

# Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the COVID-19 pandemic

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## ABSTRACT

### Introduction

The challenges presented by the COVID-19 pandemic provide opportunities to improve dental education.

### Aim

This study explored students' experiences of emergency remote learning (ERL).

### Methods

A descriptive, cross-sectional, online survey was sent to 154 Bachelor of Dentistry students at the University of the Witwatersrand in October 2020. The questionnaire included questions about demographics and 25 questions about device ownership, data and Internet usage, online teaching and learning experiences, and future needs. Quantitative and qualitative data were analysed using descriptive and inferential tests and content analysis.

### Results

The survey response rate was 67.5% (99/154). After ERL, 63.3% fewer respondents preferred contact teaching over online teaching, while more preferred mostly online (percentage change of 216.7%) and some online components (percentage change of 80.6%). The number of respondents with no preferred modality decreased by 88.2% from before to after ERL. Respondents' main reasons for preferring contact learning before ERL (n=51) were that it 'allows more interaction' (n=30) and having had

'no or limited experience of online learning' (n=9). Beyond ERL, the main reason for preferring online learning was 'promotes effective learning' (n=20).

### Conclusion

Changes in respondents' preferred teaching modalities after ERL have important implications for integrating online learning into the dental curriculum.

**Keywords:** COVID-19; Dental education; Emergency remote learning; Online learning; Blended learning; South Africa

### List of abbreviations

YOS: Year of study  
VoPP: Voice-over PowerPoint  
SOHS: School of Oral Health Sciences  
ERL: Emergency remote learning  
BDS: Bachelor of Dental Science  
SA: South Africa  
Wits University: University of the Witwatersrand

## INTRODUCTION

The unprecedented educational challenges presented by the COVID-19 pandemic provide opportunities to strengthen dental teaching and learning.<sup>1-3</sup> Dental educators' need to find contextually appropriate solutions for the myriad problems they encountered during the pandemic resulted in a plethora of papers. Most of the papers on dental education during the pandemic came from high-income countries;<sup>4</sup> for example, almost half (63/135; 46.7%) of the single-country original research papers in one scoping review from more than 30 countries were from 12 high-income countries.<sup>3</sup> Egypt (one single country paper and one collaboration between Egypt and Saudi Arabia) and Nigeria (three cross-sectional studies) were the only African countries included in the scoping review; both are low-income countries.<sup>5</sup>

South Africa (SA), although classified by the World Bank as an upper-middle-income country,<sup>6</sup> is the most unequal country in the world,<sup>7</sup> making it vital to use student experiences during the pandemic to improve higher education and make it more equitable. As advocated by Peres et al,<sup>9</sup> within the context of dental education during the pandemic, it is necessary to learn from shared

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experiences. A recent survey reported on undergraduate dental therapy and oral hygiene students' perspectives on incorporating blended learning during the COVID-19 pandemic at a South African university.<sup>8</sup> This paper from the School of Oral Health Sciences (SOHS) at the University of the Witwatersrand (Wits University) aims to contribute to the national, and possibly international, discourse about the challenges and opportunities for dental education revealed during the period of emergency remote learning (ERL).

The challenges experienced during ERL included concerns about the quality of teaching and learning, staff and students' mental health, and infection control.<sup>3,10</sup> Concerns about the quality of teaching and learning focused on institutional, teacher and student readiness for remote online learning and the impact of systemic inequalities on learning. Blended learning, commonly thought of in terms of Graham's<sup>11</sup> definition of combining face-to-face and online teaching, is the preferred method of integrating online learning in the health professions.<sup>12</sup> However, Garrison and Kanuka's<sup>13</sup> definition of blended learning introduced a vital quality dimension and intentional design: "thoughtful integration of classroom face-to-face learning experiences with online learning experiences." The idea of intentional design for blended learning interactions differentiates blended learning from enhanced classroom teaching, on the one hand, and fully online learning, on the other.<sup>14</sup>

