ACTA
STOMATOLOGICA
CROATICA
www.ascro.hr

Acta stomatol Croat. 2022;56(4):395-404.
DOI: 10.15644/asc56/4/6

ORIGINAL SCIENTIFIC PAPER
IZVORNI ZNANSTVENI RAD

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Dental Students' Attitudes and Perspectives regarding Online Learning during the COVID-19 Pandemic: a Cross-sectional, Multi-university Study

Stajališta i mišljenja studenata dentalne medicine o online nastavi tijekom pandemije bolesti COVID-19: presječno, multisveučilišno istraživanje

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Abstract

Objectives: The aim of the study was to evaluate the attitude and perspectives of dental students of four Croatian universities towards online learning during the COVID-19 pandemic. **Material and methods:** An anonymous internet-based survey was administered to undergraduate dental medicine students at the Universities of Zagreb, Rijeka, Split and Osijek. The 29-item questionnaire collected data on students' demographics, online learning organization and management, and perception of online classes. **Results:** Five hundred and four participants (85.1% female) took part in the survey. The majority of the participants (63.5%) were from the University of Zagreb. 39.6% of students reported agreement regarding online learning satisfaction. Individual university satisfaction ratings on overall online learning were: Osijek 3.69, Zagreb 3.22, Split 3.05 and Rijeka 2.64. Most students considered that lectures (82.9%) and seminars (78.9%) could be successfully delivered in an online learning format. The online learning format cannot successfully deliver laboratory, preclinical, clinical practicals or clinical clerkship, as agreed by more than 80% of the total student sample. 60% of students consider online learning a valuable alternative to face-to-face instruction. **Conclusion:** Online learning was highly praised for educational formats such as lectures and seminars, and was considered a useful substitute for conventional learning. Conventional practical courses cannot be substituted with online learning. Overall perspective about online learning was mixed among the students of four universities. The findings of the present study can serve to help individual universities address the shortcomings and reinforce the strengths of their OL programs.

Received: October 5, 2022
Accepted: November 7, 2022

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MeSH Terms: Distance Education; Dental Students; Dental Education
Author Keywords: COVID-19; Pandemics; Online Learning; Questionnaires

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Introduction

Shortly after the first case of SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) which emerged in the Republic of Croatia (1), a set of public health measures was established on March 13, 2020. The suspension of on-site classes at all levels of education introduced remote learning, which was carried out until the end of the academic year (1). Due to the novelty of the virus and the uncertainties of viral transmission, the delivery of clinical classes was clearly not recommended, posing an unprecedented challenge in medical and dental education (2).

Uvod

Nedugo nakon prvoga prijavljenog slučaja SARS-CoV-2 (engl. *Severe Acute Respiratory Syndrome Coronavirus-2*) u Republici Hrvatskoj (1), 13. ožujka 2020. godine počeo se primjenjivati niz javnozdravstvenih mjera. Obustavom nastave uživo na svim razinama obrazovanja, uvedena je nastava na daljinu koja se tako održavala do kraja akademske godine (1). Zbog nepoznavanja virusa i načina prijenosa, obavljanje kliničkih vježbi nije se preporučivalo, što je bio izazov u medicinskom i stomatološkom obrazovanju (2).

Online learning (OL), synonymous with distance learning and e-learning, appeared as a result of the digitalization of education in the past three decades. It has become increasingly popular as a form of education due to the space and time flexibility it offers and due to relatively reduced costs. At the same time, it may pose a challenge in terms of students' attention maintenance and adherence, the need for teachers' education in online tools and platforms, and material preparation (3, 4).

"Merlin", based on the open source Moodle system and maintained by the University of Zagreb University Computing Center (SRCE), is the most widely used OL system in Croatia. Merlin and various conference call-based platforms enable theoretical content teaching. However, during the COVID-19 pandemic, universities faced challenges in addressing the appropriate delivery of practical content and hands-on courses, i.e. laboratory, preclinical and clinical courses (5).

This study aimed to evaluate the attitudes of dental students towards e-learning during the initial COVID-19 outbreak, their assessment of various types of course delivery (theoretical vs. practical) and compare the results obtained at four universities in Croatia that have an undergraduate program in Dental Medicine.

Material and methods

Study design and study population

This study was designed as an observational, cross-sectional, multi-institutional study conducted using an internet-based questionnaire.

The study population consisted of undergraduate dental medicine students from four Croatian universities, University of Zagreb (UniZg), University of Rijeka (UniRi), University of Split (UniSt) and University of Osijek (UniOs), enrolled in the academic year 2019/2020. All universities have a similar six-year undergraduate dental medicine program. Thereof, students of all six years were enrolled in the study, except for the UniOs. In the academic year 2019/2020, the most senior student generation at the UniOs, the last founded undergraduate dental medicine program in Croatia, was in its fourth year.

Questionnaire design

A new questionnaire was designed for the purpose of this study, as at the study's inception no appropriate questionnaires were available in the literature. It was developed by four senior researchers with previous experience in questionnaire development and/or COVID-19 research and two undergraduate students. The questionnaire consisted of three parts, with a total of 29 questions. The first part (questions 1 - 4) aimed to collect participants' general and personal information. The second part consisted of questions on online learning organization and management (questions 5 - 22), while the third part evaluated the perception of online classes (questions 23 - 29). The questions were in multiple choice and rating (Likert scale) format, with the latter ranging from 1 (strongly agree) to 5 (strongly disagree).

Online nastava, sinonim za nastavu na daljinu i e-učenje, nastala je kao rezultat digitalizacije obrazovanja u posljednja tri desetljeća. Postala je sve popularniji oblik učenja zbog prostorne i vremenske fleksibilnosti te relativnog smanjenja troškova. Istodobno, može biti izazov u održavanju pozornosti i pridržavanju studenata, potrebi za izobrazbom nastavnika o online platformama te pripremi materijala (3, 4).

„Merlin", temeljen na slobodnom sustavu otvorenog koda Moodle, a održavao ga je Sveučilišni računski centar Sveučilišta u Zagrebu (SRCE), najkorišteniji je sustav *online* nastave u Hrvatskoj. Merlin i razne platforme temeljene na konferencijskim pozivima omogućuju teorijsko podučavanje. Međutim, tijekom pandemije bolesti COVID-19 sveučilišta su se suočila s izazovima u vezi s pružanjem odgovarajućih sadržaja praktičnoga rada, tj. laboratorijskih, pretkliničkih i kliničkih vježbi (5).

Cilj ovog istraživanja bio je procijeniti stajališta studenata dentalne medicine o e-učenju tijekom inicijalne pandemije bolesti COVID-19, procijeniti različite formate edukacije (teorijske prema praktičnima) i usporediti rezultate između četiriju sveučilišta u Hrvatskoj koja imaju preddiplomski studij dentalne medicine.

Materijal i metode

Dizajn istraživanja i populacija istraživanja

Ovo istraživanje osmišljeno je kao opservacijsko, presječno istraživanje na više sveučilišta i provedeno je korištenjem internetskog upitnika. Populaciju istraživanja činili su studenti preddiplomskog studija dentalne medicine s četiriju hrvatskih sveučilišta – Sveučilišta u Zagrebu (UniZg), Sveučilišta u Rijeci (UniRi), Sveučilišta u Splitu (UniSt) i Sveučilišta u Osijeku (UniOs) – upisani u akademsku godinu 2019./2020. Sva sveučilišta imaju sličan šestogodišnji preddiplomski program dentalne medicine. U istraživanje su bili uključeni studenti svih šest godina, osim studenata Sveučilišta u Osijeku. U akademskoj godini 2019./2020. najstarija generacija studenata na tom sveučilištu, posljednjem osnovanom preddiplomskom studiju dentalne medicine u Hrvatskoj, upisala je četvrtu godinu.

