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DENTAL STUDENTS' EXPERIENCES OF REMOTE EMERGENCY ONLINE LEARNING AT THE UNIVERSITY OF THE WITWATERSRAND DURING THE COVID-19 PANDEMIC

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters in Health Sciences Education

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Johannesburg, 9 June 2023

DECLARATION

I, Koketso Tshite, student number 870703, declare that this research report is my own, unaided work. It is being submitted for the Degree of Masters in Health Sciences Education at the University of the Witwatersrand, Johannesburg; Human Research Ethics Committee (Medical) clearance number M191154 (see Appendix A1). It has not been submitted before for any degree or examination at this or any other university.

Signed: Koketso Tshite

the 09th day of June 2023

DEDICATION

I dedicate this work to my partner, Kabelo, and our children, Lukhanyo, Khwezilomso, and Marang, for their ongoing support and immense patience during my studies and to my family and dear friends, whose love and prayers of day and night enabled me to get such triumph and prestige.

PRESENTATIONS ARISING FROM THIS STUDY

Tshite K, George AZ. *Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the Covid-19 pandemic*. Poster presented at the Faculty of Health Sciences Research Day 2022, 15 September, University of the Witwatersrand, Johannesburg, South Africa (see Appendix B).

PUBLICATIONS AND AUTHORS' CONTRIBUTIONS

Declaration: Student's contribution to the article and agreement of co-author

I, Koketso Tshite, student number 870703, declare that I contributed adequately towards the research findings published in the article below, which is included in my research report (see Appendix C – the Department of Higher Education and Training-accredited journal of the Souths African Dental Association provided permission for the article to be reproduced):

Tshite K, George AZ. Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the Covid-19 pandemic. South African Dental Journal. 2022;77(9):542–50.

Signature of Student: ……Koketso Tshite……

Date: 09 June 2023

Agreement by co-author: By signing this declaration, the co-author listed below agrees to the student including the article in this research report.

Signature of co-author: ……Ann George……

Date: 09 June 2023

ABSTRACT

Background

The Covid-19 pandemic presented unprecedented challenges that could provide opportunities to improve dental education. Most papers reporting these challenges and opportunities came from high-income countries, so exploring students' experiences during emergency remote learning (ERL) in low-resource settings is imperative.

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 open- and closed-ended questions. Quantitative data were analysed using descriptive and inferential tests. The open-ended responses were analysed using content analysis.

Summary of results

The response rate for the survey was 67.5% (99/154). There was a significant difference across the five years of study between urban and rural locations during ERL and the type of internet connection the respondents used. Respondents' preferred teaching modalities changed from before to after ERL, with more preferring blended learning over contact or fully online learning.

Conclusions

The tumult created by the sudden shift to ERL should be viewed as a learning curve to broaden our knowledge of how best to harness the affordances of online learning. The exposure to online learning appears to have shifted dental students' preferences towards combined online and contact learning. More blended learning has implications for integrating online learning into the dental curriculum in ways that enhance learning and requires broader institutional support. Recommendations are made for ways that such support could be provided.

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LIST OF ABBREVIATIONS

BDS: Bachelor of Dental Science

ERL: emergency remote learning

LMS: learning management system

SA: South Africa

SOHS: School of Oral Health Sciences

VoPP: voice-over PowerPoint

Wits University: University of the Witwatersrand

YOS: year of study

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PERSONAL STATEMENT

I am a qualified dentist and a female educator at the School of Oral Health Sciences, and I am interested in using online learning for better dental education. Aware of the school's limited use of online or blended learning before the pandemic, I designed a study focusing on dental students' readiness for online learning as a needs analysis to promote educational technology usage in the school. However, the onset of the Covid-19 pandemic necessitated a shift in focus when online teaching and learning became the default mode during emergency remote learning. I redesigned the study in mid-2020 based on my experiences of the difficulties associated with transitioning online and my awareness of educators' and students' concerns about emergency remote learning. I received approval for the modified study from my assessors (see Appendix F) and the Human Research Ethics Committee (Medical) clearance number M191154 (see Appendix A).

CHAPTER 1: BACKGROUND AND CONTEXT

1.1. INTRODUCTION

This study is set against the background of the affordances and challenges of online learning highlighted during the Covid-19 pandemic. The chapter introduces relevant concepts and models from the literature that provide a foundation for the study.

The context for the study is the School of Oral Health Sciences at the University of the Witwatersrand and its response to the global Covid-19 pandemic. The chapter also discusses the problem motivating the study and the research aim and objectives arising from this problem.

1.2. ONLINE LEARNING IN HIGHER EDUCATION

Since the 1980s, information and communication technology (ICT) has been more widely integrated into higher education (Hamissi, Gholami & Hamissi, 2013; Englund, Olofsson & Price, 2017). One of the driving forces behind the integration is that tertiary institutions "cannot ignore the societal trends related to the information and communication technologies" (Pavel, Fruth & Neacsu, 2015: 704). Online learning, or using ICT to access the internet for education, goes beyond distributing documents in electronic format to learners via the internet (Ellaway & Masters, 2008). Online learning includes a pedagogical approach that typically aspires to be flexible, engaging and learner-centred and encourages interactions between staff members, staff and learners, and learners and learners (Ellaway & Masters, 2008).

Online learning offers many benefits. It allows learners, without any restrictions on place and time, to access diverse learning tools, including discussion boards, lectures, assessments, and content repositories and to engage in document sharing (Ngai, Poon & Chan, 2007). Appropriately designed online learning materials can promote learners' autonomy in the learning process, offer opportunities for self-paced learning and collaboration, and reduce operating costs for institutions (Ngai, Poon & Chan, 2007; Dominici & Palumbo, 2013; Mohammadyari & Singh, 2015).

Despite the potential benefits of online learning, the widespread integration of ICT into higher education is affected by several factors across national, institutional, and teacher and learner levels (Piccoli & Ahmad, 2001; Lee, Yoon & Lee, 2009).

1.2.1 National level factors

Several countries began investing heavily in ICT in education in the 1980s, with many, including South Africa, introducing ICT integration as a national policy (Kozma, 2008). The broader use of ICT in education contributed to the digital divide, defined as "inequality of access to the internet" (Castells, 2002: 248). Internet access is a "requisite for overcoming inequality in a society in which the dominant functions and social groups are increasingly organised around the internet" (Castells, 2002: 248). However, some parts of the world still do not have internet access due to their economic status. Digital inequalities across societies are attributed to economic, social, geographical, and generational divides (Mathrani, Sarvesh & Umer, 2021), but the digital divide does not only refer to a lack of internet access. Van Dijk and Hacker (2003) believe four other types of deficiencies contribute to the digital divide, namely, the lack of

- mental access – basic digital experience
- material access to digital devices and network connections
- skill access – a lack of digital skills
- usage access – the lack of meaningful usage opportunities

The Organisation for Economic Cooperation and Development identified another type of digital divide, the digital gender divide, which refers to discrimination that prevents women from realising equal benefits from emergent digital opportunities (Borgonovi et al., 2018). 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 females' ability to work and study at home more than males (Mathrani, Sarvesh & Umer, 2021).

1.2.2 Institutional-level factors

For online learning to be effective, institutions should be well-equipped and ready for online teaching and learning. Adequate infrastructure includes strong Wi-Fi connections, enough network points, and rooms specially allocated to teachers for online teaching to be delivered. Institutions must also provide ICT training for teachers to use ICT efficiently and effectively.

1.2.3 Teacher- and learner-level factors

One of the challenges to integrating ICT into higher education is the lack of digital literacy among teachers and learners. Digital literacy is a fundamental life skill essential for online learning (Pavel, Fruth & Neacsu, 2015). Digital literacy was first described by Gilster (1997: 1) as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers". This utilitarian definition evolved into a broader approach encompassing attitudes when Bawden (2008) defined digital literacy as "the set of attitudes, understanding and skills to handle and communicate information and knowledge effectively, in a variety of media and formats." Since 1997, many definitions of digital literacy have been recognised, including the plural digital *literacies* (Spante et al., 2018). The 2011 technical report by Ala-Mutka (2011), in which they mapped digital literacies (see Figure 1. 1), highlights the overlap between the different literacies comprising digital literacy.

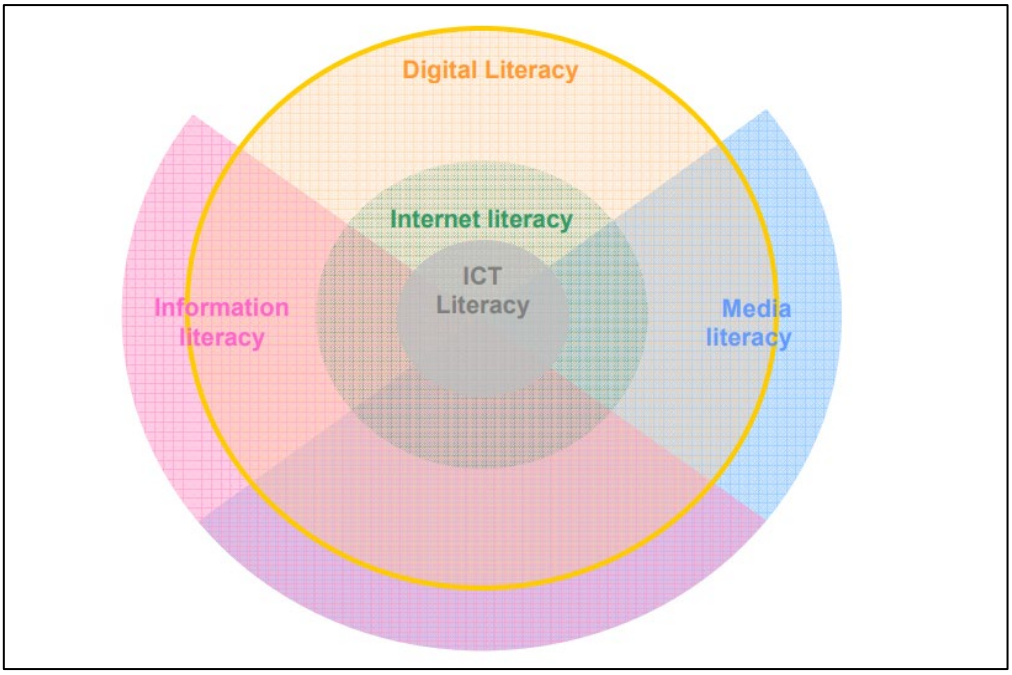


Figure 1.1 Mapping digital literacy and other main concepts (Ala-Mutka, 2011)

Over time, the functional concept of digital literacy has been replaced by digital competence (Spante et al., 2018). The European Commission (European Parliament and the Council, 2008) related digital literacy to digital competence as follows: "Digital literacy is the skills required to achieve digital competence... Digital literacy is underpinned by basic technical use of computers and the Internet". The broader concept of 'digital competence' goes beyond the literacy required for using ICT (Redecker & Punie, 2017), extending to how individuals use it (Janssen et al., 2013; Falloon, 2020). Given the range of definitions, 'digital literacy' will be broadly defined in this study as "the ability to handle technological devices (hardware and software)" (Machin-Mastromatteo, 2012). Digital competence will be defined as the

> … set of knowledge, skills, attitudes, strategies and awareness which are required when ICT and digital media are used to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and build knowledge in an effective, efficient and adequate way, in a critical, creative, autonomous, flexible, ethical and a sensible form for work, entertainment, participation, learning, socialisation, consumption and empowerment (Ferrari, 2012).

