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Optometry students' experience of online learning during the COVID-19 pandemic

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Optometry education, like other health professions, has historically been conducted via contact teaching and learning in classrooms, clinics and laboratories. In 2020, COVID-19 imposed an abrupt move to online learning for higher education institutions. This was performed with little insight into the feasibility and readiness for its adoption within certain contexts, as well as the potential impact on learning. This qualitative descriptive project purposively recruited a representative sample of 30 optometry students from a South African university to explore their experiences of online learning during the COVID-19 pandemic. Data were collected using focus group interviews. The data were audio-recorded, transcribed and analysed thematically. Four themes emerged from the research, namely; learning how to learn online, need for social support, technology dependent, and authentic learning. The key challenges observed were difficulty in transitioning to online learning, independent learning, and not having reliable access to internet connectivity. Gaps in clinical skills resulting from restricted access to contact training and real-world clinical exposure negatively impacted competency development.

Contribution: Pandemic disruptions to routine academic programme activities within higher education institutions have the potential to negatively impact the learning experience for students where institutions and/or students may be unprepared or under-resourced to support such a shift. The results of this study further suggest that exposure to real-world clinical contexts for optometry students should be enabled even under pandemic conditions to promote the development of clinical competencies needed for effective healthcare delivery. Finally, remote online assessments must be designed to support authentic learning so as not to compromise exit-level outcomes, skills and competencies.

Keywords: optometry; online learning; clinical education; technology-based learning; competencies; pandemic responsiveness; online assessments; South Africa.

Introduction

For most health professions training programmes, teaching and learning have historically been conducted via contact teaching methods (Zalat, Hamed & Bolbol 2021). This is because training in clinical procedures is fundamental to competency development for health professionals (Green, Edwards & Tower 2022). However, the global outbreak of COVID-19 in 2020 imposed significant changes to the way society operated; forcing educational programmes around the world to abruptly move to virtual modes of course delivery using online approaches (Nortvig et al. 2020). Online learning, which does not take place in a physical classroom with fellow students or a teacher present, has become more prevalent in institutions of higher learning in recent times (Koksal 2020). Yet, for most health professions programmes, it has not been fully embraced given the need for face-to-face clinical skills training. The continued reliance on face-to-face clinical skills training is underpinned by the need for clinical skills and competency development (Costello et al. 2014).

Optometrists are considered the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care. This includes refraction and dispensing of eyeglasses and other optical corrective devices, detection or diagnosis and management of diseases of the eye, and the rehabilitation of conditions of the visual system (World Council of Optometry n.d.). Consequently, practical (skills-based) and clinical (competencies) training are central to the training of optometrists. However, in the contact-restricted COVID-19 context, practical training sessions at institutions of higher learning were largely suspended, with efforts to achieve some of the required learning outcomes using online approaches. At the University of KwaZulu-Natal in South Africa, teaching and learning swiftly moved to virtual modalities for all

programmes after the university adopted an Emergency Remote Online Learning strategy in response to the COVID-19 pandemic in March 2020. For clinical programmes, efforts were made to achieve some of the learning outcomes using video-based instruction and assessment methods, as well as simulation software, where available. In the context of optometry training, clinical skills imply contact with patients within a healthcare setting, which is preceded by practical training in labs aimed at technical skills development for application in the clinical assessment and management of patients.

Making the shift from contact learning to online learning is challenging; potentially impacting the attitudes of students towards the learning project itself (Kreijns, Kirschner & Jochems 2003). This study was undertaken to better understand the online learning experiences of optometry students during COVID-19 as well as the impact of this method of learning on clinical competence. Furthermore, the study sought to explore how external factors relevant to the South African context impacted the online learning experiences of optometry students. Research shows that teaching and learning are influenced by more than teaching methods alone (Azulay Chertok, Barnes & Gilleland 2014). The constructivist approach to learning emphasises an environment in which learning is community-centred; that is, it recognises the importance of social construction of knowledge and connectedness as part of the learning experience (Swan 2005). This is relevant to the COVID-19 pandemic experience, which restricted the movement of persons, effectively removing the social community synonymous with contact learning at universities.