Whether referring to completely online teaching or a component of blended learning, the quality dimension of online learning is based on its potential to promote deep or meaningful learning when used in constructivist pedagogical ways.<sup>14-16</sup> The constructivist principles that underpin meaningful learning require students to engage with concepts in ways that promote the construction of knowledge.<sup>17</sup> Online learning is mistakenly believed to be "a representative metaphor of constructivism where the subject of learning is shifted from the teacher to the student, emphasising the autonomous, reflective, and responsible role of the student."<sup>18</sup> Online learning is not inherently constructivist.<sup>19</sup> Rather, educators must design online learning interactions that facilitate knowledge construction,<sup>20</sup> which requires adequate technological and pedagogical knowledge.<sup>21</sup> Clinical skills videos demonstrating technical skills as examples of best practices,<sup>22,23</sup> could, for example have been used to alleviate dental educators' challenges in continuing clinical teaching during ERL. However, this would require adequate technological and pedagogical knowledge and levels of resources, planning, and preparation that may not always have been possible during the pandemic.

Digital inequality across societies has been attributed to economic, social, geographical, and generational divides.<sup>24</sup> These inequalities became more visible during the pandemic when students were required to work from home, drawing attention to rural/urban differences.<sup>10</sup> The Organisation for Economic Cooperation and Development identified a digital divide called the digital gender divide, which refers to discrimination that prevents women from realising equal benefits from emergent digital opportunities.<sup>25</sup> Women are still subjected to

socio-cultural norms and a lack of education, which can be exacerbated in crises. In addition, women often bear household burdens that would affect female students' ability to study at home more than males.<sup>24</sup>

Given the challenges faced during ERL and the dearth of information about South African dental students' experiences, it is essential to determine what lessons can be learned to enhance dental education.

## AIM OF THE STUDY

This study explored dental students' experiences of ERL during SA's first wave of the pandemic, from 26 March to 1 August 2020. The study's objectives were to determine students' experiences of online teaching and learning and their needs for future teaching.

## CONTEXT OF THE STUDY

The School of Oral Health Sciences at Wits University is one of four South African dental schools offering the Bachelor of Dental Science (BDS) or the equivalent Bachelor of Dental Surgery (BChD). The first two years of the five-year BDS programme at Wits University include mainly theory and pre-clinical teaching, conducted in the skills laboratories at the Charlotte Maxeke Academic Hospital. The final three years of the BDS focus on clinical training in four polyclinics at Charlotte Maxeke Johannesburg Academic Hospital.

South Africa went into total lockdown at midnight on 26 March 2020, suspending all contact teaching. Dental and medical students resumed clinical training on 1 August 2020. Wits University responded to the lockdown by implementing a laptop programme and providing students and staff with 30GB of data monthly. The University's Faculty of Health Sciences invited all staff to attend training on multiple online teaching methods, including creating voice-over PowerPoint (VoPP) presentations, to facilitate the rapid transition to ERL and the effective use of the learning management system in use at the time. Despite the university's efforts to support teachers and students, institutional barriers were identified. Banda<sup>26</sup> pointed out that Wits University's legacy IT infrastructure could not fully support online learning and teaching during the early stages of the pandemic.

## METHODS

### Ethics

The Human Research Ethics Committee (Medical) of the Faculty of Health Sciences at Wits University approved the study (M191154).

### Study design and sampling

A descriptive, cross-sectional, convergent mixed methods online survey with closed- and open-ended questions was sent to a purposive sample of 154 BDS students registered in 2020, all of whom were eligible to participate in the study. The quantitative and qualitative findings were converged to improve our understanding of dental students' experiences of online teaching and learning during ERL.<sup>27</sup> Epi Info was used to calculate an estimated sample size of 111 using a 5% margin of error and a confidence level of 95%.

### Development and administration of the survey

The survey was developed in and administered using REDCap electronic data capture tools hosted at Wits University. The questionnaire was adapted from a 2017 survey of Wits University medical students' readiness for e-learning,<sup>28</sup> which had been based on the published studies of Farley et al<sup>29</sup> and Dahlstrom et al.<sup>30</sup> The Ingratta et al 2017 survey<sup>28</sup> was modified for relevance to dental education during the period of ERL. The questionnaire used in this study consisted of 25 questions about students' device ownership, internet and data usage, their experiences of online teaching and learning before and during ERL and their perceived needs for teaching and learning beyond ERL. The questions were face validated by an experienced researcher to improve validity.<sup>31</sup> Demographic data were also collected. Feedback from a pilot study was used to modify the questions.