Dizajn upitnika

Za potrebe ovog istraživanja osmišljen je novi upitnik jer na početku nisu bili dostupni oni odgovarajući. Pripremili su ga četiri starija istraživača s iskustvom u pisanju upitnika i/ili istraživanju bolesti COVID-a-19 i dva studenta preddiplomskog studija. Upitnik se sastojao od triju dijelova i sadržavao je ukupno 29 pitanja. Prvi dio (pitanja 1 – 4) imao je za cilj prikupiti opće i osobne podatke sudionika. Drugi dio sastojao se od pitanja o organizaciji i upravljanju online nastavom (pitanja 5 – 22), a treći dio ocjenjivao je percepciju online nastave (pitanja 23 – 29). Pitanja su bila u formatu višestrukog izbora i ocjenjivanja (Likertova ljestvica) u rasponu od 1 (potpuno se slažem) do 5 (uopće se ne slažem).

Upitnik je pripremljen za distribuciju korištenjem platforme Google Forms te je podijeljen e-poštom putem na-

The questionnaire was prepared for distribution using the Google Forms platform and was disseminated by email through a dedicated link. E-mail addresses provided to the researchers by each university's student representatives were authorized for such use. The questionnaire was distributed in June 2020, following the end of active classes in the summer semester. After the initial call for participation, a reminder was sent after one week. The questionnaire was open for access for two weeks in total.

Ethical considerations

This research was part of a student research project. It was approved by the Ethics Committee of the School of Dental Medicine of the University of Zagreb (number: 05-PA-30-XVI-4/2020). Study information was provided in digital format upon entering the questionnaire through the dedicated link. Furthermore, the questionnaire could not be accessed before digital informed consent was obtained from the participants. Participation in the research was voluntary and anonymous. No monetary or non-monetary compensation was provided for participation.

Data analysis

Responses "completely agree" and "agree" were considered an agreement and a positive attitude, while "disagree" and "completely disagree" were considered to be a disagreement and a negative attitude. The collected data were entered into a data processing program (Microsoft Office Excel). Furthermore, categorical data were analyzed with a chi-square test. One-way ANOVA was used to analyze continuous data with additional Bonferroni post-hoc tests between groups. Non-parametric correlation analysis (Kendall) was used to analyze the relationship between variables of positive attitudes and age, gender and year of study. All p values below 0.05 were considered significant. IBM SPSS version 26.0.0.1 was used for all statistical procedures.

Results

The study included 504 participants, of which 85.1% were female. The majority of the participants (63.5%) were from UniZg. Participants from all four universities were almost equally distributed over years of study, except UniOs which at the time had enrolled students from year one to four (Figure 1).

The results indicate that students generally used two major platforms for e-learning during the pandemic: online-learning system Merlin, and conference call-type platforms (e.g. Zoom, Skype, Google Hangouts) used for either small (up to 10 students) or large (more than 10 students) groups (Figure 2). Conference call-type platforms were used more than online-learning systems at UniZg (67.8%) and UniRi (51.4%). Conversely, students from UniSt and UniOs mostly used Merlin, 76.4% and 67.5%, respectively.

Detailed data are presented in Tables 1 and 2. Table 1 presents the attitudes of the overall student sample, rated on a 5-item Likert scale. Table 2 highlights the positive and negative attitudes of students of each university and the differences among them.

mjenske poveznice. Adrese e-pošte, koje su istraživačima dali predstavnici studenata svakog sveučilišta, bile su ovlaštene za takvu upotrebu. Upitnik je poslan u lipnju 2020. godine poslije završetka nastave u ljetnom semestru. Nakon prvog poziva za sudjelovanje, tjedan dana poslije poslan je podsjetnik. Upitniku se moglo pristupiti tijekom dva tjedna.

Etička razmatranja

Ovo istraživanje bilo je dio studentskoga znanstvenog projekta. Odobrilo ga je Etičko povjerenstvo Stomatološkog fakulteta Sveučilišta u Zagrebu (broj: 05-PA-30-XVI-4/2020). Podatci o istraživanju dani su u digitalnom obliku nakon pristupa upitniku putem namjenske poveznice. Nadalje, upitniku se nije moglo pristupiti prije nego što je dobiven digitalni informirani pristanak. Sudjelovanje u istraživanju bilo je dobrovoljno i anonimno. Za sudjelovanje nije bila predviđena nikakva novčana, ni nenovčana naknada.

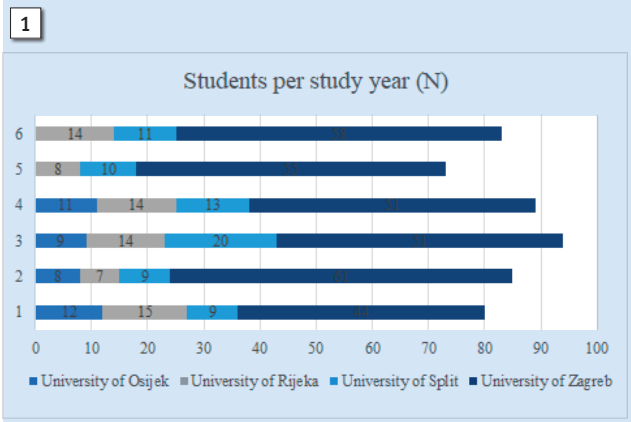
Analiza podataka

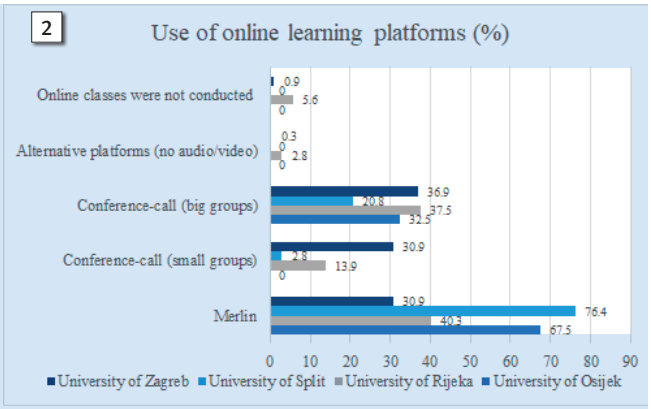
Odgovori „potpuno se slažem" i „slažem se" smatrani su slaganjem i pozitivnim stajalištem, a „ne slažem se" i „uopće se ne slažem" smatrani su neslaganjem i negativnim stajalištem. Prikupljeni podatci uneseni su u program za obradu podataka (Microsoft Office Excel). Nadalje, kategorički podatci analizirani su hi-kvadrat testom. Jednosmjerna ANOVA korištena je za analizu kontinuiranih podataka s dodatnim Bonferronijevim post-hoc testovima između skupina. Neparametrijskom korelacijskom analizom (Kendall) analiziran je odnos između varijabli pozitivnih stajališta te dobi, spola i godine studija. Sve p-vrijednosti manje od 0,05 smatrane su značajnima. IBM SPSS verzija 26.0.0.1. korištena je za sve statističke postupke.