Online learning also demands self-efficacy, which impacts student satisfaction in the online environment (Alqurashi 2016). Lentell (2014) suggested that online learning approaches need to meet user requirements to gain students' trust and improve their acceptance of this type of learning. Even in a traditional contact learning environment, students' self-efficacy was found to impact the learning and academic performance of medical students (Hayat et al. 2020). In South Africa, university students are often faced with data connectivity issues that may directly affect their engagement during online learning activities (Hawthorne et al. 2009). Previous research has highlighted the challenge of tools for effective online learning, which are often absent in developing countries (Frehywot et al. 2013). The negative impact of factors such as inconsistent electricity availability and data instability on teaching and learning schedules, even under non-pandemic conditions, has been acknowledged (Capone, De Caterina & Mazza 2017).

Given the growing interest within the field of educational research on factors that affect learning outcomes and student satisfaction in online or blended learning in higher education, this research into South African optometry students' experiences when engaging in online learning under pandemic restrictions was deemed necessary for future planning.

Methods

A qualitative exploratory case study design was used to investigate the phenomena of interest. This design was chosen as qualitative research approaches aim to understand the lived experiences of participants (Neubauer, Witkop & Varpio 2019). The study population included optometry students registered in the 2021 academic year at an institution in South Africa (institution name omitted to maintain integrity of the review process). Students were contacted via email and invited to participate in the study following a process of oral informed consent. A total representative sample of 30 students aged between 18 and 22 years was recruited for the study.

Data were collected by means of four focus group interviews, one for each year of study. The focus group interviews were administered via Zoom, with a maximum of eight students represented per year level. Students were engaged on their online learning experiences during COVID-19. Key lines of questioning included transitioning to online learning, factors that impacted the overall learning experience and impact of remote learning on clinical competence. Interviews were audio recorded and manually transcribed. Confidentiality was maintained by allocating codes to each participant at the beginning of the focus group to ensure data anonymity. The interviews were carried out by the researchers who had undergone prior coaching on how to conduct focus group sessions. Content analysis, as described by Erlingsson and Brysiewicz (2017), was used to draw out meaning units related to the key research questions on online learning experiences. Data were analysed using inductive reasoning (Creswell 2018) and reported descriptively using themes and subthemes, following a process of member checking.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of KwaZulu-Natal Humanities and Social Sciences Research Ethics Committee (HSSREC) (No. HSSREC/00002961/2021).

Results

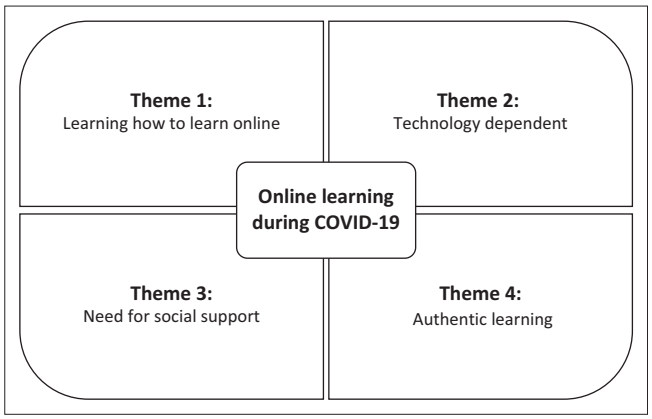
Thirty optometry students aged between 18 and 22 years old who ranged from the 1st to the 4th year in the programme (Levels 1, 2, 3 and 4, respectively) participated in the research, with four main themes emerging from the results (Figure 1).

Theme 1: Learning how to learn online

Theme 1 reflects the participants' experiences of the abrupt transitioning to online learning. The theme encompasses two subthemes, namely 'A new way of learning' and 'If it's to be, it's up to me'.

Subtheme 1.1: A new way of learning

Most participants reported that the COVID-19-imposed move to online learning was their first exposure to online



COVID-19, coronavirus disease 2019.