### Data collection

The survey was emailed to students in early October 2020 and remained open until 10 December 2020.

The university registrar provided permission to access students' emails from the SOHS. The first screen of the survey consisted of an information sheet. Students had to consent to participate in the study before continuing the survey.

### Data analysis

The data were exported to Microsoft Excel for cleaning. There were no duplicate entries. Five incomplete entries (more than half of the answers missing) were removed from the dataset. The closed-ended questions were analysed using descriptive statistics and tests of significance in IBM SPSS.<sup>27</sup> Frequency and custom tables were used to analyse and present students' demographics. The Kruskal-Wallis ANOVA test was used to compare student device ownership and device usage by year of study. The Mann-Whitney U test was used to compare students' device ownership and usage by gender. Associations were tested using chi-squared tests; the Fisher's exact test result was reported where expected counts were less than 5%. All tests were conducted at a significance level of

**Table 1. Sample and population demographics**

Variables												
Age												
≤19 years	8 (40)	NR	2 (18,2)	NR	0	NR	0	NR	0	NR	10 (10.1)	NR
20-24 years	9 (45)	NR	8 (72.7)	NR	24 (82.8)	NR	18 (81.8)	NR	10 (58.8)	NR	69 (69.7)	NR
25-29 years	1 (5)	NR	1 (9.1)	NR	4 (13.8)	NR	3 (13.6)	NR	4 (23.5)	NR	13 (13.1)	NR
≥30 years	2 (10)	NR	0	NR	1 (3.4)	NR	1 (4.5)	NR	3 (17.6)	NR	7 (7.1)	NR
Population group#												
African	14 (70)	23 (63.9)	6 (54.5)	25 (67.7)	16 (55.2)	13 (40.6)	9 (40.91)	7 (31.8)	7 (41.2)	5 (16.1)	52 (52.5)	73 (46.2)
Indian	3 (15)	4 (11.1)	2 (18.2)	5 (13.5)	7 (24.1)	13 (40.6)	9 (40.91)	10 (45.5)	6 (35.3)	24 (77.4)	27 (27.3)	56 (35.4)
White	2 (10)	7 (19.4)	1 (9.1)	2 (5.4)	2 (6.9)	5 (15.6)	3 (13.64)	2 (9.1)	2 (11.8)	2 (6.5)	10 (10.1)	18 (11.4)
Coloured	1 (5)	2 (5.6)	1 (9.1)	5 (13.5)	4 (13.8)	1 (3.1)	0	1 (4.5)	0	0	6 (6.1)	9 (5.7)
Asian	NA	0	NA	0	NA	0	NA	2 (9.1)	NA	0	NA	2 (1.3)
Prefer not to say	0	0	1 (9.1)	0	0	0	1 (4.5)	0	2 (11.82)	0	4 (4.0)	0
Gender												
Male	5 (25)	14 (38.9)	3 (27.3)	11 (29.7)	6 (20.7)	14 (43.8)	10 (45.5)	3 (13.6)	2 (11.8)	9 (29.0)	26 (26.3)	51 (32.3)
Female	15 (75)	22 (61.1)	8 (72.7)	26 (70.3)	23 (79.3)	18 (56.3)	12 (55.5)	19 (86.4)	15 (88.2)	22 (71.0)	73 (73.7)	107 (67.7)
Other	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Residence when at the university												
Campus residence	6 (30)	17 (47.2)	5 (45.5)	2 (5.4)	5 (17.2)	0	7 (31.8)	0	4 (23.5)	0	27 (27.3)	19 (12.0)
Off-campus	14 (70)	19 (52.8)	6 (54.5)	35 (94.6)	24 (82.8)	32 (100)	15 (68.2)	22 (100)	13 (76.5)	31 (100)	72 (72.7)	139 (87.9)
Location during the pandemic												
Urban	15 (75)	NR	7 (63.6)	NR	26 (89.7)	NR	17 (77.3)	NR	16 (94.1)	NR	81 (81.8)	NR
Rural	5 (25)	NR	4 (36.4)	NR	3 (10.3)	NR	5 (22.7)	NR	1 (5.9)	NR	18 (18.2)	NR
No response	0	NR	0	NR	0	NR	0	NR	0	NR	0	NR

\*The population data at admission supplied by the university's Business Intelligence Service (BIS) (n = 158) was used to compare the sample to the population (n = 154) for all variables except age and location during the pandemic, which were deemed not relevant (NR) to establish the representativeness of the sample.