Although recent generations have been touted as 'digital natives' (Prensky, 2001a,b), this notion has been disproved and does not automatically suggest that they are digitally literate

(Ng, 2012). At the most fundamental level, teachers need appropriate training to promote the different types of knowledge required to use technology effectively for teaching and help them develop appropriate skills to design learning materials. Mishra and Koehler's (2006) technological pedagogical content knowledge (TPACK) framework (see Figure 1.2) remains widely used to inform the types of knowledge teachers need to integrate ICT and "to inform and guide research in the area of teaching with technology" (Angeli & Valanides, 2009: 155).

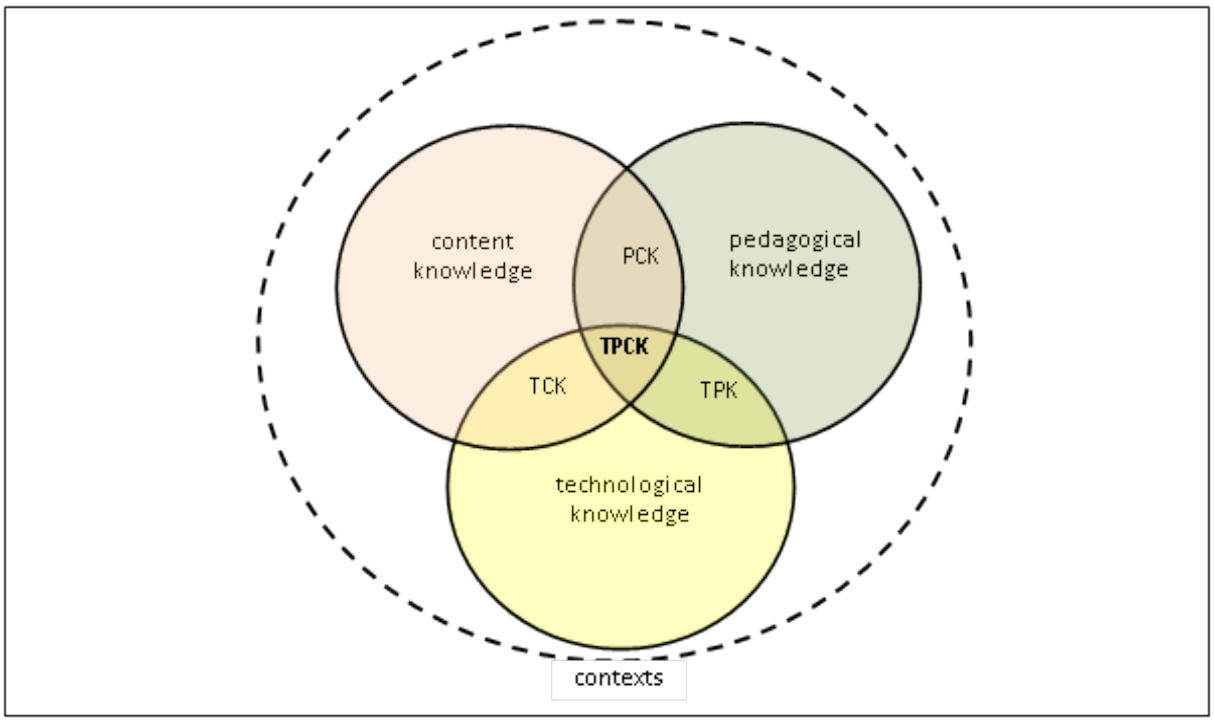


Figure 1.2 Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006)

1.3. ONLINE LEARNING IN HEALTH SCIENCES EDUCATION

Online learning can be completely online, as in distance learning, or combined with face-to-face teaching in what is known as blended learning (Graham, 2006). Blended learning is the most common method of integrating online learning in the health professions (Choules, 2007; Al-Shorbaji et al., 2015). Garrison and Kanuka (2004) introduced a vital quality dimension and intentional design to blended learning. These authors refer to blended learning as the "thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004: 96). 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 (Garrison & Kanuka, 2004; Jonassen et al., 2008; Ertmer & Newby, 2013).

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 (Jonassen et al., 2008; George & Sanders, 2017; Sanders & George, 2017). Constructivism is a learning theory that describes how knowledge is constructed (Kanuka & Anderson, 1999). The constructivist principles that underpin meaningful learning require students to engage with concepts that promote knowledge construction (Schweisfurth, 2011).

One of the reasons blended learning is the preferred approach in health sciences education (HSE) is because HSE involves both theoretical and clinical teaching. According to the social cognitive model of sequential skill acquisition (see Figure 1.3), learning happens in two phases – first socially and then individually (Schunk, Schunk & Zimmerman, 1997; Zimmerman & Kitsantas, 2002). The social-learning phase involves observing a skilled practitioner demonstrating a skill, followed by imitation of the modelled behaviour, before moving towards a self-directed practice that culminates in the self-regulated performance of the desired skill.

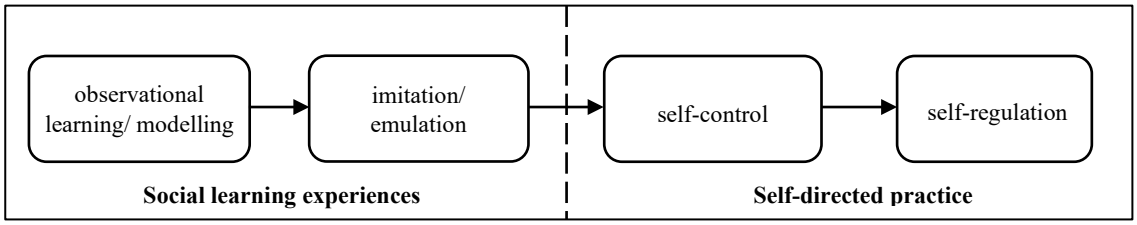


Figure 1.3 Social cognitive model of sequential skill acquisition

Demonstrations also form the basis of acquiring technical skills in Peyton's four-step model of demonstration, deconstruction, comprehension, and performance (Walker & Peyton, 1998), which was effective for teaching procedural skills across health-profession education (Giacomino, Caliesch & Sattelmayer, 2020). Demonstrations are the second step of the five-step model for teaching psychomotor skills (George & Doto, 2001). Clinical-skill videos can demonstrate technical skills by providing examples of best practices (Hibbert et al., 2013).

However, reports suggest that both students and clinicians prefer skills videos to be blended, i.e., in combination with contact teaching (George et al., 2019).

1.4. ONLINE LEARNING AND SELF-REGULATED LEARNING

Self-efficacy describes how an individual judges their own capabilities in executing courses of action which leads to attaining or achieving a designated goal (Zimmerman, 2000). In the context of teaching and learning, self-efficacy promotes students' autonomy such that students, together with educators, become assessors of their own work. The level of self-efficacy depends on the difficulty of a given task.

According to Martin and Marsh (2006a), the self-efficacy dimension of resilience can be fostered through less didactic teaching and more self-directed learning (SDL). Self-directed learning is defined as the "process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975: 18).

SDL was emphasised as a critical approach to cultivating spontaneous and motivated learners (Chen, Chen & Tsai, 2021) and "salvaging the academic year during the COVID-19 pandemic" (Mahlaba, 2020: 123). SDL aligns with the theory of constructivism, which implies that learners are engaged with and in control of their learning process (Clark, 2018). Student autonomy forms a major component of SDL, suggesting that discovery learning and collaborative learning can be implemented as instructional approaches to encourage autonomy and responsibility (Clark, 2018). However, two challenges were identified with this approach. First, online education is 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" (Kang, Choi & Chang, 2007: 403). However, online or technology-enhanced learning is not inherently constructivist (Judson, 2006) unless educators design online-learning interactions that help students construct their own knowledge.

The second challenge regarding SDL as a critical approach to cultivating spontaneous and motivated learners during the pandemic is that the terms *self-regulated learning* (SRL) and *SDL* are sometimes used interchangeably (Saks & Leijen, 2014), whereas they have different emphases (Voskamp, Kuiper & Volman, 2020). The broader concept of SDL encompasses students taking responsibility for the learning process, whereas SRL refers to the independent completion of tasks designed by teachers (Saks & Leijen, 2014). SRL is thus a component of SDL, but SRL does not require SDL (Saks & Leijen, 2014). Despite their theoretical differences, SDL and SRL require skills that must be developed through purposeful teaching (Bolhuis & Voeten, 2001), suggesting that teachers cannot assume that all students possess these skills to the same extent. In addition, self-regulated behaviour speaks to an internal locus of control, that is, the extent to which individuals believe they have control over events. Such control would have been difficult to exercise during the stress and uncertainty associated with a pandemic. Song et al. (2021) also highlighted the insurmountable pressures experienced by health professionals, which increase their risk of various psychological problems, such as anxiety, fear, depression, and insomnia (Martin & Marsh, 2006b).

1.5. ONLINE LEARNING DURING THE COVID-19 PANDEMIC

The Covid-19 pandemic resulted in many countries implementing lockdowns and social distancing to combat the spread of the disease. Most academic institutions worldwide responded to the pandemic restrictions with a great online transition (Howard et al., 2022) to emergency remote teaching (ERT) to allow academic programmes to continue online teaching. ERT involves a sudden shift from traditional to remote teaching in emergencies like the Covid-19 pandemic, providing insufficient time for planning (Affouneh, Salha & Khlaif, 2020). This rapid change from traditional to online teaching during the pandemic occurred regardless of students' and educators' readiness for online learning.

Affouneh et al. (2020) cited multiple challenges associated with ERT, including educators working in highly stressful situations while not knowing how long the crisis will last; students complaining about educational inequalities and difficulties accessing educational resources, and teachers' concerns about students' engagement in ERT.

ERT's novel challenges can be viewed as opportunities for education leaders and policymakers to learn new lessons about education in crisis and develop all facets of their online-learning systems (Affouneh et al., 2020). For example, faculties should reprioritise their goals, reorganise their course materials and provide training on remote teaching (Iyer, Aziz & Ojcius, 2020). Moreover, faculties should be reassured regarding the capacity of departments to adapt to such crises.

1.6. PROBLEMS MOTIVATING THE STUDY

South Africa went into total lockdown (Alert Level 5) at midnight on 26 March 2020, after the first national case of SARS-CoV 2 was reported. During Alert Levels 4 and 5, all contact teaching was suspended. Like other education institutions, higher education institutions responded by moving online teaching, highlighting the lack of national, institutional and teacher and learner readiness for large-scale, sustained remote teaching. Health sciences students resumed clinical training on 1 August 2020, when the lockdown restrictions were adjusted to Alert Level 3.

1.6.1 The impact of the pandemic on digital divides

Digital divides became more visible when students were required to work from home during the pandemic, drawing attention to rural/urban differences in their access to devices and data (Pelletier et al., 2021). Africa is one of the continents hampered most by widespread poverty (Fuchs & Horak, 2008). South Africa (SA), although the World Bank classifies it as an upper-middle-income country (World Bank, 2022), is regarded as the most unequal country in the world (World Bank Group, 2018). Data costs are higher in SA compared to other African countries thus adding to the problems of students' variable access to devices and Wi-Fi (Moyo, 2022).