Rezultati

Istraživanje je obuhvatilo 504 sudionika, od kojih 85,1 % žena. Većina (63,5 %) bila je sa Sveučilišta u Zagrebu. Sudionici sa svih četiriju sveučilišta bili su gotovo ravnomjerno raspoređeni po godinama studija, osim onih sa Sveučilišta u Osijeku gdje su se u tom razdoblju upisivali studenti od prve do četvrte godine (slika 1.).

Rezultati pokazuju da su se studenti tijekom pandemije općenito koristili dvjema glavnim platformama za e-učenje: sustavom za *online* nastavu Merlin i platformom za konferencijske pozive (npr., Zoom, Skype, Google Hangouts) koje su se upotrebljavale ili za male (do 10 studenata) ili velike (više od 10 studenata) grupe (slika 2.). Platforme za konferencijske pozive korištene su češće od sustava za *online* nastavu na Sveučilištu u Zagrebu (67,8 %) i Sveučilištu i Rijeci (51,4 %). Suprotno tomu, studenti sa Sveučilišta i Splitu i Sveučilišta u Osijeku najviše su se koristili Merlinom – 76,4 % odnosno 67,5 %. Detaljni podatci su u tablicama 1. i 2. Tablica 1. prikazuje stajališta ukupnoga uzorka studenata, a ocijenjena su na Likertovoj ljestvici od pet točaka. Tablica 2. ističe pozitivna i negativna stajališta studenata svakog sveučilišta i razlike





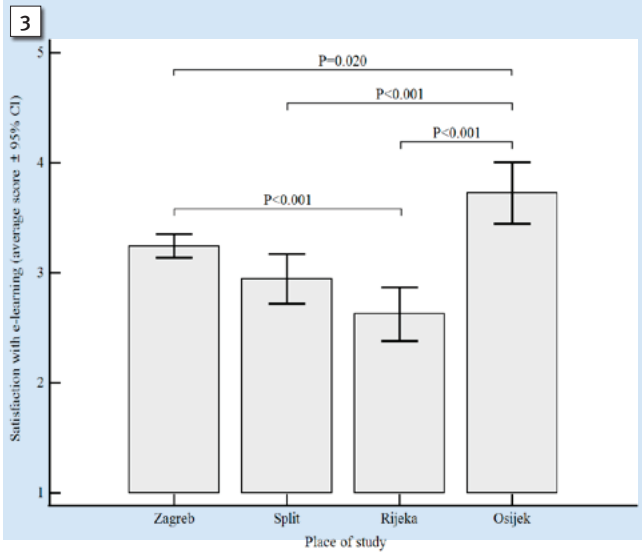


Figure 1 The number of students per participating university
Slika 1. Broj studenata po sveučilištu koje sudjeluje
Figure 2 Platforms used for online learning
Slika 2. Platforme koje se koriste za online nastavu
Figure 3 OL satisfaction rating of individual universities
Slika 3. Ocjene zadovoljstva online nastavom na pojedinim sveučilištima

39.6% of students reported agreement regarding OL satisfaction, followed by 31.9% of those disagreeing and 28.4% of neutral respondents. UniOs students had significantly greater positive attitudes than other universities (67.5%, p<0.001).

Most students agreed that lectures (82.9%) and seminars (78.9%) could be conducted in OL format. UniZG students had significantly more positive attitudes, 90% for lectures and 85% for seminars (p>0.001). More than 80% of the total student sample disagreed that OL is the format for successfully delivering laboratory, preclinical, clinical practicals or clinical clerkship, respectively.

Almost half of the students agreed to have discovered new online information and literature sources in the period of OL. UniRi students have meanwhile reported significantly more negative attitudes, with 65.3% reporting disagreement with the statement that they have found new information sources (p=0.001). 70.5% of the overall sample agreed that OL as a learning modality requires more time and is effort-consuming, with UniRi students, 75.0% (p=0.034) reporting significantly higher level of agreement.

Around 80% of students disagreed that there would be no compensation needed for clinical practicals and clinical clerkship, respectively. Similarly, almost 70% of sixth-year students disagreed that they feel well prepared for independent clinical work following the period of OL.

među njima. S *online* nastavom slaže se 39,6 studenata, 31,9 % se ne slaže i 28,4 % je neutralnih ispitanika. Studenti Sveučilišta u Osijeku imali su značajno pozitivnija stajališta od kolega s ostalih sveučilišta (67,5 %, p < 0,001).

Većina studenata smatra da predavanja (82,9 %) i seminari (78,9 %) mogu biti u obliku *online* nastave. Studenti Sveučilišta u Zagrebu imali su značajno više pozitivnih stajališta – 90 % za predavanja i 85 % za seminare (p > 0,001). Više od 80 % ukupnog uzorka studenata nije se složilo da je nastava na daljinu uspješan oblik kad je riječ o laboratorijskim, pretkliničkim i kliničkim vježbama ili stručnoj praksi.

Gotovo polovina studenata složila se da su otkrili nove internetske izvore informacija i literature u razdoblju dok se održavala nastava na daljinu. Studenti Sveučilišta u Rijeci u međuvremenu su prijavili značajno više negativnih stajališta – njih 65,3 % izjavilo je kako se ne slažu da su pronašli nove izvore informacija (p = 0,001). Da *online* nastava kao oblik učenja oduzima više vremena i truda složilo se 70,5 % ukupnog uzorka; studenti Sveučilišta u Rijeci – njih 75,0 % (p= 0,034) prijavili su značajno više slaganja s ovom tvrdnjom.

Otprilike 80 % studenata nije se složilo da neće biti potrebna nadoknada za kliničke vježbe i stručnu praksu. Slično tomu, gotovo 70 % studenata šeste godine nije se složilo da se poslije razdoblja *online* nastave osjećaju dobro pripremljenima za samostalan klinički rad.

Table 1 Overall student population attitudes
Tablica 1. Ukupna stajališta populacije studenata