Required demographics not available in the datasets are denoted by NA.

#The racial classifications of African and Coloured (mixed race) were introduced during the apartheid era (1947–1994) according to the Population Registration Act (No. 30 of 1950). The terms for the different population groups as previously defined by the apartheid system are still in use to assist the South African government with redress of previously disadvantaged population groups.

$p \leq 0.05$ . Crosstabs and bar charts were used to analyse further the differences in students' use of online learning. The open-ended answers were analysed in Microsoft Excel using content analysis to generate counts of categories of respondents' experiences of online learning.<sup>32</sup> All coding by the primary investigator was checked iteratively by an experienced researcher until intercoder-agreement was reached, to improve the reliability of the study.<sup>27</sup>

## RESULTS

The response rate for the survey was 67.5% (99/154). Most of the respondents were African (52.5%), female (73.7%), and 20-24 years old (69.7%) (see Table 1). More than 70% lived off-campus when attending university (72.7%), while more than 80% were located in urban areas during the lockdown period when the university was closed (81.8%). The sample was broadly representative of the population for population group and gender, with a slight over-representation of females (73.7%) compared with the survey population (67.7%). Students from the Indian population group were under-represented in the sample (27.3% versus 35.4%), while those defined as African students were over-represented (52.5% versus 46.2%). More respondents lived in campus residences while at university than off-campus, compared with the population data, suggesting that some students had moved into campus residences after admission.

### Access to online materials

Laptops (75%) were the primary devices across all years of study, followed by smartphones (16%). Thirteen respondents (13%) indicated that the university provided the laptops they used during ERL. Few respondents used tablets and desktops across all years of study (see Figure 1). A Kruskal-Wallis one-way ANOVA comparing the mean scores for the device used during ERL by the year of study was not statistically significant ( $p = 0.505$ ).

Seventy-nine percent of the respondents used the 30GB of data supplied by the university. Respondents' usage of the 30GB of university-supplied data was not statistically significant across the years of study ( $p = 0.333$ ). No statistically significant differences were observed when respondents' monthly data usage was compared by year of study ( $p = 0.506$ ). Respondents' usage of the university-supplied data by geographical location during ERL was also not significant ( $p < 0.756$ ), suggesting that urban or rural location did not affect respondents' usage of the data provided by the university.

More than half (51.5%) of the respondents accessed the internet using home Wi-Fi networks, data that they had purchased (5.1%) or the 30GB of data provided by the

university (14.1%), with 29.3% reporting that they had to buy data to supplement the university-supplied data. There was no statistically significant difference in internet connection type by year of study (YOS) ( $p = 0.803$ ). No statistically significant difference was observed between male and female participants on the type of internet connection used ( $p = 0.872$ ). This finding suggests that all students used similar connection methods to connect to the internet. There was, however, a significant difference between the students' geographical location during ERL and the type of internet connection they used ( $p = 0.004$ ).

Most respondents reported that they carried out online academic work daily for 3-4 hours (38.4%), while 21.2% spent less than 3 hours online, 22.2% spent between 5-6 hours, 8.1% spent 7-8 hours, 4.0% spent more than 8 hours, and 6.1% indicated 'other' periods of time spent online. A Mann-Whitney U test comparing the mean scores for the number of hours spent online, by gender, was not statistically significant ( $p = 0.168$ ).

Nearly all respondents (88.8%) accessed the internet for academic work between 06h00 and 19h00, with 65% working between 19h00 and 06h00. About one-fifth of respondents (21.2%) accessed the internet between 02h00 and 06h00 when they could utilise free data equivalent to the data bundle purchased on the service provider's special offer, which extended between 24h00-05h00.