1.6.2 Variable uptake of blended learning at the University of the Witwatersrand

The University of the Witwatersrand (Wits University) introduced blended learning in 2012. Subsequent strategy and policy documents, including the *2015–2019 Learning and Teaching Plan, Wits Digital Learning and Teaching Strategy* (Crouch, 2018), and *Wits Learning and Teaching Plan 2020-2024* (University of the Witwatersrand, 2019a) reaffirmed the

University's commitment to 'Increasing flexible and life-long learning opportunities' (University of the Witwatersrand, 2019), including blended teaching and learning. Despite blended learning being adopted as "integral" to the university's *2015–2019 Learning and Teaching Plan*, a five-year review described blended learning as having taken "a long time to find traction within the University" (University of the Witwatersrand, 2019b: 84). Blended learning was variably implemented across the university, with some teachers making limited use of ICT before the pandemic.

A policy document released in November 2020, the *Plan for Learning and Teaching in 2021* (University of the Witwatersrand, 2020), outlined the steps taken by the University from April 2020, many of which continued into 2021. However, many of these responses were unavailable during the early part of ERL, making it difficult for faculty and students to transition to online learning. The University's responses to ERT and emergency remote learning (ERL) included implementing a laptop and data programme and, in conjunction with internet service providers (in a national response), zero-rating some educational websites. The laptop programme provided students and staff with 30GB of data monthly. The University also offered training and assistance for teachers, which was supplemented in the Faculty of Health Sciences (FHS) by staff 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 University's learning management system (LMS), Sakai. Despite the University's efforts to support teachers and students, institutional barriers were identified. Banda (2020) pointed out that Wits University's legacy IT infrastructure could not fully support online learning and teaching during the early stages of the pandemic.

1.6.3 Problems facing the School of Oral Health Sciences

The School of Oral Health Sciences (SOHS) 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 theory and pre-clinical teaching conducted in the skills laboratories at the adjacent Charlotte Maxeke Academic Hospital. The last three years of the BDS course focus on clinical training in four polyclinics at Charlotte Maxeke Johannesburg Academic Hospital. Before the Covid-19 pandemic, SOHS was facing several challenges, including increases in

the number of students enrolled at the first-year level. The increased student numbers resulted in space shortages and double lecturing, whereby a lecturer delivers the same lecture twice to different groups of students.

Dental teaching faced unique challenges during the ERL (Sukumar, Dracopoulos & Martin, 2021). It combines theory, laboratory, and clinical practice (Santos et al., 2021) with the clinical training component encompassing technical and non-technical skills (Santos et al., 2021). Extraction techniques exemplify a chair-side technical skill, while clinical reasoning, decision-making, and communication are non-technical soft skills (Michels, Evans & Blok, 2012; Hibbert et al., 2013). The challenge of infection control for students was exacerbated due to the chair-side nature of clinical dental teaching, primarily due to the aerosols generated when treating non-mask-wearing patients. While clinical skills videos may have offered an alternative to replace clinical training during the hard lockdown (Lala et al., 2021), the resources, planning, and preparation required to record videos may not always have been possible during the pandemic. SOHS did not stipulate the teaching method lecturers should use during ERT, but they advocated uploading the content to the LMS, Sakai.

Some authors believe that a graduate dentist must be able to utilise ICT for personal and professional development regardless of their priorities in research, public health, teaching or clinical care (Hamissi, Gholami & Hamissi, 2013). However, scant literature is available on ICT integration into dental education (Saxena et al., 2018). Certainly, the move to ERT and emergency remote learning (ERL) emphasised the SOHS's limited use of ICT before the pandemic.

1.7. STUDY AIM AND OBJECTIVES

1.7.1 Aim and significance of the study

The aim of this study was to explore dental students' experiences of ERL during SA's first wave of the pandemic, from 26 March to 1 August 2020. A better understanding of dental students' experiences could assist the SOHS with reviewing their ERT and ERL policies, reorganising their online-learning materials, and providing training on online teaching that could enhance teaching and learning in the longer term.

For this study, ERT and ERL will refer to the period from 26 March to 1 August 2020, when all teaching was online.

1.7.2 Research question

What were dental students' experiences of ERL in the SOHS at the University of the Witwatersrand during SA's first wave of the pandemic, from 26 March to 1 August 2020?

1.7.3 Objectives of the study

The objectives of this study were as follows for dental students at the SOHS of the University of the Witwatersrand:

1. To determine their demographics
2. To determine by gender, their ownership of digital devices
3. To determine their internet and data usage during the period of ERL
4. To explore their experiences of online teaching and learning during the period of ERL
5. To explore their experiences of online teaching and learning before the period of ERL and their needs for future online teaching and learning

1.8. CONCLUSION

This chapter discussed the affordances of and barriers to online learning in higher education, which came to the fore during the Covid-19 pandemic, and how these played out in the context of the setting for the study. The chapter also discussed the implications of constructivism as a learning theory underpinning online teaching and learning. Finally, the problems facing the School of Oral Health Sciences that formed the basis for the study were discussed, leading to the aim and objectives of this study.

CHAPTER 2: METHODS

2.1. INTRODUCTION

This chapter deals with the research paradigm and methods used during the study.

2.2. RESEARCH PARADIGM

A research paradigm refers to the researcher's "basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways*"* (Guba & Lincoln, 1994: 105). Where *ontology* refers to what constitutes knowledge and how that knowledge can be known, *epistemology* refers to the relationship between the knower and what can be known (Guba & Lincoln, 1994). A researcher's assumptions about the nature of knowledge influence how they obtain knowledge and thus, the methods available to them in investigating knowledge.

Researchers with positivist and postpositivist worldviews believe that there is one absolute external reality (Phillips & Burbules, 2000) that can never be perfectly derived (Creswell, 2014). These researchers use quantitative data-collection methods and statistical analyses to test theories and stress issues of researcher objectivity, validity and reliability (Creswell & Plano Clark, 2018). Researchers with constructivist and interpretivist worldviews believe that knowledge is internally constructed by individuals and groups based on their social and historical contexts (Crotty, 1998; Creswell & Creswell, 2018). These researchers focus on making meaning of individual and collective understandings by gathering and interpreting participant perspectives (Crotty, 1998). A qualitative approach requires researchers to "position themselves in the research to acknowledge how their interpretation flows from their personal, cultural, and historical experiences" (Creswell & Creswell, 2018: 8).

The pragmatic worldview rejects the primacy of data-collection methods associated with the postpositivist and constructivist paradigms and focuses on solving problems by answering their research questions using the most appropriate methods (Creswell & Plano Clark, 2018). The researcher is situated within the pragmatic paradigm, which allows her to select research methods to address the research objectives best and not be limited by the classical

postpositivist and constructivist paradigms, with their respective dependence on quantitative and qualitative data-collection methods (Creswell & Plano Clark, 2018).

The researcher's objectives for this study required collection of both quantitative and qualitative data. The researcher's positioning within the pragmatic paradigm allowed her to collect both quantitative and qualitative data to address the research objectives.

2.3. STUDY DESIGN

The choice of study design is crucial because it allows proper planning and ensures that the study methods match the study's objectives and aim (Creswell & Plano Clark, 2018). With that in place, a researcher can collect appropriate data that will be analysed according to the relevant data analysis tests (Creswell & Plano Clark, 2018).

The design for this study was a cross-sectional survey using both open-ended and closed-ended questions. In a cross-sectional study, the researcher collects participant data simultaneously but does not follow the participants over time, as in longitudinal studies (Manfreda et al., 2003; Creswell, 2014). Closed-ended questions aim to understand the extent of participants' general experiences, limiting them to a set of alternatives given in the survey (Manfreda et al., 2003) and allowing for efficient data analysis. Some authors regard including open-ended questions that do not serve a particular purpose in surveys as problematic. O'Cathain and Thomas (2004: 7) warned against 'general open-ended questions' included to make the survey more interesting or allow participants to provide "any other comments". Other authors have cautioned that open-ended answers should not be equated with rigorous qualitative research and thus are suitable to publish as 'stand-alone findings' (LaDonna, Taylor & Lingard, 2018). Well-designed open-ended questions may explore participants' perspectives and allow them to elaborate on their thoughts and beliefs (Manfreda et al., 2003).

2.3.1 Sampling and estimated sample size

All 154 students registered for BDS in 2020, from the year of study (YOS) I to YOS V, were eligible to participate. These students constituted a purposive sample (Cohen, Manion &

Morrison, 2018) because they were best positioned to answer the survey questions, i.e., they had the most knowledge.

Epiinfo software was used to calculate an estimated sample size of 111, using a 5% margin of error and a confidence level of 95%.

2.3.2 Development of the questionnaire

The survey questionnaire was developed and administered through Research Electronic Data Capture (REDCap). The questionnaire (see Appendix D) was adapted from a 2017 survey of medical students' readiness for digital learning (Ingratta et al., 2022), which was based on two published studies (Farley et al., 2015; Dahlstrom et al., 2016). There were 25 closed- and open-ended questions. Students were asked demographic information and about their device ownership, internet, and data usage during ERL to provide insight into their digital competence. The questions relating to their experiences of online teaching and learning during ERL, before and after ERL would provide insight into their extent of self-directed learning, the types of learning activities their teachers were designing and which of these the students found most benefitted their learning. LaDonna et al. (2018: 5) point out that open-ended answers may help contribute to the "preliminary understanding" of a phenomenon.

The study was piloted on a group of final-year Oral Hygiene students registered in 2020. The survey was emailed to the students in September 2020, and the feedback from a pilot study was used to modify the questions.

2.3.3 Data collection

The survey was emailed to students in early October 2020 and remained open until 10 December 2020. The University Registrar permitted access to students' emails from the SOHS (see Appendix E). REDCap collected students' IP addresses to avoid duplicate submissions.

The first screen of the survey consisted of an information sheet. Students had to consent to participate in the study before continuing the survey.

2.3.4 Data analysis

The data were exported from REDCap to a password-protected Microsoft Excel spread sheet for cleaning. There were no duplicate entries. Five incomplete entries were removed from the dataset. The closed-ended questions were analysed using descriptive statistics and various tests of significance in IBM SPSS Statistics 27. Frequency and custom tables were used to analyse and present student demographics. The Kruskal-Wallis ANOVA test was used to compare students' device ownership and usage by YOS. The Mann-Whitney U test was used to compare students' device ownership and usage by gender. Associations were tested using chi-squared tests. Where expected counts were less than 5%, the Fisher's exact test result was reported. All tests were conducted at a significance level of $p \leq 0.05$. 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 and perceptions of online learning (Vaismoradi et al., 2013). For the content analysis, the students' responses were open-coded (Creswell & Poth, 2018) using a combination of inductive and deductive coding to develop an initial set of categories and subcategories. Coding involves "denoting concepts to stand for data" (Corbin and Strauss, 2015: 216). The subcategory counts were represented on bar charts, with their corresponding categories shown as chart legends.

LaDonna et al. (2018) contend that free-text responses must be robustly analysed in ways that do more than report counts. In this study, quotations were used to include participants' voices. Double quotation marks denote student quotations in the Results section to distinguish them from the categories and subcategories derived during the analysis. Single quotation marks and capital letters denote categories. Subcategories are shown only in single quotation marks.