Q#	Attitude	Level of agreement - N(%)				
Organisation and management of OL		**1**	**2**	**3**	**4**	**5**
Q9	I'm satisfied with OL so far	46 (9.1%)	154 (30.5%)	143 (28.4%)	118 (23.4%)	43 (8.5%)
Q10	I believe lectures can be successfully delivered in OL format	224 (44.4%)	194 (38.5%)	47 (9.3%)	27 (5.4%)	12 (2.4%)
Q11	I believe seminars can be successfully delivered in OL format	158 (31.4%)	240 (47.6%)	56 (11.1%)	37 (7.3%)	13 (2.6%)
Q12	I believe lab. practicals can be successfully delivered in OL format	7 (1.4%)	20 (4.0%)	59 (11.7%)	231 (45.8%)	187 (37.1%)
Q13	I believe preclin. practicals can be successfully delivered in OL format	5 (1.0%)	20 (4.0%)	63 (12.4%)	208 (41.3%)	208 (41.3%)
Q14	I believe clin. practicals can be successfully delivered in OL format	5 (1.0%)	5 (1.0%)	30 (5.9%)	169 (33.5%)	295 (58.6%)
Q15	I believe clin. clerkship can be successfully delivered in OL format	7 (1.4%)	4 (0.8%)	29 (5.8%)	170 (33.7%)	294 (58.3%)
Q16	During this period of OL I have discovered new online information and literature sources	42 (8.2%)	217 (43.1%)	130 (25.8%)	85 (16.9%)	30 (6.0%)
Q17	This modality of learning requires more time and dedication to the educational material	147 (29.2%)	208 (41.3%)	104 (20.6%)	40 (7.9%)	5 (1.0%)
Q18	There will be no need for the compensation of lost clinical practicals	6 (1.1%)	18 (3.6%)	85 (16.9%)	202 (40.1%)	193 (38.3%)
Q19	There will be no need for the compensation of lost clinical clerkship	7 (1.4%)	13 (2.6%)	73 (14.5%)	207 (41.1%)	204 (40.4%)
Q20	I feel well prepared for sitting exams after this period of OL	30 (5.9%)	128 (25.4%)	166 (32.9%)	122 (24.2%)	58 (11.5%)
Q21	I feel well prepared for working with patients after this period of OL	12 (2.4%)	26 (5.1%)	109 (21.6%)	172 (34.1%)	185 (36.7%)
Q22	I feel well prepared for working independently as a clinician after this period of OL (6th year*)	7 (7.4%)	7 (7.4%)	17 (18.1%)	29 (30.9%)	34 (36.2%)
Perception of online classes						
Q23	I consider OL useful as an substitute to CL	44 (8.7%)	158 (31.3%)	134 (26.6%)	129 (25.6%)	39 (7.7%)
Q24	I consider OL useful as an addition to CL	100 (19.8%)	292 (57.9%)	59 (11.7%)	40 (7.9%)	13 (2.6%)
Q25	OL can NOT be an adequate substitute for clinical formats (clin. practicals and clerkship)	349 (69.2%)	115 (22.8%)	14 (2.8%)	9 (1.8%)	17 (3.4%)
Q26	There is further need for improvement of OL formats	170 (33.7%)	255 (50.6%)	64 (12.7%)	13 (2.6%)	2 (0.4%)
Q27	Teachers were well prepared for execution of OL	53 (10.5%)	181 (35.9%)	148 (29.4%)	84 (16.7%)	38 (7.5%)
Q28	I was well prepared for execution of OL	60 (11.9%)	239 (47.4%)	159 (31.5%)	39 (7.7%)	7 (1.5%)

N - frequency; % - percentage; Q - question; OL - online learning; CL - conventional learning

Similar rates of students, that is one third, reported agreeing and disagreeing with being well-prepared for sitting exams after the OL period. UniRi students, 84.7% (p=0.001), reported significantly more negative attitudes and disagreed to a greater extent with this statement.

40% of the overall sample considered OL a good substitute for conventional learning. UniOs students were the only ones reporting positive attitudes, with 60% (p<0.001)

Slične stope studenata, jedna trećina, izjavili su da se slažu i ne slažu da su dobro pripremljeni za polaganje ispita poslije razdoblja nastave na daljinu. Studenti Sveučilišta u Rijeci – njih 84,7 % (p = 0,001) prijavili su značajno više negativnih stajališta i više neslaganja s tom tvrdnjom.

Da je *online* nastava dobra zamjena za konvencionalnu nastavu, smatra 40 % ukupnog uzorka. Studenti Sveučilišta u Osijeku jedini su imali pozitivna stajališta – naime, njih 60 %

Table 2 Positive ("strongly agreeing" + "agreeing") and negative ("strongly disagreeing" + "disagreeing") attitudes of students
Tablica 2. Pozitivna „potpuno se slažem" + „slažem se") i negativna („uopće se ne slažem" + „ne slažem se") stajališta studenata

Attitude			University - N(%)				p
			Zagreb	Split	Rijeka	Osijek	
Q#	**Organisation and management of OL**						
Q9	I'm satisfied with OL so far	Negative	182 (56.9%)	53 (73.6%)	56 (77.8%)	13 (32.5%)	**<0.001**
		Positive	138 (43.1%)	19 (26.4%)	16 (22.2%)	27 (67.5%)	
Q10	I believe lectures can be successfully delivered in OL format	Negative	32 (10.0%)	26 (36.1%)	21 (29.2%)	7 (17.5%)	**<0.001**
		Positive	288 (90.0%)	46 (63.9%)	51 (70.8%)	33 (82.5%)	
Q11	I believe seminars can be successfully delivered in OL format	Negative	48 (15.0%)	26 (36.1%)	23 (31.9%)	9 (22.5%)	**<0.001**
		Positive	272 (85.0%)	46 (63.9%)	49 (68.1%)	31 (77.5%)	
Q12	I believe lab. practicals can be successfully delivered in OL format	Negative	300 (93.8%)	70 (97.2%)	68 (94.4%)	39 (97.5%)	0.552
		Positive	20 (6.3%)	2 (2.8%)	4 (5.6%)	1 (2.5%)	
Q13	I believe preclin. practicals can be successfully delivered in OL format	Negative	304 (95.0%)	70 (97.2%)	66 (91.7%)	39 (97.5%)	0.395
		Positive	16 (5.0%)	2 (2.8%)	6 (8.3%)	1 (2.5%)	
Q14	I believe clin. practicals can be successfully delivered in OL format	Negative	313 (97.8%)	71 (98.6%)	70 (97.2%)	40 (100.0%)	0.743
		Positive	7 (2.2%)	1 (1.4%)	2 (2.8%)	0 (0.0%)	
Q15	I believe clin. clerkship can be successfully delivered in OL format	Negative	314 (98.1%)	70 (97.2%)	69 (95.8%)	40 (100.0%)	0.479
		Positive	6 (1.9%)	2 (2.8%)	3 (4.2%)	0 (0.0%)	
Q16	During this period of OL I have discovered new online information and literature sources	Negative	135 (42.2%)	40 (55.6%)	47 (65.3%)	23 (57.5%)	**0.001**
		Positive	185 (57.8%)	32 (44.4%)	25 (34.7%)	17 (42.5%)	
Q17	This modality of learning requires more time and dedication to the educational material	Negative	87 (27.2%)	25 (34.7%)	18 (25.0%)	19 (47.5%)	**0.034**
		Positive	233 (72.8%)	47 (65.3%)	54 (75.0%)	21 (52.5%)	
Q18	There will be no need for the compensation of lost clinical practicals	Negative	305 (95.3%)	70 (97.2%)	69 (95.8%)	36 (90.0%)	0.376
		Positive	15 (4.7%)	2 (2.8%)	3 (4.2%)	4 (10.0%)	
Q19	There will be no need for the compensation of lost clinical clerkship	Negative	310 (96.9%)	71 (98.6%)	66 (91.7%)	37 (92.5%)	0.080
		Positive	10 (3.1%)	1 (1.4%)	6 (8.3%)	3 (7.5%)	
Q20	I feel well prepared for sitting exams after this period of OL	Negative	211 (65.9%)	53 (73.6%)	61 (84.7%)	21 (52.5%)	**0.001**
		Positive	109 (34.1%)	19 (26.4%)	11 (15.3%)	19 (47.5%)	
Q21	I feel well prepared for working with patients after this period of OL	Negative	290 (90.6%)	68 (94.4%)	69 (95.8%)	39 (97.5%)	0.205
		Positive	30 (9.4%)	4 (5.6%)	3 (4.2%)	1 (2.5%)	
Q22	I feel well prepared for working independently as a clinician after this period of OL	Negative	53 (16.6%)	10 (13.9%)	15 (20.8%)	2 (5.0%)	0.158
		Positive	267 (83.4%)	62 (86.1%)	57 (79.2%)	38 (95.0%)	
Perception of online classes							
Q23	I consider OL useful as an substitute to CL	Negative	176 (55.0%)	53 (73.6%)	57 (79.2%)	16 (40.0%)	**<0.001**
		Positive	144 (45.0%)	19 (26.4%)	15 (20.8%)	24 (60.0%)	
Q24	I consider OL useful as an addition to CL	Negative	58 (18.1%)	21 (29.2%)	23 (31.9%)	10 (25.0%)	**0.026**
		Positive	262 (81.9%)	51 (70.8%)	49 (68.1%)	30 (75.0%)	
Q25	OL can NOT be an adequate substitute for clinical formats (clin. practicals and clerkship)	Negative	27 (8.4%)	4 (5.6%)	4 (5.6%)	5 (12.5%)	0.500
		Positive	293 (91.6%)	68 (94.4%)	68 (94.4%)	35 (87.5%)	
Q26	There is further need for improvement of OL formats	Negative	53 (16.6%)	8 (11.1%)	9 (12.5%)	9 (22.5%)	0.350
		Positive	267 (83.4%)	64 (88.9%)	63 (87.5%)	31 (77.5%)	
Q27	Teachers were well prepared for execution of OL	Negative	164 (51.3%)	47 (65.3%)	52 (72.2%)	7 (17.5%)	**<0.001**
		Positive	156 (48.8%)	25 (34.7%)	20 (27.8%)	33 (82.5%)	
Q28	I was well prepared for execution of OL	Negative	119 (37.2%)	38 (52.8%)	37 (51.4%)	11 (27.5%)	**0.006**
		Positive	201 (62.8%)	34 (47.2%)	35 (48.6%)	29 (72.5%)	