### Experiences of emergency remote learning

Figure 1 shows the six categories of responses when respondents were asked what they enjoyed about teaching and learning during ERL ( $n = 107$ ). The primary reason for enjoying online learning was the 'flexibility of working online' ( $n = 55$ ), followed by the 'benefits of working at home' ( $n = 18$ ) and the 'attributes of specific online learning methods' ( $n = 10$ ). One student's response illustrated how combining different online learning methods benefitted their learning:

...if there was a topic that I did not understand, I could refer to the voice-over lectures and get a response from a tutor on the forums immediately, and the tests and quizzes

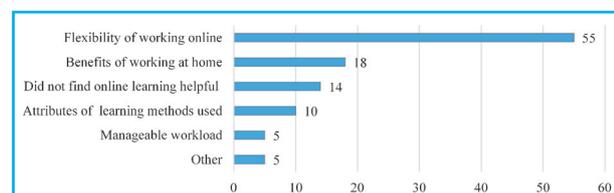


Figure 1. Reasons for use of substances / perceived benefits n=206

Table 2. Preferred methods of online teaching and learning during ERL (n = 99)

Teaching method	BDS1 (n = 20) %	BDS2 (n = 11) %	BDS3 (n = 29) %	BDS4 (n = 22) %	BDS5 (n = 17) %	Total (n = 99) (n; %)
Tests and quizzes	40.0	9.1	27.6	40.9	29.4	31 (31.3)
Voice-over PowerPoint Presentations	35.0	45.5	37.9	22.7	5.9	29 (29.3)
Online meetings	10.0	18.2	20.7	18.2	29.4	19 (19.2)
Other	5.0	18.2	6.9	9.1	5.9	8 (8.1)
Assignments	0	0	3.4	4.5	29.4	7 (7.1)
Videos	10.0	9.1	3.4	4.5	0	5 (5.1)

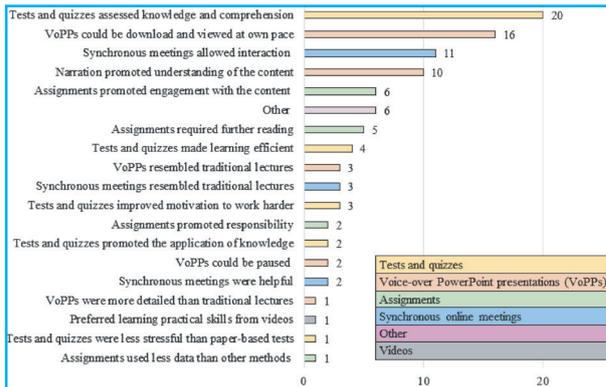


Figure 2. Reasons for preferring different methods of learning online (n = 99)

allowed me to keep up with studying the content. Table 2 shows respondents' preferences for specific online methods of teaching and learning used during ERL by YOS. There was no statistically significant difference for most useful online method by YOS ( $p = 0.245$ ).

Respondents' reasons for preferring specific online learning methods (n = 99) are shown in Figure 2. They mainly valued tests and quizzes (n = 30) because they assessed knowledge and comprehension (n = 20), and VoPP presentations (n = 26) because they could download the presentations and view them as needed (n = 16) and the 'narration promoted understanding of the content' (n = 9). The main reason for preferring synchronous online meetings (n = 16) was because they 'allowed interaction' with lecturers and peers (n = 11), while assignments (n = 14) were deemed to have 'promoted engagement with the content' (n = 6). Interestingly, one reason for preferring VoPPs and synchronous meetings was because they resembled traditional lectures (n = 3, for both). The 'Other' (n = 6) subcategory comprised responses that did not answer the question.

Figure 3 shows the three categories of challenges (n = 147) respondents faced during the period of ERL: 'Difficulties accessing the online content' (n = 76), 'Difficulties adjusting to working at home' (n = 37) and 'Challenges with learning online' (n = 32). Irrelevant responses were classified as 'Other' (n = 2). 'Network and connectivity issues' (n = 61) were the major obstacle to accessing the online content, followed by 'insufficient data' (n = 7). The major difficulty adjusting to learning at home (n = 34) related to 'difficulties managing time' (n = 16), with one student referring to the