All collected and analysed data and project documentation (informed consents and contracts) were stored on the researcher's secured hard drive in a locked room with regular backup to a secure cloud server. All datasets generated during and analysed the study and all data dictionaries with metadata will be deposited for access, preservation, data management and dissemination in a publicly available repository, and digital object identifiers will be generated. The data will be open for peer review and collaboration purposes.

2.3.5 Trustworthiness

Validity refers to the extent to which accurate conclusions can be drawn from the research project and the extent to which the conclusion can be generalised to other contexts (Heale & Twycross, 2015). The following steps were taken to improve the validity of this study. The questionnaire was face-validated by an experienced researcher to ensure that the questions were clearly worded and appropriately sequenced and grouped. The questionnaire was piloted prior to the commencement of the study to ensure that the questions were eliciting appropriate responses. The external validity or transferability of the study was improved by describing the context and setting to allow other researchers to decide whether the findings may apply to their situations.

Reliability is the degree to which a research method produces stable and consistent results (Heale & Twycross, 2015). Intercoder reliability was improved by an expert in qualitative research checking the coding of participant responses in an iterative process. We discussed the naming of codes and the development and naming of categories through several cycles until agreement was reached.

2.4. Conclusion

This chapter discussed the researcher's basic belief system or worldview regarding the philosophical assumptions that influenced the study. The chapter also discussed the study's general methods, including the questionnaire's development and administration and issues of validity and reliability.

CHAPTER 3: RESULTS

3.1. INTRODUCTION

This chapter outlines the study results from the students' demographics to their access to online materials and their experiences of emergency remote learning. The chapter concludes with the participants' preferred learning modality before and after ERL. All the results are represented on bar charts using inferential and descriptive data analysis.

3.2. RESPONSE RATE AND DEMOGRAPHICS

The response rate for the survey was 67.5% (99/154). Most of the respondents were Black (52.5%), female (73.7%), and 20-24 years old (69.7%) (see Table 1 on the next page). 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 broadly represented the population's race and gender, with a slight over-representation of females (73.7%) compared to the population (67.7%). Students from the Indian race group were under-represented in the sample (27.3% versus 35.4%), while Black students were over-represented (52.5% versus 46.2%). Compared to the population data, more respondents lived in campus residences while at university than off-campus, suggesting that some students had moved into campus residences after admission.

Table 1. Sample and population demographics

Variables	BDS 1 (n = 20)	BDS 1 (n = 36)	BDS2 (n = 11)	BDS2 (n = 37)	BDS3 (n = 29)	BDS3 (n = 32)	BDS4 (n = 22)	BDS4 (n = 22)	BDS5 (n = 17)	BDS5 (n = 31)	Sample (n = 99)	Population (N = 158)*
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 (946)	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 used to assist the South African government with redressing injustices perpetrated on previously disadvantaged population groups.

3.3. 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 across all years of study used tablets and desktops (see Figure 3.1). A Kruskal-Wallis one-way ANOVA comparing the mean scores for the device used during ERL by the YOS was not statistically significant, BDS 1 (*mean rank, 45.68*), BDS 2 (*mean rank, 54.51*), BDS 3 (*mean rank, 53.86*), BDS 4 (*mean rank, 45.20*), BDS V (*mean rank, 51.85*), H (corrected for ties) = 3.324, $df = 4$, $N = 99$, $p = 0.505$.

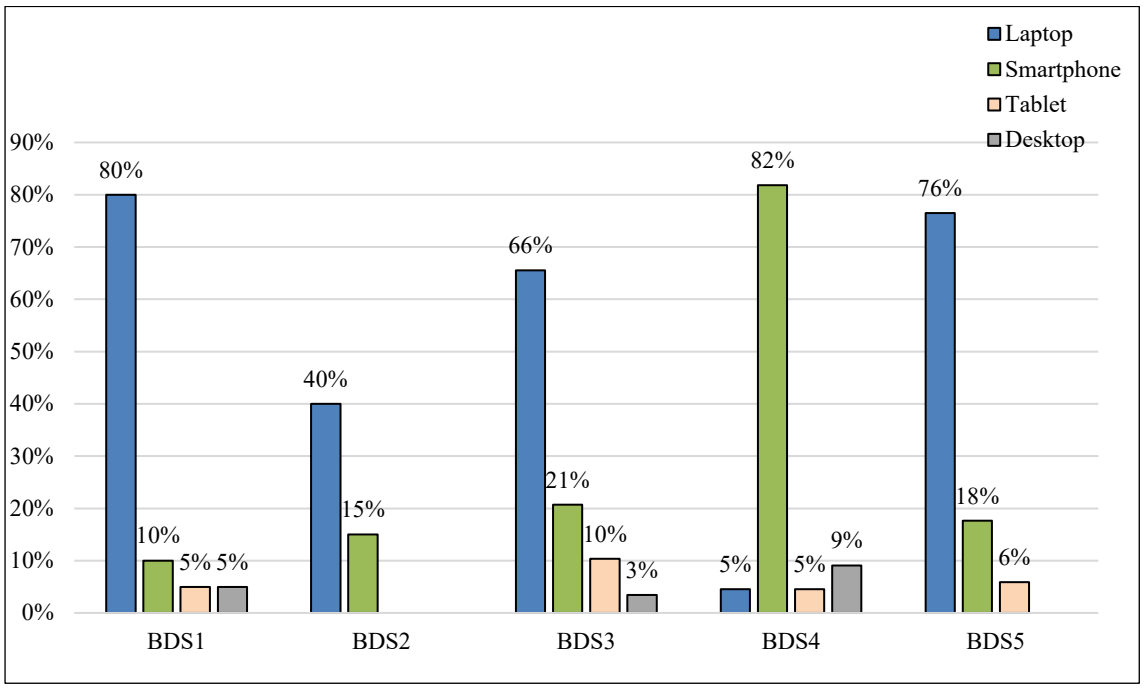


Figure 3.1. Type of device used by YOS ($n = 99$)

Figure 3.2 shows that 79% 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: BDS 1 (*mean rank, 55.55*), BDS 2 (*mean rank, 51.50*), BDS 3 (*mean rank, 45.14)*, BDS 4 (*mean rank, 47.00*), BDS 5 (*mean rank, 54.68), H* (corrected for ties) = 4.584, $df = 4$, $N = 99$, $p = 0.333$. There were also no statistically significant differences observed when respondents' monthly data usage was compared by YOS: BDS 1 (*mean rank, 48.98*), BDS 2 (*mean rank, 61.82*), BDS 3 (*mean rank, 49.76*), BDS 4 (*mean rank, 48.20*), BDS 5 (*mean rank, 46.29*), H (corrected for ties) = 3.316, $df = 4$, $N = 99$, $p = 0.506$. Respondents' usage of the university-supplied data by geographical

location during the period of ERL was not significant, χ^2 (1, N = 99) = 0.272, p < 0.756, suggesting that urban or rural location did not affect respondents' usage of the data provided by the University.

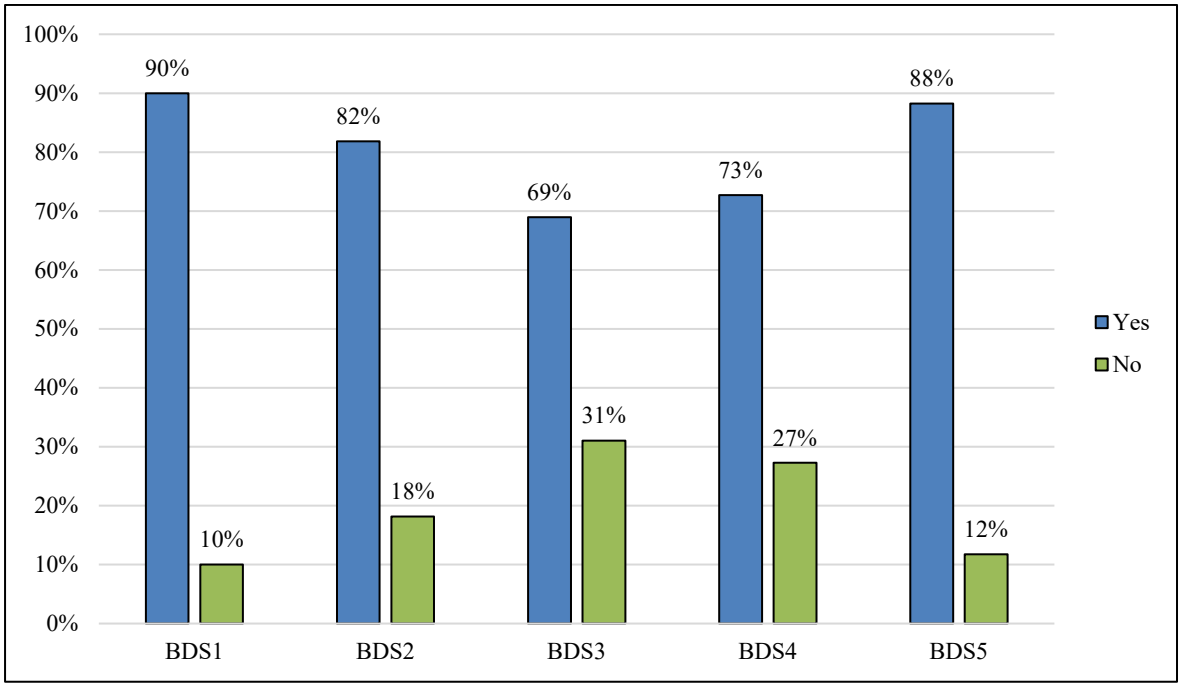


Figure 3.2. Usage of the 30GB of data provided by the University by YOS (n = 99)

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 for type of connection to the internet by YOS: BDS 1 (*mean rank, 53.63*), BDS 2 (*mean rank, 53.91*), BDS 3 (*mean rank, 50.36*), BDS 4 (*mean rank, 49.14*), BDS 5 (*mean rank, 43.71*), H (corrected for ties) = 1.632, df = 4, N = 99, p = 0.803. No statistically significant difference was observed between male participants (*mean rank = 50.71*) and female participants (*mean rank = 49.75*) on the type of internet connection, U = 930.5000, z = -.161 (corrected for ties) 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: urban (*mean rank = 46.39*) and rural (*mean rank = 66.25*), U = 436.500, z = -2.903 (corrected for ties), p = 0.004, two-tailed.

Most respondents 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 spent online. A Mann-Whitney U test comparing the mean scores for the number of hours spent online by gender was not statistically significant: females (*mean rank, 52.28*), males (*mean rank, 43.60*), U = 782.500. z = -1.379 (corrected for ties), 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 Vodacom's Night Owl offer, which extends between 24h00–05h00.

3.4. EXPERIENCES OF EMERGENCY REMOTE LEARNING

Figure 3.3 shows the six categories of responses when respondents were asked what they enjoyed about teaching and learning during ERL (n = 107). As previously stated, categories are denoted by single quotation marks and capital letters. Subcategories are shown only in single quotation marks.