FIGURE 1: Emerging themes.

learning. This resulted in the need for a swift adaptation to this new way of learning:

> 'It took a little bit of getting used to at first. I think we realized that there was no one to check up on us we were responsible obviously for ourselves' (Participant 8, Level 2, male)

The adjustment was greater for participants in their first year of study as most had never been exposed to online learning before, with Participant 7 expressing the following:

> 'It was a quite big jump ... a very big jump from high school; and then the switch to online learning. It was very different, but eventually I was able to adjust.' (Participant 7, Level 1, female)

This rapid adjustment to online learning left some participants feeling overwhelmed and pressured. Many participants reported feeling increased pressure and anxiety as a result:

> 'I felt intimidated by the sudden move to online learning, like from classroom to online; but I guess it was just something we had to adapt to. I thought I couldn't do it, but as time went on, it was easy to adapt to.' (Participant 3, Level 1, female)

Participants' acceptance and preference levels for the new online learning approach differed. Some participants felt that on-campus, contact learning allowed for a more productive, academically orientated environment, while others preferred to learn within the comfort of their own homes:

> 'I feel the most challenging part of online learning was definitely being in a different environment that didn't facilitate learning. If you were at campus in a live lecture you will be fully invested and the knowledge that you receive is much greater than compared to when you are at home with other distractions.' (Participant 23, Level 4, female)

> 'I personally think that it was better for me because I don't like getting up early and going to campus every day, so you know it was better because you could be in the comfort of your own home and do the zoom lectures and the lessons at your own time and pace.' (Participant 11, Level 2, female)

Although some preferred learning from home, most participants reported an increase in distractions and interference within the home learning environment:

> 'They [*family members*] just think you're at home and accessible, sending you around doing things for them, and you don't get enough time to do your work because you are supposed to be respecting them ...' (Participant 25, Level 4, female)

Subtheme 1.2: If it's to be, it's up to me!

Subtheme 2 relates to the participants' experiences of taking responsibility for their learning. While certain participants were able to easily adapt to the shift, others encountered various challenges relating to self-directed learning. The principle of taking responsibility for one's learning, core to the general principle of online learning, was evident in the responses of the participant:

> 'I think we realised that there was no one to check up on us. We were responsible obviously for ourselves and then that knowledge.' (Participant 9, Level 2, female)

Taking responsibility for one's learning was a new concept for most participants, as was learning independently. This was evident in all the years of study:

> 'In school we always had a timetable where from a certain time you have a certain lesson and stuff like that and it was normally easier to attend lessons because you were in school and you had to go. For now, it was like just planning your day, making sure that you attend all your lectures and do what you need to do for that day.' (Participant 1, Level 1, female)

> 'Now I have to study whether I attend Zoom class, it's all up to me. It became a huge learning milestone because you know from high school you always had teachers making a register so you have to be there ... I have learned to discipline myself. Nobody is going to be coming after you.' (Participant 19, Level 3, male)

> 'Before we had to have lectures all the time; we had to come to class, learn, listen to the lecture ... now ... I just had to learn to do things on my own.' (Participant 16, Level 3, male)

Theme 2: Technology dependent

This theme highlights the participants' experiences relating to the demands of online learning, as well as their need for connectedness. It was evident that online learning placed a greater workload demand on the participants than face-to-face lectures:

> 'During contact lectures, we don't get flooded this much ...' (Participant 22, Level 3, female)

Participants reported facing pressure from lecturers who expected them to do a lot of work in a short period of time:

> 'The lecturers put up a lot of videos for us to go through and read up on. We also have a lot of videos to watch during the day as well as practicals and things on campus ...' (Participant 23, Level 4, female)

Participants further expressed a need to be connected to fellow students and lecturers in order to support their online learning experience. One participant expressed that it helped to speak to someone who could provide support, in particular, being connected to peers who shared the same academic challenges:

> 'It becomes a lot ... sometimes [*you need to*] speak to your friends because everyone goes through the same things. So, I find that venting to my friends in my class who share the same feelings as me ... and also surround yourself with positive people that will motivate you and not discourage you from learning.' (Participant 27, Level 4, female)

The need for connectedness was further evident with many participants expressing a desire for contact sessions to supplement online learning:

> 'I wouldn't mind online learning as long as maybe not every Saturday, but maybe one Saturday in every month a certain number of students can just go have a face to face interaction with a lecturer, if they have any questions they can sort that out during the week.' (Participant 11, Level 2, female)