Chi-square test
N - frequency; % - percentage; Q - question; OL - online learning; CL - conventional learning; P - significance level

of them agreeing with the statement. 77.7% of the overall sample agreed OL is only a good alternative for conventional learning, with UniZg students exhibiting a significantly more positive attitude (81.9%, p=0.026). 92% of all students agreed that OL could not substitute clinical education formats.

(p < 0,001) složilo se s tvrdnjom. Da je *online* nastava samo dobar dodatak konvencionalnoj nastavi, slaže se 77,7 % ukupnog uzorka, pri čemu studenti Sveučilišta u Zagrebu imaju značajno pozitivnije stajalište (81,9 %, p = 0,026). Da *online* nastava ne može zamijeniti formate kliničkoga obrazovanja, složilo se 92 % svih studenata.

The overall sample generally agreed that both the teaching staff and the students were well-prepared for OL, 46.4% and 50.3%, respectively. UniOs students were reporting significantly more positive attitudes for both statements, 82.5% (p<0.001) and 72.5% (p=0.006), respectively. 84.3% of all students agreed that there is a further need for improvement of OL.

Overall OL satisfaction was also rated by the total student sample as follows: 1 – 6.5%, 2 – 17.5%, 3 – 37.9%, 4 – 30.6% and 5 – 7.5%. Individual university ratings were: UniOs 3.69, UniZg 3.22, UniSt 3.05 and UniRi 2.64 (Figure 3).

An analysis of the correlation between positive attitudes and specific determinants such as age, female gender and year of study showed some statistical significance but with mostly weak Kendall's correlation coefficient (Table 3).

Ukupni uzorak općenito se složio da su nastavnici i oni sami bili dobro pripremljeni za nastavu na daljinu – 46,4 %, odnosno 50,3 %. Studenti Sveučilišta u Osijeku imali su značajno pozitivnija stajališta o obje tvrdnje – 82,5 % (p < 0,001), odnosno 72,5 % (p = 0,006). Da je potrebno daljnje poboljšanje *online* nastave, složilo se 84,3 % svih studenata.

Sveukupno zadovoljstvo nastavom na daljinu također je ocijenio ukupni uzorak studenata na sljedeći način: 1– 6,5 %, 2 – 17,5 %, 3 – 37,9 %, 4 – 30,6 % i 5 – 7,5%. Pojedinačne ocjene sveučilišta bile su: Sveučilište u Osijeku 3,69, Sveučilište u Zagrebu 3,22, Sveučilište u Splitu 3,05 i Sveučilište u Rijeci 2,64 (slika 3.).

Analiza korelacije između pozitivnih stajališta i specifičnih determinanti, odnosno dobi, ženskoga spola i godine studija, pokazala je određenu statističku značajnost, ali uz uglavnom slab Kendallov koeficijent korelacije (tablica 3.).

Table 3 Correlation of positive attitudes and age, students' gender and year of study
Tablica 3. Povezanost pozitivnih stajališta i dobi, spola studenata te godine studija

Q#	Attitudes	Age	Female gender	Study year
Organisation and management of OL				
Q10	Success of OL format of lecture	0.184 (**<0.001**)	0.047 (0.287)	0.149 (**<0.001**)
Q11	Success of OL format of seminars	0.158 (**<0.001**)	0.071 (0.109)	0.124 (**0.002**)
Q12	Success of OL format of lab. practicals	0.097 (**0.013**)	-0.024 (0.586)	0.057 (0.150)
Q13	Success of OL format of preclin. practicals	0.132 (**0.001**)	0.018 (0.678)	0.120 (**0.002**)
Q14	Success of OL format of clin. practicals	0.123 (**0.002**)	-0.020 (0.646)	0.120 (**0.002**)
Q15	Success of OL format of clin. clerkship	0.079 (**0.043**)	-0.014 (0.756)	0.075 (0.058)
Q16	Discovery of new online sources	0.088 (**0.024**)	0.062 (0.166)	0.108 (**0.006**)
Q17	Requiring more time and dedication	-0.095 (**0.015**)	0.108 (**0.016**)	-0.119 (**0.003**)
Q21	Prepared for clinical work with patients	0.192 (**<0.001**)	-0.050 (0.267)	0.225 (**<0.001**)
Q22	Prepared for independent clinical work	-0.406 (**<0.001**)	-0.014 (0.757)	-0.450 (**<0.001**)
Perception of online classes				
Q24	OL as a useful addition to CL	0.128 (**0.001**)	0.031 (0.483)	0.106 (**0.007**)

Values: Kendall's rank correlation coefficient - τ_b (p-values)
Q - question; OL - online learning; CL - conventional learning

Discussion

This study aimed to assess student attitudes and OL perceptions during the COVID-19 pandemic and compare them among the student population of four Croatian universities. The overall perception of OL and its segments was mixed and varied among students of different universities. Students generally agreed that the online delivery of lectures and seminars was satisfactory. Conversely, education formats that presume manual practice, i.e. laboratory, preclinical and clinical practices, could not be adequately performed and substituted in an online format.

The COVID-19 pandemic is undoubtedly one of the greatest public health crises in contemporary history, affecting all aspects of society. The most significant impact of COVID-19 on education has surely been a global switch towards OL concerning disease transmission reduction policies. OL has been implemented in higher education curricula far before the onset of the pandemic, however, with significant variability between countries and universities (6, 7). One of the countries at the forefront of online education, the United

Rasprava

Ovo istraživanje imalo je za cilj procijeniti studentska stajališta i mišljenja o *online* nastavi tijekom pandemije bolesti COVID-19 te ih usporediti među studentskom populacijom četiriju hrvatskih sveučilišta. Sveukupna percepcija nastave na daljinu i njezinih segmenata bila je raznolika i varirala je među studentima različitih sveučilišta. Studenti su se općenito složili da su *online* predavanja i seminari bili zadovoljavajući. Suprotno tomu, obrazovni formati koji obuhvaćaju manualnu praksu, odnosno laboratorijske, pretkliničke i kliničke vježbe, ne mogu biti adekvatno obavljeni i zamijenjeni *online* formatom.