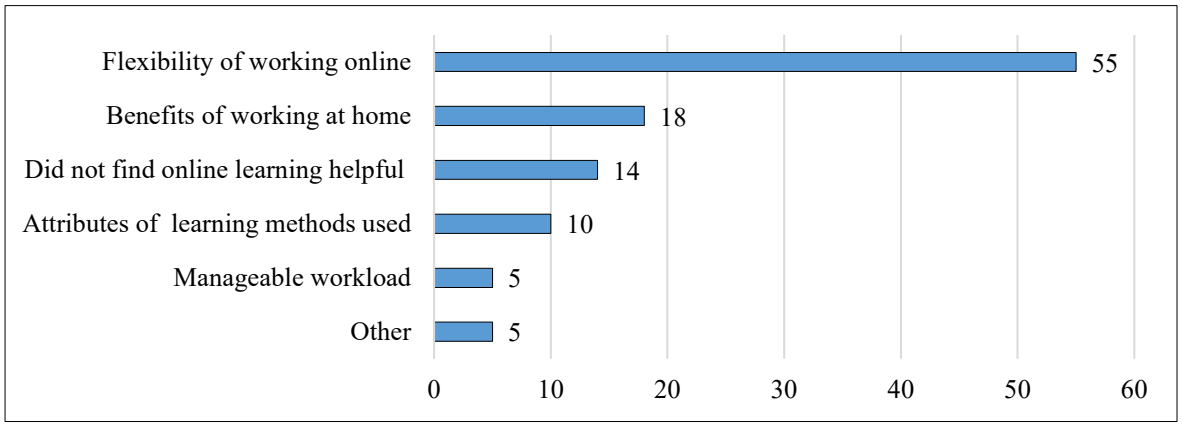


Figure 3.3. Respondents' reasons for enjoying online learning during ERL (n = 106)

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 online learning methods used' (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 allowed me to keep up with studying the content.

Some respondents 'Did not find online learning helpful' (n = 14) (see Figure 3.3).

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 the most beneficial online method by YOS: BDS 1 (*mean rank, 47.73*), BDS 2 (*mean rank, 64.82*), BDS 3 (*mean rank, 52.55*), BDS 4 (*mean rank, 48.41*), BDS 5 (*mean rank, 40.79*), H (corrected for ties) = 5.443, df = 4, N = 99, p = 0.245.

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)
Synchronous 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)

The respondents' preferred methods of teaching and learning during ERL, shown in Table 2, corresponded with the results in Figure 3.4, which depicts their reasons for preferring different online learning methods (n = 99). The categories of respondents' reasons for preferring specific methods are depicted in decreasing order in the legend for Figure 3.4. 'Tests and quizzes', the most preferred method in Table 2 (n = 30), was also the most preferred method in Figure 3.4 for several reasons, including they 'assessed knowledge and comprehension' (n = 20) and 'made learning efficient' (n = 4). 'Voice-over PowerPoint presentations' (n = 26) were the second-most preferred method because respondents could download the presentations and view them as needed (n = 16), and the 'narration promoted understanding of the content' (n = 9) (see Figure 3.4). 'Synchronous online meetings' (n = 16) (see Figure 3.4) were the next most preferred teaching method (as in Table 2) because they 'allowed interaction' with lecturers and peers (n = 11). Interestingly, one reason for preferring VoPPs and synchronous meetings was because they resembled traditional lectures

(n = 3, for both). 'Assignments' (n = 14) were mainly felt to have 'promoted engagement with the content' (n = 6), while 'Videos' were the least preferred method in both Table 2 and Figure 3.4. The 'Other' (n = 6) category comprised responses that did not answer the question.

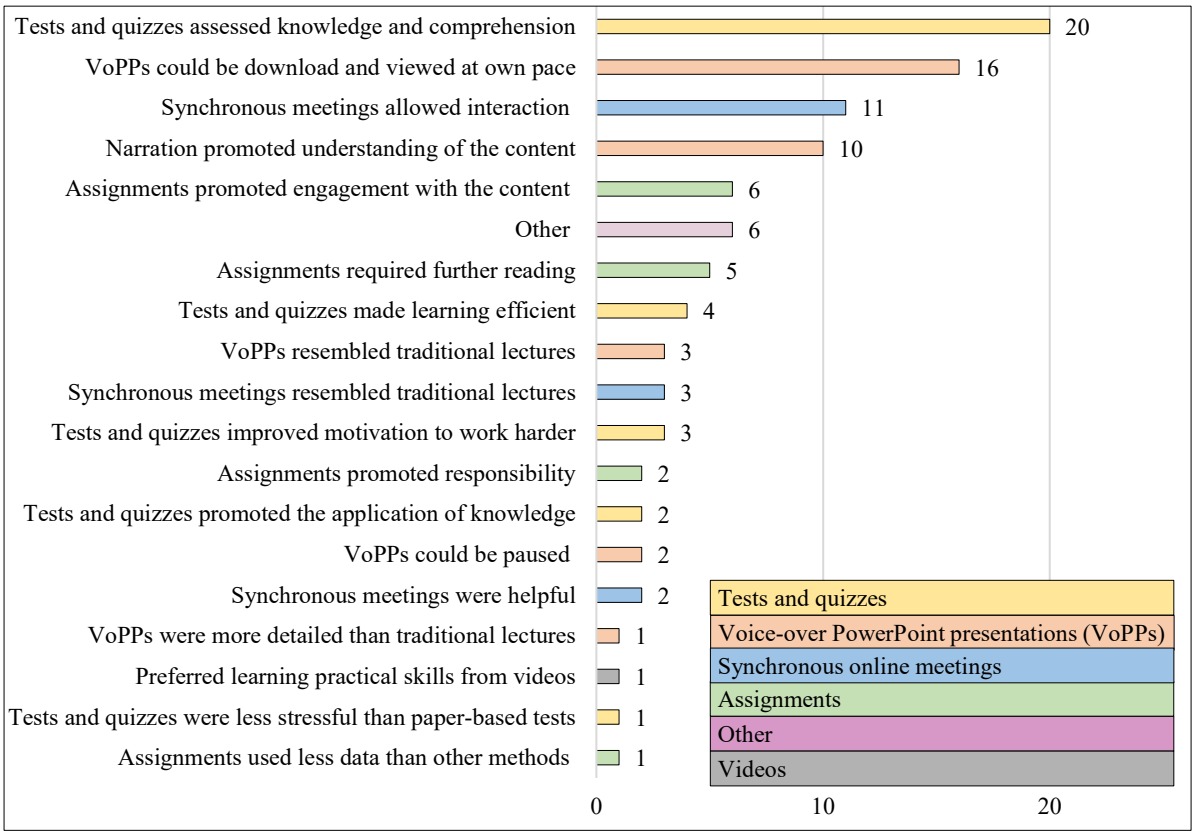


Figure 3.4. Reasons for preferring different methods of learning online (n = 99)

Figure 3.5 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). The subcategory, 'network and connectivity issues' (n = 61), was the major obstacle to accessing the online content, followed by 'insufficient data' (n = 7). One of the major 'Difficulties adjusting to learning at home' (n = 34) related to 'difficulties managing time' (n = 16), with one student referring to the "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 provided 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" (*n* =35) were the 'unrealistic workload' (*n* = 14), which one student described as "too much work, too little time," while another mentioned the "EXCESS WORKLOAD [sic]."

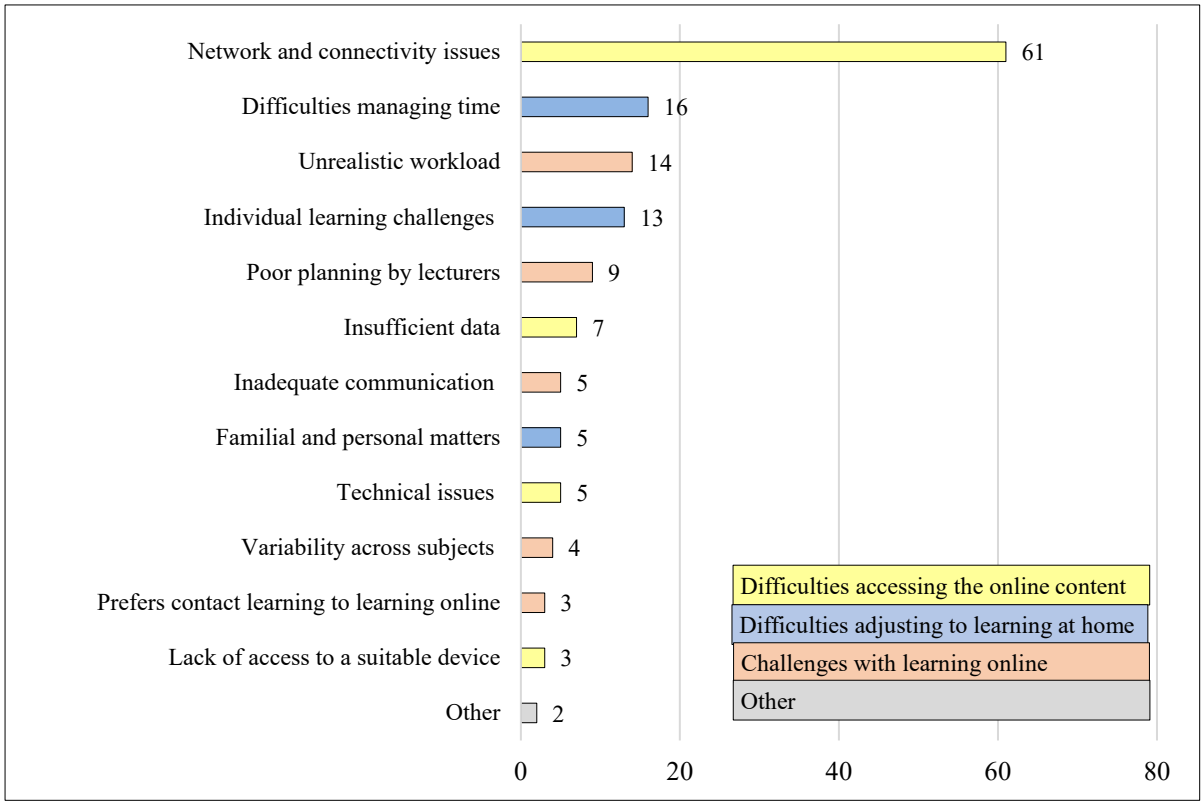


Figure 3.5 Online learning challenges during ERL (*n* = 147)

3.5. 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 3.6). 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 80.6% for '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 (2.5%) and after ERL (3.8%).