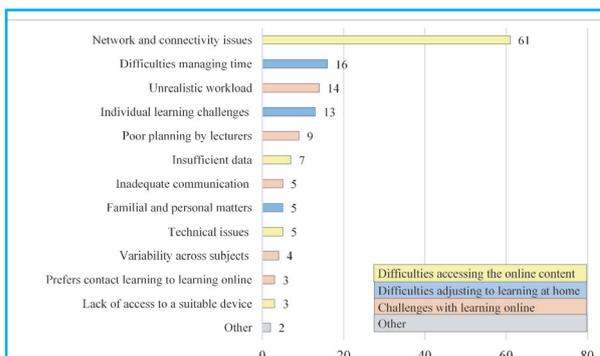


Figure 3. Online learning challenges during ERL (n = 147)

"distractions from family members during work time." Another major difficulty adjusting to learning at home (n = 34) was 'individual learning challenges' (n = 13), with examples like "working and studying and household chores whilst going through family losses" and "job losses during the COVID period." The major challenges with learning online were the 'unrealistic workload' (n = 14), which one student described as "too much work, too little time," while another mentioned the "EXCESS WORK LOAD [sic]."

**Preferred learning modality before and after ERL**

Before ERL, 'Contact teaching' (37.5%) was the preferred modality, followed closely by courses with 'Some online course components' (31.3%) (see Figure 4). In addition, more than one-fifth of respondents indicated 'No preference' (21.3%) for either the contact or online modality, before ERL. Comparing the percentage changes from before to after ERL, 63.3% fewer respondents preferred contact teaching, while all the categories involving online teaching increased. The most striking changes were a 216.7% increase in those wanting 'Mostly but not completely online' courses and an 80.6% increase in those wanting 'Some online course components.' The number of respondents with 'No preference' decreased by 88.2%. Entirely online courses were the least preferred learning modality before and after ERL.

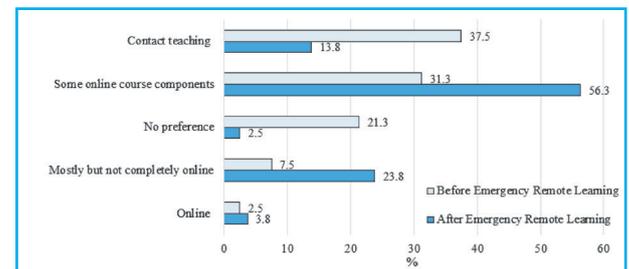


Figure 4. Preferred teaching modality before and after emergency remote learning (n = 80)

Respondents' main reasons for preferring contact over online learning before ERL (n = 51) were that it 'Allows more interaction' (n = 30) and having had 'No or limited experience of online learning' (n = 9). Other reasons were that contact learning was perceived as being 'Better structured' (n = 4) and involving a 'Reduced workload' (n = 4), while 'Online learning posed too many challenges' (n = 3). There was also a preference for hard copies of

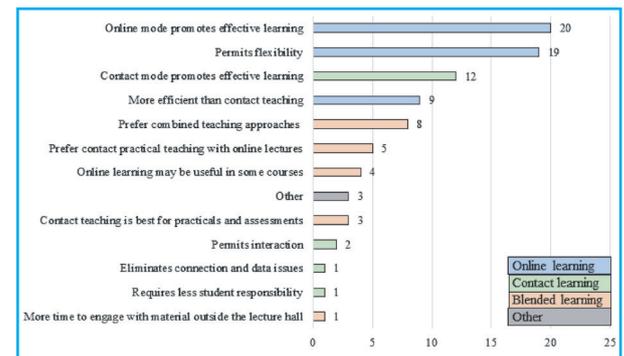


Figure 5. Reasons for learning modality preference after emergency remote learning (n=88)

notes (n = 1). Respondents' reasons for preferring online learning before ERL (n = 19) were that it 'allows greater student autonomy' (n = 7), 'promotes learning better' (n = 7), a perception that 'contact sessions were not useful' (n = 3) and that uploaded resources were useful (n = 2).