Pandemija bolesti COVID-19 nedvojbeno je jedna od najvećih javnozdravstvenih kriza u suvremenoj povijesti koja utječe na sve aspekte društva. Najznačajniji utjecaj bolesti COVID-a-19 na obrazovanje sigurno je bio globalni prelazak na nastavu na daljinu sa svrhom smanjenja prijenosa bolesti. *Online* nastava implementirana je u nastavne planove i programe visokoga obrazovanja daleko prije početka pandemije, no uz znatne razlike između zemalja i sveučilišta (6, 7). Jedna od zemalja koja prednjači u obrazovanju na daljinu – Sje-

States, already had more than 30% of the nationwide student population enrolled in an online course in 2012 (8). In fact, the importance and value of OL have been long recognized by the US academic leaders, defining it as crucial for academic institutions' long-term strategy (9). Even though the implementation of OL at the UniZg officially started in 2007 (10), only a smaller number of faculties conducted online courses before the pandemic (11). As the results obtained in the present study suggest, online teaching was primarily conducted using two types of remote learning systems: e-learning platforms such as Merlin (presuming asynchronous format) and various online applications for conference calls (presuming synchronous format). Teaching in Zagreb and Rijeka relied more on conference call-based applications, 67.8% and 51.4%, respectively. In Split and Osijek, e-learning platforms were mainly used, as reported by 76.4% and 67.5% of students, respectively. While synchronous learning is recognised for enabling direct communication and interactivity, the asynchronous learning format allows for time and space flexibility and collaborative work. Schlenz et al. reported that 54.3% of teachers at a German dental school used synchronous learning formats in the same time frame as the present study, and very little, 5.7% used asynchronous format (12). A possible explanation for this observation could be the low rate (14.3%) of teachers' experience with OL and the need to prepare teaching materials. Hannon et al., however, highlighted online e-learning platforms, asynchronous format, for their value and role as predominant mediums for theoretical learning (13). A study comparing the two learning formats highlighted that students, in fact, prefer the asynchronous learning format (14).

More than 90% of the total sample agreed that OL could not replace any type of practical course. Furthermore, almost 80% disagreed that there would be no need for compensation for clinical training hours. These findings are in line with previous research on the impact of COVID-19 on dental and medical education (12, 15–17). Students also reported anxiety about losing their dexterity skills due to the loss of preclinical and clinical hours (18–20). In fact, 70.8% of students in the present study stated that they felt unprepared for clinical hours, while 71.1% of the 6th-year students did not feel prepared for independent clinical work following graduation. Lack of regular manual training classes could be bypassed by specific learning formats, such as video format, online tutorials or even an online hands-on course, as described by Oetter et al. (21). The authors reported on a highly praised mixed theoretical-practical course, promoting the learning of surgical techniques on easily accessible models such as bananas or meat with concomitant live demonstration.

Finally, students from Zagreb and Osijek reported the greatest satisfaction with OL, 58.6% and 67.5%, respectively. On the other hand, around 45% of students in both Split and Rijeka reported disagreement and complete disagreement with satisfaction regarding the organization of OL, followed by around 30% of neutral respondents. In 2010 and 2011, Brumini et al. conducted a survey-based study on dental students from Zagreb, Rijeka and Split and their attitudes towards OL and reported a generally positive attitude among

dinjene Američke Države, već je 2012. godine imala više od 30 % studentske populacije u cijeloj zemlji uključene u takav oblik nastave (8). Zapravo, važnost i vrijednost *online* nastave odavno su prepoznali američki akademski voditelji i definirali je kao ključnu za dugoročnu strategiju akademskih institucija (9). Iako je provedba *online* nastave na Sveučilištu u Zagrebu službeno počela 2007. godine (10), samo je manji broj fakulteta prije pandemije tako organizirao nastavu (11). Prema podatcima iz ovog istraživanja, *online* nastava uglavnom se održavala s pomoću dviju vrsta sustava za nastavu na daljinu: platforme za e-učenje kao što je Merlin (pretpostavlja asinkroni format) i raznih *online* aplikacija za konferencijske pozive (pretpostavlja sinkroni format). Nastava u Zagrebu i Rijeci više se oslanjala na aplikacije temeljene na konferencijskim pozivima – 67,8 %, odnosno 51,4 %. U Splitu i Osijeku uglavnom su se koristile platforme za e-učenje, što je izjavilo 76,4 %, odnosno 67,5 % studenata. Dok je sinkroni format nastave poznat po tome što omogućuje izravnu komunikaciju i interaktivnost, asinkroni omogućuje fleksibilnost vremena i prostora te zajednički rad. Schlenz i suradnici izvijestili su da se 54,3 % nastavnika na njemačkome Stomatološkom fakultetu koristilo sinkronim formatom nastave u istom vremenskom okviru kao i ovo istraživanje, a vrlo malo – 5,7 %, koristilo se asinkronim formatom (12). Moguće objašnjenje za to opažanje mogla bi biti niska stopa (14,3 %) iskustva nastavnika s nastavom na daljinu i potreba za pripremom materijala. Međutim, Hannon i suradnici istaknuli su *online* platforme za e-učenje, asinkroni format, zbog njihove vrijednosti i uloge kao prevladavajućeg medija za teorijsku nastavu (13). U istraživanju u kojemu su se uspoređivala dva formata nastave istaknuto je da studenti zapravo preferiraju asinkroni format (14).

Više od 90 % ukupnog uzorka složilo se da *online* nastava ne može zamijeniti ni jednu vrstu praktičnoga rada. Nadalje, gotovo 80 % studenata nije se složilo da nema potrebe za kompenzacijom kliničkih vježbi. Ti su rezultati u skladu s dosadašnjim istraživanjima o utjecaju bolesti COVID-19 na stomatološko i medicinsko obrazovanje (12, 15 – 17). Studenti su također istaknuli da su zabrinuti zbog gubitka spretnosti zato što su imali premalo pretkliničkih i kliničkih sati (18 – 20). Zapravo, 70,8 % studenata u ovom istraživanju izjavilo je da se osjećaju nepripremljeni za klinički rad, a 71,1 % studenata 6. godine nije se osjećalo spremno za samostalan klinički rad poslije diplome. Nedostatak redovitih manualnih vježbi mogao bi se nadoknaditi posebnim formatima učenja, kao što su video, *online* poduke ili čak *online* praktični tečajevi, kao što su to opisali Oetter i suradnici (21). Autori su izvijestili o iznimno hvaljenom mješovitom teorijsko-praktičnom tečaju, promičući učenje kirurških tehnika na lako dostupnim modelima kao što su banane ili meso uz popratnu demonstraciju.