> 'I feel like I'm a person who understands well when I see you because I can memorize you and remember how you explained in class. So online learning wasn't for me.' (Participant 20, Level 3, female)

Theme 3: Need for social support

This theme reflects core factors that enable online learning, such as access to the internet, which impacted the participants' learning experience. Poor internet connectivity as well as inadequate data allowances by the institution for online learning during COVID-19 were two major concerns reported by participants, impacting their ability to effectively learn online:

> 'I personally have experienced data problems with Wi-Fi, and it directly affected me because I failed that test I was writing.' (Participant 2, Level 1, male)

> 'Since I reside on-campus residence we don't get data so we only use Wi-Fi and sometimes it really difficult to connect so you have to buy it [*data*] on your own.' (Participant 4, Level 1, female)

The aforementioned underscores the fact that online learning is technology-dependent, with unequal and unreliable access to the internet posing a challenge for many South African students when forced to engage in online learning.

The negative experiences in terms of connectivity were widespread among participants, but worse for participants living in areas with poor network coverage:

> 'For people who are from rural areas, we struggle a lot when it comes to network connection, even if you have data. But then you find that spot where you have stable connection, which is rare around the area.' (Participant 17, Level 3, male)

Power supply also presented a major challenge for participants since load shedding (power cuts) regularly affects South Africans across all communities. As a result of this power instability, many participants missed lectures either because of their devices not being sufficiently charged or because of the interruption in network accessibility:

> '… besides that we had that time where we had no electricity at home and it was during the week, I didn't attend classes because the laptop and the phone had no power. It wasn't easy to access.' (Participant 14, Level 2, male)

Theme 4: Authentic learning

This theme comprises two subthemes, 'Clinical Training with no clinics' and teaching, learning and assessment.

Subtheme 4.1: Clinical training with no clinics

Almost all participants complained of the lack of access to hands-on practical training and its impact on their clinical skills development. In some cases, participants reported being exposed to the clinical environment (direct patient contact) for the first time during an assessment:

> 'So, in my assessment I had to do techniques for the first time within those time limits'. (Participant 13, Level 2, female)

This placed further pressure on the participants who were required to 'perform' clinically and their skills be evaluated without the necessary real-world training and exposure to the university clinic.

These negative experiences were highlighted across all year levels with all participants feeling as if they were not given enough time for practical exposure during lockdown, prior to assessments. Participant 15, A second year student said:

> 'I feel like we never have enough time to practise before practical assessments. Everything is so squashed ... in order to fit the time into our prac hours'. (Participant 15, Level 2, female)

Furthermore, access to real patients, critical for clinical competency development, was acknowledged as an unmet, yet essential training need among participants:

> 'Optometry students need to be seeing patients on campus, and we are constantly seeing fellow classmates. It's a huge disadvantage. Personally for me, I mean going on campus every Wednesday for General Clinic only to know that you are going to be seeing your fellow classmate or you are going to be seeing not necessarily fellow student but someone from the university, also a student, who might not, you know, give you an experience that you would have gotten had the university been allowing patients from outside the university so ... we seeing the same things over and over again.' (Participant 21, Level 3, male)

Participants further felt that because they did not get to see 'real' patients, they suffered significant gaps in clinical competence.

Subtheme 4.2: Student-centred teaching, learning approach and assessment

The need for a student-centred approach, with lecturers accommodating the different learning styles and preferences of students, within an online learning context, also emerged from the data:

> 'I'm a very audio-visual kind of learner, and I have to talk to someone in order to learn something. So, I ask questions in person or in email. If the email is not enough then I'd speak to the lecturers in person.' (Participant 30, Level 4, female)

> 'I find the recorded videos much more comprehendible because in live lectures sometimes, if you ask a lecturer to repeat it, well the same explanation two or three times they'll probably get annoyed but on online learning you can just rewind it and play it over again.' (Participant 12, Level 2, male)

This suggests a need for varying modes of delivery and engagement, which address students' different preferences.