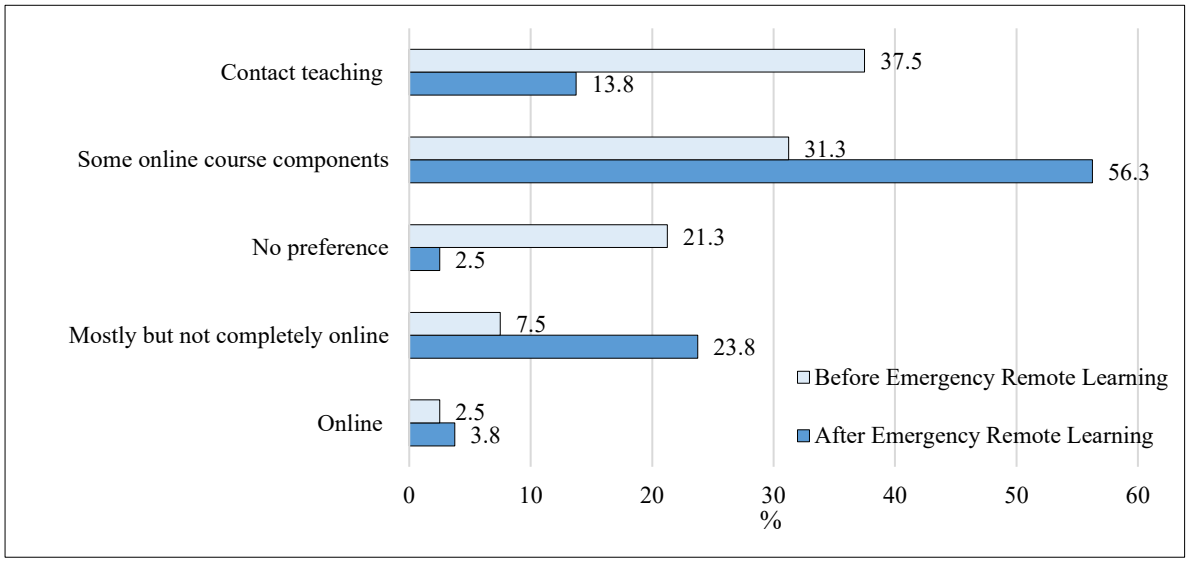


Figure 3.6 Preferred teaching modality before and after emergency remote learning (*n* = 80)

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 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 3.7. The main reason for preferring 'Online learning' (*n* = 48) was that it 'promotes effective learning' (*n* = 20), which was also the main reason (*n* = 12) given for preferring 'Contact learning' (*n* = 16). When 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).

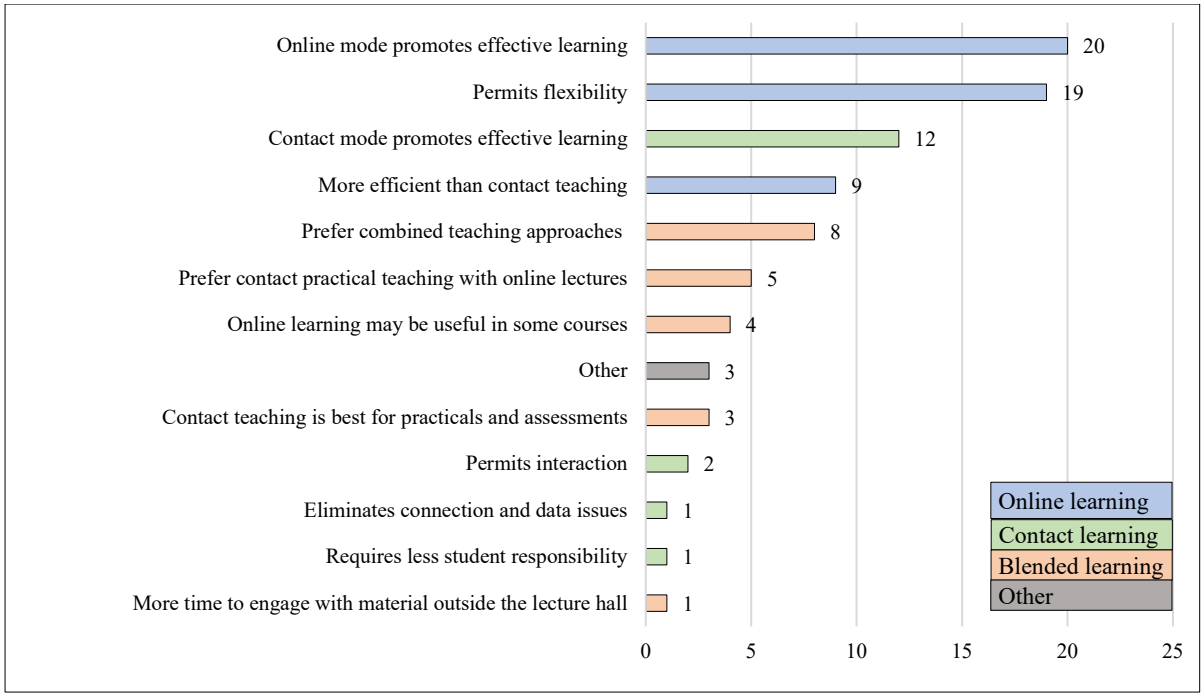


Figure 3.7 Reasons for learning modality preference after emergency remote learning (*n* = 88)

When asked what they needed to facilitate online learning in the future (see Figure 3.8), the biggest category, 'Better learning design' (*n* = 34), included needs relating to 'better workload planning' (*n* = 10). Concerning 'Better workload planning' (*n* = 10), 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 primary 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) were 'better internet connections' (*n* = 9) and the 'provision of suitable devices' (*n* = 3).

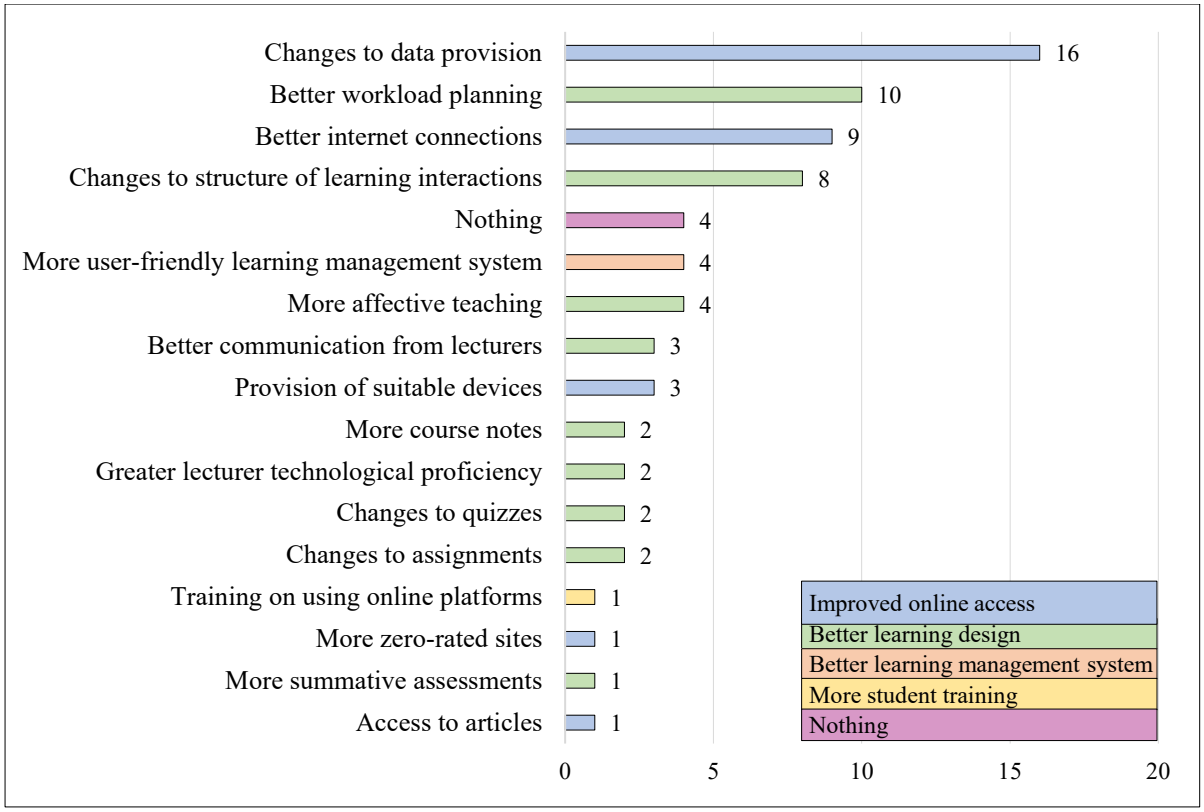


Figure 3.8 Needs to facilitate online learning in the future (n = 73)

3.6. CONCLUSION

This chapter outlined and discussed the study's open-ended and closed-ended results, as received from the participants. The students' demographics were provided, after which their access to online materials and their experiences of emergency remote learning were reported. The chapter concluded with the participants' preferred learning modality before and after ERL.

CHAPTER 4: DISCUSSION

This chapter discusses the study's results and compares the study's results to the literature. The chapter unpacks the major international changes in higher education, especially in medical and dental schools during ERL. Students' experiences of ERL and their preferred teaching modality are also discussed. The chapter concludes with recommendations to the SOHS from responses in the current study.

The period of ERL 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 ("The test tube: A symbolic story", 2018), 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, Bukumiric and Mladenovic (2021): more than 90% of the students in their study reported that the ready accessibility of online PowerPoint presentations allowed them to work at their own pace and further explore topics of interest. In their study integrating learning management systems into dental simulation clinics, Pani and Vieira (2021) 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 Vieira (2021) 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 (Kember & Leung, 2006).

Spalding et al. (2020), 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 before the pandemic (Hibbert et al., 2013; George et al., 2019) 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 (Moodley et al., 2022). However, the students in that study felt that fully online teaching could not adequately prepare them for clinical practice (Moodley et al., 2022). 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, Halpin and Saeed (2021); however, videos were the least preferred online learning method 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. However, videos may be less suitable for clinical learning than pre-clinical learning. The first phase of the social cognitive model of sequential skill acquisition involves the social learning experiences of observing demonstrations and imitating the modelled behaviour (Schunk, Schunk & Zimmerman, 1997; Zimmerman & Kitsantas, 2002). Video demonstrations may not foster social interactions to the same extent as clinical teaching.

The period of ERL 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.[10] Connectivity issues were a major challenge for the respondents in this study. The University of KwaZulu-Natal study by Moodley et al. (2022) 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 ("Government to give free data to every South African household", 2022), this has yet to be implemented, and the consistently high data prices in SA (Seeth, 2018; Bottomley, 2020) remain a contributing factor to unequal education. The country must emphasise the socio-economic discourse underpinning online learning to avoid perpetuating and possibly even widening the digital divide. 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. (2022), 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, making students 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. Notwithstanding the difficulties of working from home, respondents' difficulties managing their time and workload may be due to their inability to self-direct their learning. This phenomenon requires further exploration in our context beyond the preliminary insight provided by the content analysis.

Studies similar to the one reported in this paper are essential for guiding institutional decisions about implementing 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. Teachers also need to be made aware that more self-directed learning promotes self-efficacy and student autonomy, allowing students to take responsibility for their learning. 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 (Gonyea, 2005). 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.

4.1. RECOMMENDATIONS

The following recommendations are based on the findings from this study and another disaster that impacted clinical teaching and learning in the SOHS. A devastating fire broke out at Charlotte Maxeke Johannesburg Academic Hospital on 16 April 2021. The fire affected areas next to the Dental Clinic, which was still reeling from the impact of the pandemic, compromising teaching, especially in YOS three, four, and five. The SOHS suffered a considerable loss of academic time due to the absence of students and staff on the hospital premises for over three months, ultimately impacting patients. During the time SOHS taught on the extended teaching platforms, namely, clinics in outlying areas, properly planned and implemented blended learning could have augmented clinical teaching and learning but was not used optimally, suggesting that we were not using the lessons learned during the pandemic.

Based on my experiences during the pandemic and subsequently, I recommend the following to the University, in general, and the SOHS, in particular:

- Promoting a blended learning approach means all staff and students must be equipped to conduct such learning. Blended learning should not be an approach adopted only during emergencies. Not all courses or all topics within a course lend themselves to having online components, so it is vital for staff to know which aspects can be taught online.

