could damage or put health or lives of the participants at risk. However, each participant was requested to read and, whenever appropriate, agree to participate with an informed consent.

RESULTS

The total number of students surveyed from the Faculty of Dentistry of the Autonomous University of Guerrero was 722, and the study involved participants who attended the even semesters of the career from 2nd to 10th. Of the total population, 219 were men (30.3%) and 503 women (70%), with mean age of 21.4 years (SD ±2.5).

94.2% of the population were single and 92.8% did not have children. An alarming fact was that although the majority of participants depended economically on their parents, 38.5% had a job before COVID-19, and during the pandemic and at the time of survey, only 8.7% of students were employed.

The majority of student's population were residents of municipality of Acapulco. However, the Autonomous University of Guerrero receives students from all regions of the state of Guerrero, and has a social program of attention to vulnerable groups and social inclusion, therefore, a percentage of this population is obligatorily accepted and some students speak indigenous language. Graph 1 shows the observed characteristics.

Most of the students (74%) reported connecting to their classes online through their cell phones, and the rest used other devices, such as laptops, desktops, or tablets. Most of the respondents (62%) reported having always or almost always access to the Internet on their cell phones, 34% occasionally, and 4% never. 40% (*n* = 285) of the students did not have the Internet at home, but they had access by phone plans. Only 12% (*n* = 87) reported not having a comfortable space at home to receive classes online. 80% (*n* = 578) of the students responded having knowledge of communication technology that allows them to take part in virtual classes in a better way.

When asking students about satisfaction with virtual classes, 68% (*n* = 491) were satisfied and 32% (*n* = 231) were dissatisfied. 79% (*n* = 572) of the students considered that the emotional support of the teacher was as important as the academic support during virtual teaching

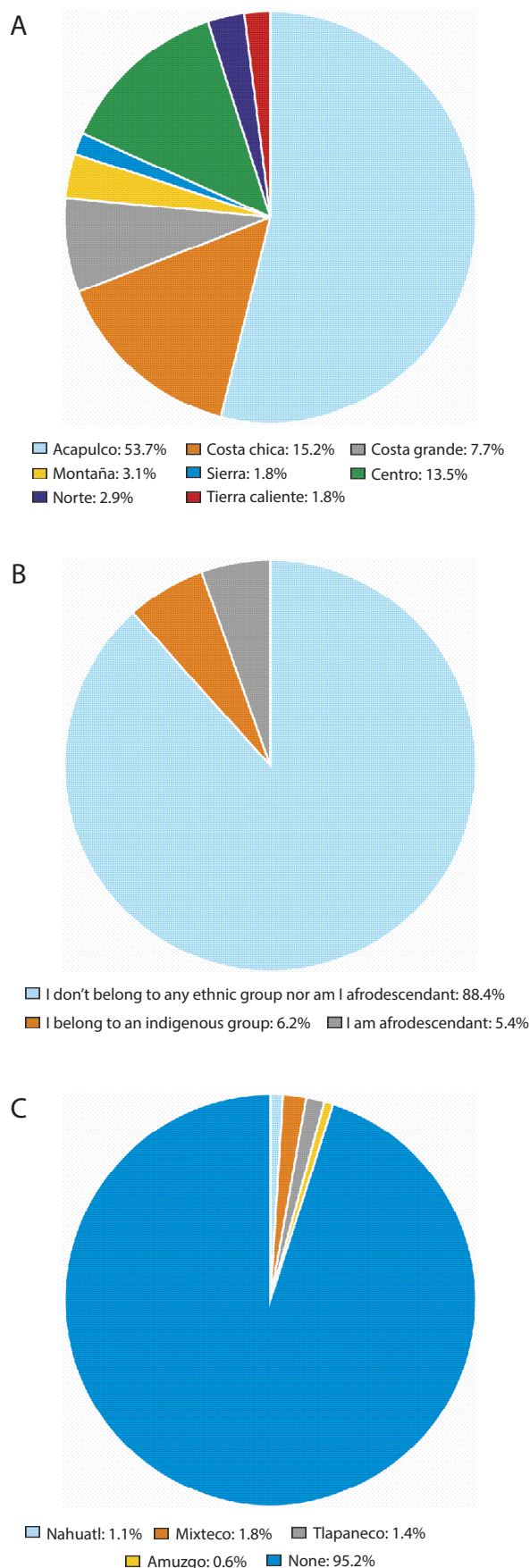


FIGURE 1. Region of origin of the state, belonging to a vulnerable group and speaking an indigenous language