Beyond ERL, respondents' reasons (n = 88) in support of online learning, contact learning and blended learning are depicted in Figure 5. The main reasons for preferring online learning were that it 'promotes effective learning' (n = 20), although the same was said of contact learning (n = 12). Where students felt that online learning promotes effective learning, their reasons were, for example, that it "facilitates comprehension", while they felt that contact learning "eliminates connection issues." Other reasons for preferring online learning were that it 'permits flexibility' (n = 19), is 'more efficient than contact teaching' (n = 9) and 'permits interaction' (n = 2). Respondents valued blended learning because they 'prefer combined teaching approaches' (n = 8) and 'contact practical teaching with online lectures' (n = 5).

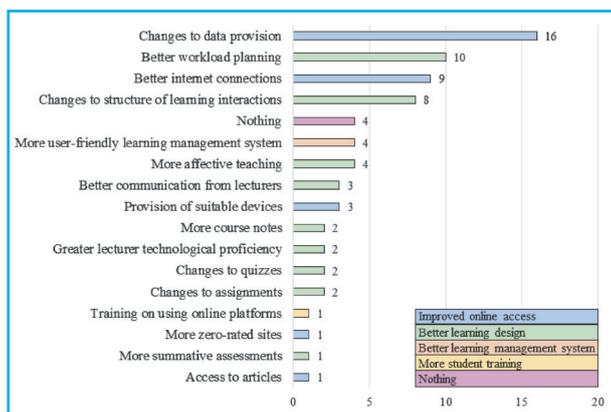


Figure 6. Needs to facilitate online learning in the future (n = 73)

When asked what they needed to facilitate online learning in the future (see Figure 6), the biggest category 'Better learning design' (n = 34) included needs relating to 'better workload planning' (n = 10). Concerning better workload planning, students requested, for example, a "fair workload" and a "good online timetable." One respondent's comment (see below) included several needs relating to 'changes to the structure of learning interactions' (n = 8). The student wanted more participation from lecturers and indicated a preference for synchronous online sessions:

Simply publishing a PowerPoint on Sakai and saying, "I've posted the lecture, if you have any questions, you can email me directly or through your class rep,"[sic] no, do voice-overs AND have a virtual Q&A. The Big Blue Button live lectures were so good.

The main change respondents felt they needed in the future was 'Changes to data provision' (n = 16). One student said they need an "adequate amount of data." Other changes respondents wanted related to the category 'Improved online access' (n = 30): a 'Better internet connection' (n = 9) and the 'Provision of suitable devices' (n = 3).

## DISCUSSION

The period of ERL has resulted in substantial changes in the higher education system, as evidenced by the dramatic shifts in respondents' preference from contact learning to blended learning and the reduction in those who had indicated no preference for either modality before ERL. Notwithstanding the challenges of the extreme conditions under which teaching and learning took place during the pandemic, ERL has served as a metaphorical test tube, an incubator of ideas,<sup>33</sup> about the possibilities of how online learning can be used to enhance traditional dental teaching. The fact that respondents indicated they wanted more blended learning despite the myriad challenges they experienced appears to centre around the flexibility of working at their own pace, combined with the variety of online learning methods and resources available to them, especially tests and quizzes and VoPP presentations.

These findings are similar to those of Mladenovic et al;<sup>34</sup> more than 90% of the students in that study reported that the ready accessibility of online PowerPoint presentations allowed them to work at their own pace and further explore interest topics. In their study integrating learning management systems into dental simulation clinics, Pani and Vieira<sup>35</sup> found that uploading pre-readings and case scenarios allowed more focused discussions and better time management. Their students could prepare better for discussion sessions and interact more productively with lecturers and peers. While the Pani and Viera<sup>35</sup> study illustrates the judicious use of online resources, educators must be realistic about the time required for online work. The unrealistic workload cited by respondents in this study could be counterproductive to deep or meaningful learning.<sup>36</sup>

Spalding et al,<sup>37</sup> in their study of the higher education challenges and possibilities in Brazil during the pandemic, recommended changes in the conceptions of learning and teaching as a strategy for focusing on mental health in the education system. In keeping with what has been reported in other studies, both pre-pandemic<sup>22,23</sup> and during the pandemic, the respondents in our study indicated that the shift towards blended learning should focus on teaching theoretical components online while clinical teaching is conducted in person.