- Teachers must have adequate faculty development to ensure they are digitally competent to design and develop effective blended-learning interactions for their disciplines.
- All teaching and learning spaces, including those on extended teaching platforms, must have reliable and fast-speed internet connectivity to facilitate blended learning.
- Students, especially those from disadvantaged backgrounds, must be provided with data during emergencies and disasters to allow learning to continue. Although I have used the example of the hospital fire, there are other examples of times when such contingency plans are essential, for example, during student protests.

4.2. CONCLUDING REMARKS

This chapter positioned the results of the study relevant to the literature. Following all the information gathered from this study and other studies, the chapter concludes with recommendations to Wits University and the SOHS, drawn from experiences during and after the pandemic, to optimise the use of blended learning, especially for clinical teaching.

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APPENDICES

APPENDIX A1: ORIGINAL ETHICS CLEARANCE CERTIFICATE (2019)

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Dr K Mbambo

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M191154

NAME: (Principal Investigator)	Dr K Mbambo
DEPARTMENT:	Faculty of Health Sciences Centre for Health Science Education Medical School University
PROJECT TITLE:	Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the COVID-19 pandemic
DATE CONSIDERED:	2019/11/29
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr A George
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/09/09

This clearance certificate is valid for 5 years from the date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and will therefore reports and re-certification will be due early in the month of **November** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

APPENDIX A2: ETHICS LETTER ACCEPTING MODIFICATIONS (2020)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

TO: Dr K Mbambo
Faculty of Health Sciences
Centre for Health Science Education
Medical School
University

E-mail: koketso.tshite@wits.ac.za

CC: Supervisor: Dr A George <Ann.George@wits.ac.za>
and <HREC-Medical.ResearchOffice@wits.ac.za>

FROM: Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2020/09/09

REF: *R14/49*

PROTOCOL NO: **M191154** *(This is your ethics application study reference number. Please quote this reference number in all correspondence relating to this study)*

PROJECT TITLE: *Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the COVID-19 pandemic*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to the Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

APPENDIX B: POSTER

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

Koketso Tshite[1], Ann George[2]
[1]School of Oral Health Sciences, [2]Centre for Health Science Education

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

INTRODUCTION

The COVID-19 pandemic presented unprecedented challenges that could provide opportunities to improve dental education.(1-3) Blended learning is one of the preferred methods of integrating online learning in the health professions.(4) However, the rapid transition to emergency remote learning (ERL) during the COVID-19 pandemic suggested limited usage of online learning in the School of Oral Health Sciences at the University of the Witwatersrand.

Given the challenges faced during ERL and the dearth of information about South African (SA) dental students' experiences, it is essential to determine what lessons can be learned to enhance dental education. The aim of this study was to explore students' experiences of online learning during SA's first wave of the pandemic and their needs for future teaching.

METHODS

- A cross-sectional descriptive online survey was administered in October 2020 to Bachelor of Dentistry students (n=154).
- The survey included 25 questions about students' experiences of online teaching and learning before and during ERL and their perceived teaching and learning needs beyond ERL.
- The closed-ended questions were analysed using descriptive statistics and tests of significance in IBM SPSS 27.
- The open-ended answers were analysed in Microsoft Excel using content analysis to derive counts of categories.

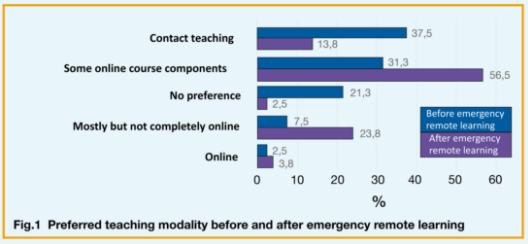


Fig.1 Preferred teaching modality before and after emergency remote learning

RESULTS

- The response rate for the survey was 67.5% (99/154).

Before ERL

- respondents preferred contact teaching (37.5%) and courses with some online components (31.3%) (see Fig. 1)
- 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) (see Fig. 2)

After ERL

- 63.3% fewer respondents preferred contact teaching (see Fig. 1)
- more preferred mostly online (percentage increase of 216.7%) and some online components (percentage increase of 80.6%) (see Fig. 1)
- the number with no preferred modality decreased by 88.2%, while fully online courses remained the least preferred modality (see Fig. 1)

Beyond ERL

- Respondents' reasons for preferring specific learning modalities (see Fig. 2) highlighted the strengths and weaknesses of online (n = 48), contact (16), and blended (n = 21) learning.
- The main reasons for supporting online learning were 'promotes effective learning' (n = 20/48), 'permits flexibility' (n = 19/48) and that it was 'more efficient than contact teaching' (n = 9/48) (see Fig. 2)

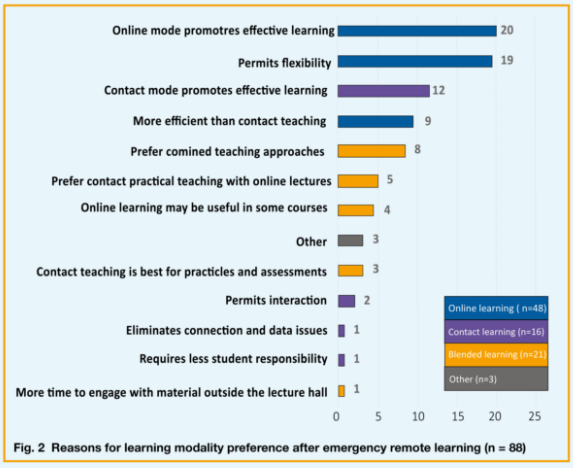


Fig. 2 Reasons for learning modality preference after emergency remote learning (n = 88)

- Contact learning was also thought to promote effective learning (n = 12/16) (see Fig. 2)
- Respondents' reasons for wanting blended learning were that they preferred combined teaching approaches (n = 8/21), with some specifying the combination of 'contact practical teaching with online lectures' (n = 5)

CONCLUSION

The exposure to online learning appears to have shifted students' preferred learning modality towards a combination of contact and online learning. More blended learning has implications for the integration of online learning into the dental curriculum, including the need to support teachers with designing effective blended learning interactions.

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APPENDIX C: PUBLISHED ARTICLE

http://dx.doi.org/10.17159/2519-0105/2022/v77no9a3
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Dental students' experiences of remote emergency online learning at the University of the Witwatersrand during the COVID-19 pandemic

SADJ October 2022, Vol. 77 No. 9 pxxx - pxxx

K Tshite[1], A Z George[2]

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.[1–3] 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;[4] 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.[3] 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.[5]

South Africa (SA), although classified by the World Bank as an upper-middle-income country,[6] is the most unequal country in the world,[7] 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,[9] within the context of dental education during the pandemic, it is necessary to learn from shared

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Author contributions:
1. Koketso Tshite: 50%
2. Ann Z George: 50%

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.[8] 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.[3,10] 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[11] definition of combining face-to-face and online teaching, is the preferred method of integrating online learning in the health professions.[12] However, Garrison and Kanuka's[13] 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.[14]

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.[14–16] The constructivist principles that underpin meaningful learning require students to engage with concepts in ways that promote the construction of knowledge.[17] 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."[18] Online learning is not inherently constructivist.[19] Rather, educators must design online learning interactions that facilitate knowledge construction,[20] which requires adequate technological and pedagogical knowledge.[21] Clinical skills videos demonstrating technical skills as examples of best practices,[22,23] 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.[24] These inequalities became more visible during the pandemic when students were required to work from home, drawing attention to rural/urban differences.[10] 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.[25] 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.[24]

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[26] 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.[27] 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,[28] which had been based on the published studies of Farley et al[29] and Dahlstrom et al.[30] The Ingratta et al 2017 survey[28] 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.[31] 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. [27] 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 (946)	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.[32] 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.[27]

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

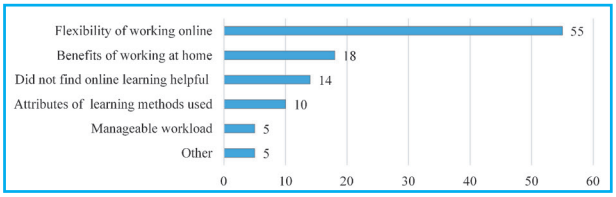


Figure 1. Reasons for use of substances / perceived benefits n=206

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)

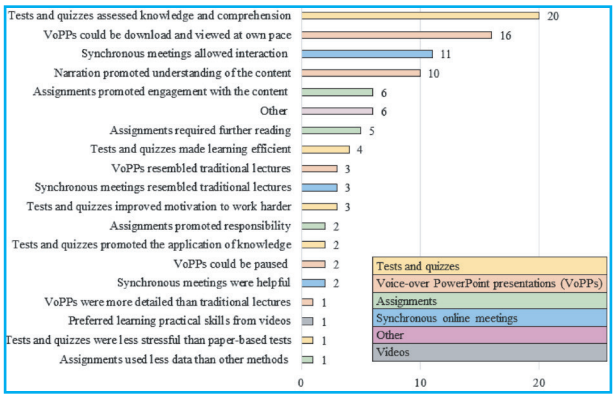


Figure 2. Reasons for preferring different methods of learning online (n = 99)

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

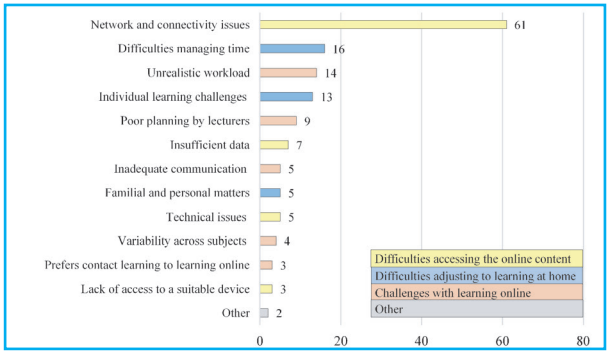


Figure 3. Online learning challenges during ERL (n = 147)

one student referring to the "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.

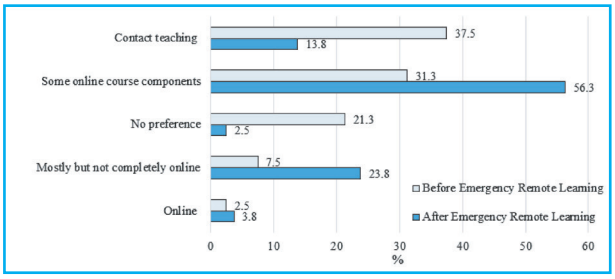


Figure 4. Preferred teaching modality before and after emergency remote learning (n = 80)

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

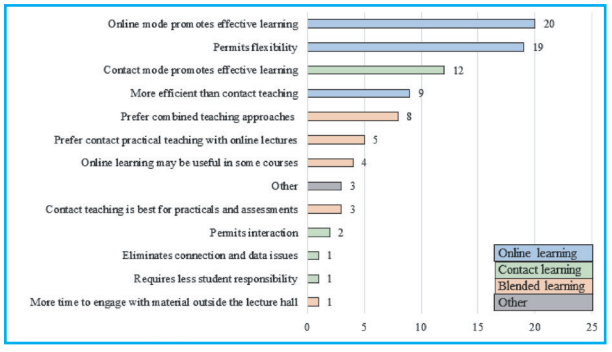


Figure 5. Reasons for learning modality preference after emergency remote learning (n=88)

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).