TABLE 1. Factors related to students' perception of virtual education

Factor	Total students, <i>n</i> = 722 (100%)	Satisfied with virtual education, <i>n</i> = 491 (68%)	Not satisfied with virtual education, <i>n</i> = 231 (32%)	<i>p</i> -value
Stress, <i>n</i> (%)				
Yes	564 (78)	371 (76)	193 (84)	0.01
No	158 (22)	120 (24)	38 (16)	
Total	722 (100)	491 (100)	231 (100)	
Contact with the professor, <i>n</i> (%)				
Yes	597 (83)	423 (86)	174 (76)	0.00
No	125 (17)	68 (14)	57 (25)	
Total	722 (100)	491 (100)	231 (100)	
Professor complies with all the topics of the program, <i>n</i> (%)				
Yes	682 (95)	475 (97)	207 (90)	0.00
No	39 (5)	15 (3)	24 (10)	
Total	721 (100)	490 (100)	231 (100)	
Have a computer, <i>n</i> (%)				
Yes	319 (44)	232 (47)	87 (38)	0.02
No	403 (56)	259 (53)	144 (62)	
Total	722 (100)	491 (100)	231 (100)	
Professor's compliance, <i>n</i> (%)				
Yes	629 (87)	438 (89)	191 (83)	0.02
No	93 (13)	53 (11)	40 (17)	
Total	722 (100)	491 (100)	231 (100)	
Agree to continue classes post-pandemic, <i>n</i> (%)				
Yes	603 (84)	391 (80)	212 (92)	0.00
No	119 (16)	100 (20)	19 (8)	
Total	722 (100)	491 (100)	231 (100)	
Virtual tools provided by the university, <i>n</i> (%)				
Yes	689 (95)	477 (97)	212 (92)	0.00
No	33 (5)	14 (3)	19 (8)	
Total	722 (100)	491 (100)	231 (100)	

n (%) is shown for categorical variables; *p*-value is calculated with χ^2

in the time of COVID-19 pandemic. 95% of the students reported that virtual education compared with traditional education had a significant impact on high level of stress. Some of the variables related to the perception of students about virtual education that had significant differences between those satisfied and not satisfied with this method are shown in Table 1.

The results of a bivariate analysis of the satisfaction of students with virtual education for theoretical contents as a result variable are found in Table 2. Once all the factors that reached statistical significance were entered in a multivariate logistic regression analysis, significant factors adjusted for age and sex were in compliance with the program by the teacher as the factor with the greatest association as well as virtual tools, training provided by UAGro, and contact with the teacher (Table 3).

DISCUSSION

Undeniable, the COVID-19 pandemic resulted in important consequences in different areas of life, such as the educational field, and various adjustments were made in the way of educating at all levels, including the university level.

The main adjustment to education that was made during the pandemic was the transition from the face-to-face modality to the virtual modality that even though not new, it gained great importance: from being a novel, occasional, and/or alternative to a permanent and unique modality, till the pandemic situation was resolved.

Based on the high acceptance of virtual education of the students (68%), we assume that this modality could be proposed as a permanent system of education for theoretical contents. This coincides with the recom-

TABLE 2. Factors associated with students' satisfaction with virtual education

Factor	OR ^a	95% CI	p-value
Stress	2.5	1.0-6.1	0.04
Contact with the professor	2.0	1.5-2.8	0.00
Homework request by professor	1.7	1.1-2.7	0.01
Professor complies with all the topics of the program	3.7	1.9-7.1	0.00
Have a computer	1.5	1.1-2.0	0.01
Virtual tools provided by the university	3.0	1.5-6.2	0.00

OR^a - adjusted odds ratio

TABLE 3. Logistic regression model of factors associated with students' satisfaction with virtual education

Factor	OR ^a	95% CI	p-value
Contact with the professor	1.8	1.3 - 2.5	0.00
Professor complies with all the topics of the program	3.0	1.5 - 6.0	0.00
Virtual tools provided by the university	2.4	1.1 - 5.1	0.01