Issues relating to the scheduling of assessments raised important perspectives:

> 'I don't think anything works for me in online learning, even duration time for test have been cut down. I feel like it's too much you need to do some calculations and think in that limited time.' (Participant 29, Level 4, male)

Another student further expressed discontentment with the way assessments were conducted:

> 'I think one of the things that really caught me off guard was how terrible the university is at having exams. I mean we have six weeks of no exams and then one week of ten exams. No, I just think that's a bit too much'. (Participant 17, Level 3, female)

Poor scheduling and time allocation of assessments also affected the participants negatively:

> '… especially the random spot tests ... because you think you free at this time and then you do something but then a spot test will be thrown at you. And now you have a lot to do at the same time.' (Participant 19, Level 3, male)

Overall, the authenticity of online assessments as a true reflection of learning was brought into question:

> 'I think the online learning hasn't taught us so much; but it has taught us on how to rush things we don't even have time to process things ... you say you cannot write the exam within 30 minutes where there are calculations, there are essay questions so I think that has affected a lot of academics if ever they could try to extend time in the exam.' (Participant 24, Level 4, female)

Some participants felt disadvantaged by the time constraints of online assessments, where sequential questioning was employed:

> 'I don't think anything works for me in online learning, even duration time for tests have been cut down. I feel like it's too much you need to do some calculations and think in that limited time. I feel like lecturers feel that writing online makes life easier for us which is a total opposite. When we are having tests on campus, we have more time.' (Participant 18, Level 3, female)

Several students also reported feeling deprived of the opportunity to recheck their answers, as well the freedom to choose the order in which they attempt the questions in online-administered tests.

As a result, participants across all levels felt that online assessments results were not a true reflection of their knowledge or academic performance:

> 'I think it's not a true reflection in a sense in as much as we would have prepared prior to writing but then I honestly feel as if we, sometimes you just learn not absorbing knowledge and information and the fact that sometimes we even have our books nearby you know if you probably forget something then you can ... you know what I'm saying.' (Participant 6, Level 1, male)

Another participant underscored the concerns with online assessments, suggesting that it does not support, measure, or represent true learning:

> 'Yeah, because I feel that true learning indicates understanding; and if we are able to guess like how we are with multiple choice ... yeah I don't know!' (Participant 10, Level 2, female)

Discussion

This research set out to better understand optometry students' experiences of online learning in the context of the COVID-19 pandemic, as well as the potential impact of this shift in learning context for students in clinical training programmes. Participants of all academic levels in this study faced similar challenges with online learning during the COVID-19 pandemic. These challenges centred around the practical needs of students having to adapt to a new way of learning, and the fact that online learning is technology-dependent, which posed a challenge in South Africa's unequal socio-economic and inconsistent infrastructure context with respect to internet connectivity. Furthermore, being disengaged from traditional learning spaces highlighted the inherent value of social connectedness in supporting the learning process, and called into question the authenticity of virtual learning specifically with respect to assessments and assessment outcomes.

Online learning is technology-dependent learning because it is carried out in a virtual environment. In this study, first-year students felt more intimidated having to adapt to tertiary education via virtual means. They struggled to take responsibility for their learning, a concept relatively new to most of them because high school learners in South Africa are generally monitored and held accountable for attendance and participation in classroom activities, unlike the reality at university even under non-pandemic conditions. Azmat, Ahmad and Mater (2022) conducted a scoping review on the lack of social interaction in online classes during COVID-19, and based on their results, suggested that a lack of social interaction impacted the effectiveness of online learning.

While many students in this study had difficulty adapting to online learning, they found access to online lecture recordings, made available as part of the institution's remote online learning strategy, advantageous because it afforded them the opportunity to learn at their own pace. However, majority sentiments towards online learning were that even in the context of a pandemic, virtual learning needs to be supported by contact learning in order to enhance the learning experience.

In other parts of the world, the integration of information technology in education has been widely embraced, with blended learning increasingly becoming an integral component of education programmes (Kanwal & Rehman 2017). This may, in part, be the result of more widespread access to the kinds of technology that enables online learning. Studies investigating barriers to online learning (Chigeza & Halbert 2014) reported internet connectivity, access to computers, technical issues and

pedagogical approaches as significant challenges (Jones & Issroff 2005). Along with these barriers, unplanned power and network outages, as was the experience of students in this study, also affect students' ability to connect to online learning platforms. It goes without saying that internet availability or accessibility is essential for students to be able to engage with online learning. Within the South African context, many of these resources are unreliable, which negatively affected students' experiences during COVID-19 as reported in this study. Connectivity challenges were similarly identified as a barrier to learning in Pakistan, where power cut is also a serious problem (Kanwal & Rehman 2017).