Konačno, studenti iz Zagreba i Osijeka istaknuli su najveće zadovoljstvo online nastavom – 58,6 %, odnosno 67,5 %. S druge strane, oko 45 % studenata u Splitu i Rijeci izjavilo je da se ne slažu i da se u cijelosti ne slažu s organizacijom online nastave, a slijedi ih oko 30 % neutralnih ispitanika. Godine 2010. i 2011. Brumini i suradnici proveli su anketu o studentima dentalne medicine iz Zagreba, Rijeke i Splita te

students of all three universities. At the time, however, almost half of the attendees have not been following online classes. In fact, the positive attitudes were determined by the greater use of the Internet, Facebook and the number of online classes (22), since dental students in Croatia previously reported online platforms were not represented properly in the study program (23).

One of the limitations of the current study is that the students from different universities were unevenly distributed within the total sample. The greatest number of participants, 63.5%, included the students from the UniZg. This may be explained by the fact that in terms of enrollment numbers, the study program at the School of Dental Medicine in Zagreb allows for the enrollment of the greatest number of students. It can also be expected that Zagreb students exhibited a greater likeliness for study participation due to their familiarity with the research team. It is also worth highlighting that the student sample from the UniOs consisted only of preclinical students. Given that students of other universities highly criticized the absence of practical courses, this could explain the generally greatest satisfaction of UniOs's students with OL.

This study is the first to include undergraduate dental medicine students from all four university programs in Croatia. As such, it provides invaluable insight into the nationwide student experience during the COVID-19 pandemic. Despite the similarities between the dental curricula in all four universities, some differences in the overall satisfaction among the students were observed. The findings of this study could serve as a basis for informed decisions of individual undergraduate program leaders on the improvement of OL. Unfortunately, the study's cross-sectional design prevents the researchers from following up on student perception changes in the pandemic's later stages. As of September 2020, education in dental medicine programs has switched partially and, in 2021, almost exclusively back to face-to-face education. Nonetheless, the authors of this study believe that data from this and similar studies should be implemented to improve (future) OL and incorporate it into a hybrid education approach. In fact, based on this study, the best-evaluated formats of online education, lectures and seminars should be considered mainstream education forms in the future.

Conclusions

OL has proven itself as an invaluable tool for university-level education during the COVID-19 pandemic, especially for learning formats such as lectures and seminars. However, OL cannot substitute all educational formats, especially those dedicated to dental medicine students. Dental medicine education presumes not only acquiring new theoretical knowledge but also manual skills and clinical competencies, the perceived value of which was strongly highlighted in the present study by reported student attitudes. Overall student satisfaction was mixed, as well as students' attitudes and experiences with particular aspects of OL. The findings of the present study can help individual universities address the shortcomings and reinforce the strengths of their OL programs.

o njihovim stajalištima o *online* nastavi i izvijestili o općenito pozitivnom stajalištu među studentima svih triju sveučilišta. Međutim, tada gotovo polovina polaznika nije pratila nastavu na daljinu. Naime, pozitivna stajališta određena su većom uporabom interneta, Facebooka i brojem *online* sati (22), zato što su studenti dentalne medicine u Hrvatskoj ranije prijavili da *online* platforme nisu bile zastupljene na pravi način u studijskome programu (23).

Jedno od ograničenja istraživanja jest nejednaka raspodjela studenata s različitih sveučilišta unutar ukupnog uzorka. Najveći broj sudionika – 63,5 %, bili su studenti Sveučilišta u Zagrebu. To je zato što se na zagrebački Stomatološki fakultet upisuje najveći broj studenata. Također se može očekivati da su zagrebački studenti pokazali veću zainteresiranost za sudjelovanje u istraživanju zbog poznavanja istraživačkoga tima. Također je bitno istaknuti da se uzorak studenata sa Sveučilišta u Osijeku sastojao samo od studenata pretkliničke nastave. S obzirom na to da su studenti drugih sveučilišta itekako kritizirali neodržavanje praktične nastave, to bi moglo objasniti općenito najveće zadovoljstvo studenata Sveučilišta u Osijeku *online* nastavom.

Ovo istraživanje prvo je koje obuhvaća studente preddiplomskog studija dentalne medicine sa svih četiriju sveučilišnih programa u Hrvatskoj. Kao takvo daje neprocjenjiv uvid u iskustvo studenata diljem zemlje tijekom pandemije bolesti COVID-19. Unatoč sličnostima kurikula dentalne medicine na sva četiri sveučilišta, uočene su razlike u ukupnom zadovoljstvu među studentima. Rezultati ovog istraživanja mogli bi poslužiti kao osnova za informirane odluke voditelja pojedinih preddiplomskih programa o poboljšanju nastave na daljinu. Nažalost, presječni dizajn istraživanja onemogućio je istraživačima da prate promjene percepcija studenata u kasnijim fazama pandemije. Od rujna 2020. godine obrazovanje iz programa dentalne medicine bilo je djelomično, a od 2021. godine gotovo je potpuno vraćeno na obrazovanje uživo. Unatoč tomu, autori ovog istraživanja smatraju da bi podatke iz ovoga i sličnih istraživanja trebalo iskoristiti za poboljšanje (buduće) *online* nastave i uključiti je u hibridni obrazovni pristup. Zapravo, na temelju ovog istraživanja najbolje ocijenjeni formati online obrazovanja – predavanja i seminari – trebali bi se smatrati glavnim oblicima obrazovanja u budućnosti.

Zaključak

Online nastava pokazala se kao neprocjenjiv alat za obrazovanje na sveučilišnoj razini tijekom pandemije bolesti COVID-19, posebno za formate učenja kao što su predavanja i seminari. Međutim, *online* nastava ne može zamijeniti sve obrazovne formate, osobito kad je riječ o studentima dentalne medicine. Obrazovanje studenata dentalne medicine podrazumijeva ne samo stjecanje novih teorijskih znanja, nego i manualnih vještina i kliničkih sposobnosti čija je vrijednost istaknuta u ovom istraživanju u prijavljenim stajalištima studenata. Sveukupno zadovoljstvo studenata bilo je različito, kao i stajališta i iskustva studenata s određenim aspektima *online* nastave. Rezultati ovog istraživanja mogu poslužiti kao pomoć pojedinim sveučilištima u otklanjanju nedostataka i usavršavanju programa nastave na daljinu.

Conflict of Interest

The authors have no conflicts of interest to declare.

Author's contribution: **D. V.** - conceived the study, acquisition of data and drafting the article; **L. M.** - analysis and interpretation of data, drafting the article; **M. B.** - conceived the study, acquisition of data and statistical data analysis; **A. B.** - constructive feedback and editing; **L. P.** - constructive feedback and editing; **I. P.** - analysis and interpretation of data, drafting the article

Sukob interesa

Autori nisu bili u sukobu interesa.