OR^a - adjusted odds ratio

mendation of ADEA about the possibility that the virtual teaching modality can be applied not only during the pandemic, but also in the post-pandemic stage [2]. Other researchers mention that one of the most important changes in education derived from the pandemic will be the transition to online teaching [11], and that dental schools will have to develop programs in virtual mode [12]. The idea of permanence of virtual education, at least partially, is also supported by other researchers, who consider that this modality has advantages over the face-to-face modality [14]. Schelndz [16], like in the present study, found a high acceptance of online dental education even after the COVID-19 pandemic. In contrast to these reports, Islam *et al.* [21] reported 87.5% of unsatisfied students with their online programs.

The fact that 68% of our surveyed students consider themselves satisfied with the virtual education received during the pandemic, does not mean that this modality is equal to or better in terms of the quality of learning of face-to-face education. This aspect will be addressed in a future investigation.

Virtual tools provided by the university showed statistical significance, being one of the most important elements that students consider highly satisfied. This coincides with what was reported by Islam *et al.* [21]. They found a significant association between the absence of virtual tools and dissatisfaction with respect to virtual education.

Regarding the findings on the stress levels generated during the pandemic and virtualization of education, 95% of the students considered that virtual education in the time of pandemic has generated higher levels of stress compared with the stress generated by pre-pandemic face-to-face education. This coincides with researchers from the Wuham University, who reported an increase in stress and anxiety in their students secondary to this phenome-

non [3], since students from the health area are especially vulnerable to pandemic-specific stressful situations [1]. In this regard, 79% of the surveyed students considered that emotional support is as important as academic support during virtual teaching in time of pandemic.

In the case of our university, as the University of Costa Rica [9], from the very beginning of social confinement and from the moment of virtual education, various strategies were implemented to provide academic continuity to educational programs. Various strategies are listed below:

1. Use of institutional platforms for teaching classes virtually.
2. Task monitoring, application of exams, and evaluations in the same platforms.
3. Simultaneously, training courses provided for students, teachers, and managers on electronic tools to be used during the pandemic.
4. Possibility of taking degree exams remotely.
5. Alternative strategies for academic monitoring of students without connectivity or devices for Internet connection.
6. Psychological counseling for personal handling of the pandemic through a call center to university students and general population.
7. Tutorial support through institutional remote tutoring program, whereby students were monitored by previously assigned tutors.
8. Food support within university canteens with take-away food, with service offered to university students and general population.
9. Free of charge PCR tests for detection of SARS-CoV-2 offered to the university community by laboratory of the Faculty of Chemical Biological Sciences.

An encouraging fact is that most of the students have the means to receive distance education, but un-

fortunately and as a result of this pandemic, a high percentage of those who had a job (38.7%) to help support their studies lost it during this stage, leaving only 8.5% of students with employment.

In the final model, there were three variables found as the factors associated with the satisfaction of students with virtual education. Two related to the professor's attitudes (compliance with the program and the ease of contacting the professor), and one factor was associated with what the university provided to students during that stage. Factors that influenced the satisfaction of students with the virtual education received are as follows: 1) the teachers complied with the academic programs; 2) the university provided the students with tools and training; and 3) the contact with the teacher was feasible.

LIMITATIONS

Although a response rate of 79% was shown in the present study, it could have been improved by insisting on those students who did not respond, and the sample size could have been larger. Another limitation is the temporality due to cross-sectional design of the current study. We plan to survey the same students at a different time to generate a longitudinal study.

CONCLUSIONS

In the present study, the students reported high levels of satisfaction with online education, which was influenced by the teachers complying with the programs, the university providing the students with necessary tools and training, and the high chances of contacting the teachers. It is possible that virtual education can be permanent in the universities for teaching of theoretical components as well as a support. It is important to emphasize that the support that students feel they receive from the authorities of university through the tools provided is fundamental for them to feel high level of satisfaction with the type of virtual education.

We concluded that home schooling modality could be permanently adopted for the careers in the health area to cover theoretical contents, and support of the universities providing the necessary tools for the students is essential for these purposes.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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