The dental students in the survey conducted at the University of KwaZulu-Natal referred to the stress of switching between lectures and clinics during traditional teaching, both in the time required and the possible negative impact on their learning, which blended learning modalities could alleviate.<sup>9</sup> However, the students in this study felt that fully online teaching could not adequately prepare them for clinical practice.<sup>9</sup> The idea that while some dental courses require contact teaching, others—like Prosthodontics, Restorative, Practice Management, Oral Pathology, and General Practice—could continue online in the future was supported by third- and fourth-year students in the United States study by Gardner et al.<sup>38</sup> Although videos were the least preferred method of online learning in the Gardner et al study, their potential needs to be explored more fully, especially where the videos have been designed to meet specific needs. In our

study, the pre-clinical first- and second-year respondents preferred learning from videos more than those in the clinical years. This preference could be due to the first- and second-year students having access to pre-clinical skills videos specially recorded by lecturers in the SOHS to allow continuity of teaching and learning during the pandemic. Pre-clinical skills videos provide an opportunity for enhancing learning that could be further explored in the future.

The ERL period highlighted the inequalities still prevalent in SA, which must be considered in all educational planning. SA remains one of the most unequal countries globally regardless of the long-term trend indicating progress in reducing poverty, which is higher in rural areas.<sup>10</sup> Connectivity issues were a major challenge for the respondents in this study. The University of KwaZulu-Natal study by Moodley et al<sup>8</sup> reported a similar finding. While Wits University was not unique in its lack of readiness for the period of ERL, its laptop programme and data provision initiative supported students to continue their education.

This study found no significant difference in the type of device used by dental students and their usage of the 30GB of university-supplied data by YOS. However, some students had to purchase supplementary data to complete their academic work, raising the question of whether the blanket provision of 30GB was sufficient across all courses and all years of study. This study shows that the non-clinical YOS at SOHS utilised more videos, requiring more data than the clinical YOS. The blanket approach of providing equivalent data bundles across all years of study may not be efficient. While recent reports suggest that the government plans to provide free data to SA households,<sup>39</sup> this has yet to be implemented, and the consistently high data prices in SA40,<sup>41</sup> remain a contributing factor to unequal education. To avoid perpetuating the digital divide, the country needs to emphasise the socio-economic discourse underpinning online learning. One outcome that should address some of the technical problems experienced during ERL at Wits University was the replacement of the learning management system, Sakai, with the university's instance of Canvas, known as Ulwazi, in January 2021.

Although some students enjoyed the flexibility of working from home, others felt that their home environment was not conducive to deep learning. Many had experienced difficulties adjusting to working at home due to domestic and family responsibilities. These findings were similar to the University of KwaZulu-Natal study by Moodley et al,<sup>8</sup> in which participants reported struggling with working from home for similar reasons. The technical difficulties students experienced also contributed to the ineffectiveness of working from home, resulting in students being unable to submit academic tasks on time. Students reported that they would have appreciated more affective teaching, whereby lecturers show compassion regarding issues beyond students' control.

Studies similar to the one reported in this paper are essential for guiding institutional decisions about how to implement blended learning in the future.

Some recommendations that could be explored are implementing policies that include more staff training on online teaching platforms and digital pedagogies and ongoing critical analysis of student feedback for optimum teaching methods according to the YOS. Issues around access to technology and connectivity go beyond revising university policies on online learning and require local and national government intervention; otherwise, the disadvantaged will remain disadvantaged. A limitation of using self-reported data is its subjectivity.<sup>42</sup> Issues of validity and reliability were addressed to improve the credibility of the findings, and the convergence of the qualitative and quantitative findings further improved the study's rigour.

## CONCLUSION

This study provides direction based on students' needs for blended learning within the SOHS and the Faculty of Health Sciences. Educators need training on designing effective blended-learning interactions, especially about what constitutes a reasonable workload. While the challenges identified during ERL were unique, especially in terms of geographical location, they provided a worst-case scenario that higher education, especially disciplines with a substantial practical teaching component, must be able to withstand. The sudden shift to ERL should be viewed as a learning curve to harness the advantages of online learning. These findings could be relevant to other national and international dental schools, especially in settings with limited resources.

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## Conflict of interest

The authors declare that they have no conflict of interest related to any aspect of this research project.

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