Doprinos autora: **D. V.** - osmislio studiju, prikupljanje podataka i izradu članka; **L. M.** - analiza i interpretacija podataka, izrada članka; **M. B.** - osmislio studiju, prikupljanje podataka i statističku analizu podataka; **A. B.** - konstruktivna povratna informacija i uređivanje; **L. P.** - konstruktivne povratne informacije i uređivanje; **I. P.** - analiza i interpretacija podataka, izrada članka

Sažetak

Ciljevi: Željelo se procijeniti stajališta i mišljenja studenata dentalne medicine četiriju hrvatskih sveučilišta o *online* nastavi tijekom pandemije bolesti COVID-19. **Materijal i metode:** Provedena je anonimna internetska anketa među studentima preddiplomskog studija dentalne medicine na sveučilištima u Zagrebu, Rijeci, Splitu i Osijeku. Upitnikom s 29 pitanja prikupljeni su demografski podatci studenata, podatci o organizaciji i upravljanju nastavom a daljinu te o percepciji takve nastave. **Rezultati:** U anketi su sudjelovala 504 sudionika (85,1 % žena). Većina (63,5 %) bila je sa Sveučilišta u Zagrebu. Da su zadovoljni nastavom na daljinu, izjavilo je 39,6 % studenata. Ocjene studenata s pojedinačnih sveučilišta koliko su zadovoljni sveukupnom *online* nastavom bile su: Osijek 3,69, Zagreb 3,22, Split 3,05 i Rijeka 2,64. Većina studenata smatra da se predavanja (82,9 %) i seminari (78,9 %) mogu uspješno održati u *online* formatu nastave. No tako se ne mogu uspješno obavljati laboratorijske, pretkliničke i kliničke vježbe ili stručna praksa, s čime se složilo više od 80 % ukupnog uzorka studenata. Da je nastava na daljinu dobar dodatak konvencionalnoj nastavi, smatra 60 % studenata. **Zaključak:** *Online* nastava vrlo je hvaljena za obrazovne formate kao što su predavanja i seminari te je studenti smatraju korisnim dodatkom konvencionalnoj nastavi. Konvencionalna praktična nastava ne može se zamijeniti onom na daljinu. Sveukupna perspektiva o *online* nastavi bila je različita među studentima četiriju sveučilišta. Rezultati ovog istraživanja mogu poslužiti kao pomoć pojedinim sveučilištima u otklanjanju nedostataka i usavršavanju programa nastave na daljinu.

Zaprimljen: 5. listopada 2022.
Prihvaćen: 7. studenoga 2022.

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MeSH pojmovi: učenje na daljinu; studenti dentalne medicine; stomatološko obrazovanje
Autorske ključne riječi: COVID-19, pandemija; online nastava; upitnici

References

1. Ministarstvo znanosti i obrazovanja. Dodatne upute vezane uz obustavu nastave na visokim učilištima [Internet] 2022 [cited 2022 Sep 20]. Available from: https://mzo.gov.hr/UserDocsImages/dokumenti/Vijesti/2020/Dodatn20upute%20vezano%20uz%20obustavu%20nastave%20na%20visokim%20ucilistima%20-%2013.%203.%202020.pdf
2. Brkić H. Dental medicine and COVID-19 pandemic. Acta Stomatol Croat. 2020 Jun;54(2):118–20.
3. Schönwetter DJ, Reynolds PA, Eaton KA, De Vries J. Online learning in dentistry: an overview of the future direction for dental education. J Oral Rehabil. 2010 Dec;37(12):927–40.
4. Quinn BFA. Challenges and opportunities of online education in dentistry post-COVID-19. Br Dent J. 2022;233(6):491.
5. Rose S. Medical Student Education in the Time of COVID-19. JAMA. 2020 Jun 2;323(21):2131.
6. Garrison DR. E-Learning in the 21st Century: A Framework for Research and Practice. 2nd ed. New York: Routledge; 2011. pp.184.
7. Cheng YM. Antecedents and consequences of e-learning acceptance. Inf Syst J. 2011;21(3):269–99.
8. Allen E, Seaman J. Changing Course: Ten Years of Tracking Online Education in the United States [Internet]. Babson Survey Research Group and Quahog Research Group, LLC; 2013. Available from: https://www.bayviewanalytics.com/reports/changingcourse.pdf
9. Kentnor H. Distance Education and the Evolution of Online Learning in the United States. Curric Teach Dialogue. 2015;17(1–2):21–34.
10. Povjerenstvo za izradu strategije e-učenja Sveučilišta u Zagrebu. Strategija e-učenja 2007.-2010. [Internet]. 2017 [cited 2022 Sep 20]. Available from: http://www.unizg.hr/fileadmin/rektorat/Studiji_studiranje/Studiji/e-ucenje/e-ucenje_strategija/Sveuciliste_u_Zagrebu_Strategija_e_ucenja_Senat_v1.pdf
11. Bušljeta Kardum R, Jurić Vukelić D. The Challenges and Issues on the University of Zagreb during COVID-19 Crisis. Interdiscip Descr Complex Syst. 2021 Sep 30;19(3):357–65.
12. Schlenz MA, Schmidt A, Wöstmann B, Krämer N, Schulz-Weidner N. Students and lecturers perspective on the implementation of online learning in dental education due to SARS-CoV-2 (COVID-19): a cross-sectional study. BMC Med Educ. 2020 Oct 9;20(1):354.
13. Haroon Z, Azad AA, Sharif M, Aslam A, Arshad K, Rafiq S. COVID-19 Era: Challenges and Solutions in Dental Education. J Coll Physicians Surg--Pak JCPSP. 2020 Oct;30(10):129–31.
14. Goob J, Erdelt K, Güth JF, Liebermann A. Dental education during the pandemic: Cross-sectional evaluation of four different teaching concepts. J Dent Educ. 2021 Oct;85(10):1574–87.
15. Iosif L, Ţâncu AMC, Didilescu AC, Imre M, Gălbinaşu BM, Ilinca R. Self-Perceived Impact of COVID-19 Pandemic by Dental Students in Bucharest. Int J Environ Res Public Health. 2021 Jan;18(10):5249.
16. Badovinac A, Par M, Plančak L, Balić MD, Vražić D, Božić D, et al. The Impact of the COVID-19 Pandemic on Dental Education: An Online Survey of Students' Perceptions and Attitudes. Dent J. 2021 Oct;9(10):116.
17. Hattar S, AlHadidi A, Sawair FA, Alraheam IA, El-Ma'aita A, Wahab FK. Impact of COVID-19 pandemic on dental education: online experience and practice expectations among dental students at the University of Jordan. BMC Med Educ. 2021 Mar 8;21(1):151.
18. Agius AM, Gatt G, Vento Zahra E, Busuttil A, Gainza-Cirauqui ML, Cortes ARG, et al. Self-reported dental student stressors and experiences during the COVID-19 pandemic. J Dent Educ. 2021;85(2):208–15.
19. Hung M, Licari FW, Hon ES, Lauren E, Su S, Birmingham WC, et al. In an era of uncertainty: Impact of COVID-19 on dental education. J Dent Educ. 2021 Feb;85(2):148–56.
20. Adam M, Urbančič-Rak T, Crnić T. Dental Students' Discomfort and Anxiety During the First and the Second Lockdown Due to COVID-19 Pandemic at the School of Dental Medicine, University of Zagreb. Acta Stomatol Croat. 2021 Jun;55(2):186–97.
21. Oetter N, Möst T, Weber M, Buchbender M, Rohde M, Foerster Y, et al. COVID-19 pandemic and its impact on dental education: digitalization – progress or regress? Example of an online hands-on course. BMC Med Educ. 2022 Aug 1;22(1):591.
22. Brumini G, Spalj S, Mavrinac M, Biočina-Lukenda D, Strujić M, Brumini M. Attitudes towards e-learning amongst dental students at the universities in Croatia. Eur J Dent Educ Off J Assoc Dent Educ Eur. 2014 Feb;18(1):15–23.
23. Batra M, Ivanišević Malčić A, Shah AF, Sagtani RA, Medvedec Mikić I, Tariba Knežević P, Jukić Krmek S, Illeš D. Self Assessment of Dental students' Perception of Learning Environment in Croatia, India and Nepal. Acta Stomatol Croat. 2018 Dec;52(4):275-85.