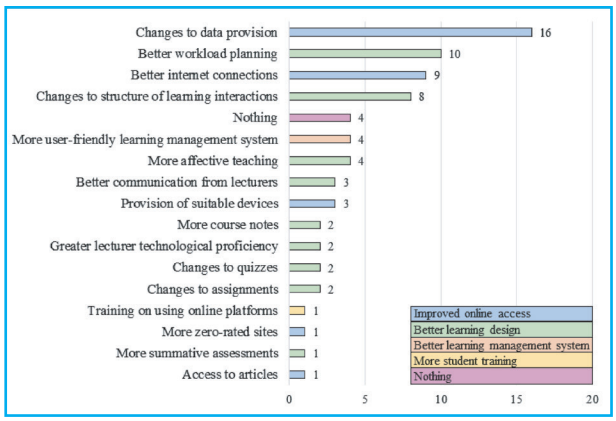


Figure 6. Needs to facilitate online learning in the future (n = 73)

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,[33] 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;[34] 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[35] 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[35] 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.[36]

Spalding et al,[37] 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[22,23] 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.[8] However, the students in this study felt that fully online teaching could not adequately prepare them for clinical practice.[8] 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.38 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.[10] Connectivity issues were a major challenge for the respondents in this study. The University of KwaZulu-Natal study by Moodley et al[8] 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,[39] this has yet to be implemented, and the consistently high data prices in SA40,[41] 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,8 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.[42] 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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APPENDIX D: SURVEY QUESTIONNAIRE

Page 1

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

PARTICIPANT INFORMATION SHEET

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

Good day! My name is Dr Koketso Mbambo and I am enrolled as a Masters student at the University of the Witwatersrand. I am a lecturer and clinician who teaches dentistry to students. I am asking you to participate in this study by completing the survey.

What the study is about:

I am investigating your online learning experiences during the remote online teaching and learning.

Why you are being invited to participate in the study:

I would like to explore how dental students at the School of Oral Health Sciences used their digital devices during the period of remote online teaching and learning. This will enable me to compare the usage of digital devices across the different years and across different subjects.

What it will mean if you participate in the study:

This information will help better inform educators, faculty and information technology (IT) staff about how best to facilitate online learning in the School of Oral Health Sciences.

Risks if you participate in the study:

There are no risks to you from participating in the study.

Potential benefits if you participate in the study:

There will be no direct benefits to you for participating in the study.

Additional information about your potential participation in the study:
Your participation in the study is voluntary, and you will not be penalised if you choose not to participate. Your name will not be recorded, so you cannot be identified. You are free to withdraw from the study at any stage and you will not be penalised for this. There are no right or wrong answers. The survey will take about 20 minutes to complete. You
can save and complete the survey at your leisure. Please remember to write down the return code should you decide to complete it at a later stage. Should you want feedback on the results of the study, please let me know.
If you have any questions about the study, please contact me:
Dr. Koketso Mbambo
Email: koketso.mbambo@wits.ac.za
Tel: (011) 488 4853
If you need to report any problems with or complaints about the study, please contact the ethics department of the
University of the Witwatersrand. The HREC (Medical) contact details are as follows:
Chairperson: clement.penny@wits.ac.za
Administrators: Ms. Zanele Ndlovu/ Mr. Rhulani Mkansi
Tel: 011 717 2700/2656/1234/1252
Email. hrec-medical.researchoffice@wits.ac.za
Thank you!
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Confidential
Page 2
Section 1: Information and consent
I agree to participate in this study
Yes
No
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Page 3
Section 2: Student Demographics

2.1. Age

Less than or equal to 19 years

20-24 years

25-29 years

Greater than or equal to 30 years

2.2. Gender

Male

Female

Other

2.2.a Please state your gender

_____

2.3. Race

Black

White

Asian/Indian

Coloured

Prefer not to say

Other

2.3.a. If you selected ‘other’, please state your race

_____

2.4. What was your geographical location during the lockdown period?

Urban

Rural

2.5. Accommodation when you are at varsity

Campus residence

Off -campus accommodation

Other

2.5.a. Please specify your type of accommodation

_____

2.6. Year of Study

BDS I

BDS II

BDS III

BDS IV

BDS V

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Page 4

Section 3: Device ownership

3.1. What is the main device you used during the period of emergency remote learning (ERL)?

Desktop

Laptop

Tablet

Smartphone

3.2. If the main device was a laptop, was it supplied by the university?

Yes

No

3.3. Which other internet-capable devices did you use during the period of ERL? Please specify the devices

Desktop

Laptop

Tablet

Smartphone

None

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Page 5

Section 4: internet and data usage during the period of ERL

4.1. Who is your internet service provider?

Cell C

MTN

Vodacom

Telkom

Other

4.1.a. If you selected other, please specify your internet service provider

_____

4.2. How were you connecting to the internet during the period of ERL?

WI-FI connection at home.

University- supplied data only.

Own data only.

University -supplied data supplemented with own data.

Other

4.2.a. If you selected other, please state how you connected to the internet during the period of ERL

_____

4.3. Did you use the 30GB of data provided by the university?

Yes

No

4.3.a. How long did the 30GB of data last you?

Less than one week

One week

Two weeks

Three weeks

Four weeks

More than four weeks

4.4. How much data do you estimate you used monthly during the period of ERL?

Nil

1-259 MB (megabytes)

260-500 MB

501-1 GB (gigabytes)

>1 GB

Don’t know

4.5. During the period of ERL, when were you mostly accessing the internet for your academic work? You may select

more than one option.

6:00am-12:59pm

13:00pm-18:59pm

19:00pm-1:59am

2:00am-5:59am

08-03-2021 09:06 projectredcap.org

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Section 5: Experiences of online teaching and learning during the period of ERL

5.1. How much time on average did you spend online, daily, doing academic work during the period of ERL?

Less than 3 hours

3-4 hours

5-6 hours

7-8 hours

More than 8 hours

5.2. Which type of online ERL did you find most useful?

Forums

Assignments

Tests and quizzes

Power point presentations with voice over

Videos

Online meetings

Chatroom

Other

5.2.a. Please specify any other type

_____

5.3. Please explain your answer to question 5.2 or 5.2.a.

5.4. Which type of online ERL did you find least useful?

Forums

Assignments

Tests and quizzes

Power point presentations with voice over

Videos

Online meetings

Chatroom

Other

5.4.a. Please specify any other type

_____

5.5. Please explain your answer to question 5.4 or 5.4.a

5.6. What, if anything, did you enjoy about the online teaching and learning during the period of ERL?
5.7. Describe any challenges you encountered regarding the online teaching and learning during the period of ERL
08-03-2021 09:06 projectredcap.org

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Section 6: Experiences of online teaching and learning before and after ERL
6.1. Before the period of ERL, what type of teaching approach best facilitated your learning?
One with no online course components
One with some online course components
One that is mostly but not completely online
One that is completely online
No preference
6.1.a. Please explain your answer in 6.1.
6.2. In a typical month, before lock down, approximately how much mobile data did you purchase to connect to the
internet for academic reasons?
Nil
1-259 MB (megabytes)
260-500 MB
501-1 GB (gigabytes)
>1 GB
Don’t know
6.3. What type of teaching would best facilitate your learning in the future, beyond the pandemic?
One with no online course components
One with some online course components
One that is mostly but not completely online
One that is completely online
No preference
6.3.a. Please explain your answer in 6.2
6.4. What would you need for online learning to better facilitate your learning in the future?

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Section 7: Close

Thank you for your participation!

Kindly leave any comments in the text box.

_____

APPENDIX E: University Registrar permission letter

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

31 October 2019

Koketso Mbambo
Staff number A0035683
Master's in Health Science Education
School of Oral Health Sciences

TO WHOM IT MAY CONCERN

"Digital literacy of dental students (2020) at the University of the Witwatersrand"

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

No research can commence before ethical clearance has been obtained. Kindly forward a copy of the clearance certificate to this office.

Nicoleen Potgieter
University Deputy Registrar

Private Bag 3, Wits, 2050, South Africa | **T** +27 11 717 1204/8 | **F** +27 86 553 2271 | www.wits.ac.za

APPENDIX F: ASSESSORS' APPROVAL LETTER FOR MODIFIED STUDY

From: Gavin Owen
To: Ann George; Loredana Bocchino; Aimee Stewart
Subject: Re: Modifications to Masters Proposal_Koketso Mbambo
Date: 13 August 2020 02:16:48 PM
Attachments: image001.png
image005.png
image007.png

Dear Ann,
The changes are very suitable - well done to you and Koketso for adapting to the current environment.
Best with the study,
Gavin

Dr Gavin Owen
PhD, PGDipEd(HE)

Lecturer
HIV Pathogenesis Research Unit
Department of Molecular Medicine and Haematology
University of the Witwatersrand, Medical School, Room 7Q12
7 York Road, Parktown, 2193
Gavin.Owen@wits.ac.za | +27 11 717 2165

From: Ann George <Ann.George@wits.ac.za>
Sent: 13 August 2020 14:06

From: Aimee Stewart
To: Ann George; Loredana Bocchino; Gavin Owen
Subject: Re: Modifications to Masters Proposal_Koketso Mbambo
Date: 13 August 2020 12:40:36 PM
Attachments: image005.png

Hi Ann hope you are well. I am happy to accept these changes. it has really been difficult for all our PG students to collect data. Please will she remove the words "complete form honestly". One has to assume potential participants will be honest and the REC will have a problem with this wording. Best wishes Aimee

Prof Aimee Stewart
Associate Professor
Department of Physiotherapy
School of Therapeutic Sciences
Faculty of Health Sciences
University of the Witwatersrand
+27117173702 (Phone)
+27117173719 (Fax)

From: Loredana Bocchino
To: Aimee Stewart; Ann George; Gavin Owen
Subject: RE: Modifications to Masters Proposal_Koketso Mbambo
Date: 13 August 2020 02:03:51 PM
Attachments: image002.png
image006.png
image007.png

Dear Anne

Also happy to accept, wishing Dr Mbambo all the best.

Kimd regards,

Dr Lori Bocchino
GEMP 3&4 Coordinator

T +27 11 717 2437
E loredana.bocchino@wits.ac.za
W www.wits.ac.za
Faculty of Health Sciences
3rd Floor, Room 3P18
7 York Road, Parktown, 2193

WITS UNIVERSITY

UUME
Unit for Undergraduate Medical Education

APPENDIX G: PLAGIARISM/TURNITIN COVER PAGE

From: Dr Ann George
Senior Lecturer: Curriculum and Faculty Development
Centre for Health Science Education
Ann.George@wits.ac.za

31 March 2023

Masters in Health Science Education: Koketso Tshite 870703:
Explanation for Similarity Score of 32%

This letter serves to confirm that Dr Tshite's similarity score of 32% for her MHSE research report (see the match overview on the next page) derives from matches with our October 2022 publication (see Appendix C) in the South African Dental Journal, which is the official journal of the South African Dental Association (www.sada.co.za).

Our publication is based on the work described in this report, so the matches were unavoidable without extensive self-citation, especially in the Methods and Results sections.

Yours faithfully

Ann George

Ann George