The reality of remote online learning during the pandemic meant that social aspects that support learning in a traditional context were often absent. Reports from the participants of this study confirm that learning is a social activity. Where learning occurs in interaction with others the overall learning experience is enhanced, in keeping with the findings by Hrastinski (2009). It is not surprising, therefore, that most participants in this study demonstrated a negative attitude towards online learning during COVID-19, which in part, was because of their feeling isolated from their usual learning support network. This is further supported by the findings of Baber (2021) that social interaction has a positive, significant impact on the effectiveness of online learning. COVID-19 restrictions on physical interaction between students and their teachers therefore lead to a sense of isolation, with some participants indicating that they would better retain content if they were exposed to face-to-face lectures instead of online. Dominant factors that create an enabling learning environment have been observed as educator's presence in online settings, interaction between students and teachers, content taught and connections between online and offline activities, among others (Moule, Ward & Lockyer 2010).

One positive aspect of the COVID-19 online learning experience was students' flexibility while learning from home, such as being able to do the work in their own time because they were able to access lecture recordings anytime. Regarding assessments, participants reported needing sufficient time to understand a question before attempting an answer: a reality they were not afforded during online assessments. When adequate time for taking assessments is compromised, as was the experience of participants in this study, students feel stressed and overwhelmed, similar to findings from other studies (Suresh, Priya & Gayathri 2018). As a result, some participants in this study felt that online assessments were not a true reflection of their learning, suggesting that students did not fully understand the content taught online despite being able to achieve positive assessment results. This is against the principle of 'assessment for learning'.

Additional findings from this study were that a lack of exposure to the clinical setting, as well as access to real patients as a result of lockdown regulations negatively impacted students' clinical competency development as well as hands-on familiarity with clinical equipment. This is in keeping with the theory of online learning, which argues that this type of learning is most effective when supported by physical tools that are used to produce knowledge (Hrastinski 2009). Virtual simulation makes students feel as if they lack critical knowledge, resulting in a lack of confidence in the clinical environment (Acosta et al. 2018). Participants in this study were rightfully concerned that they did not get adequate exposure to real patients with genuine eye problems because of COVID-19. Similar findings emerged from a study by Bączek et al. (2021), where other health science students in Poland complained of a lack of interaction with patients, which negatively impacted skills development. Despite differing preferences among participants in this study most of them reported that they would choose contact learning over online classes when given the choice, as it facilitates a more rich, authentic learning experience.

Conclusion

The need for educational programmes to continue to deliver teaching and learning in the face of a global pandemic poses several challenges for low- and middle-income countries, which may not be 'pandemic-ready' in terms of being able to swiftly shift to online learning without compromising students' learning experiences. The results of this study indicate that where students face challenges accessing the necessary learning technologies, this could have serious consequences for learning. To avoid any potential negative impact on learning and competency development in clinical programmes specifically, key resources for engaging in the ongoing educational project must be addressed. These include reliable and available access to the internet along with devices such as smartphones or computers. Furthermore, where simulation software or virtual alternatives are available, these can be used to partially compensate for the lack of access to the clinical environment, which will support the development of essential clinical skills. Furthermore, when designing teaching and assessment activities, the authenticity of students' learning should be foremost in mind. On a positive note, online learning appears to support students taking personal responsibility for their learning, which is important for the personal and professional development of health professionals. While this study focused specifically on optometry students in South Africa, the findings may also be relevant to other countries or health professions programmes in the developing world.

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Authors' contributions

D.G., T.P., N.M., N.V., S.M., U.M., Z.M. and D.v.S. contributed to the research as well as the manuscript preparation, with D.v.S. supervising the seven co-authors in this honours research project.

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Data availability

The dataset is retained by the researchers with any unique identifiers removed for confidentiality purposes.

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