Exploring the challenges and opportunities for learning during the COVID-19 pandemic: Academics' and students' experiences in the clinical technology undergraduate programme in South Africa

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Background. The COVID-19 pandemic had a significant influence on all spheres of society. This influence was particularly apparent in healthcare and in the training of health professionals within an already resource-constrained country such as South Africa. The purpose of this study was to explore the challenges and opportunities for learning from the point of view of students undertaking the Bachelor of Health Sciences (BHSc) in Clinical Technology programme, which is a specialised and distinctive field, as well as the academics involved in this programme.
Objective. To explore how the clinical training practice component of the undergraduate programme was affected by the COVID-19 pandemic.
Methods. A qualitative, exploratory research design was used. A non-probability purposive sampling method was selected. Students and academics were recruited and sampled. The first sample comprised 15 students from each of the 17 clinical departments where clinical training was undertaken. The second sample included 4 academics who were involved in teaching and supervising the placement of students at various healthcare institutions. Data were gathered using in-depth, semi-structured interviews on an adapted version of Gibbs' cycle of reflection. Six questions were presented to each participant, underpinned by the findings from the literature review and modified specifically to the context of this study.
Results. Four broad themes emerged: support for teaching during the COVID-19 pandemic; impact of the pandemic on students' mental wellbeing; transitioning to the online learning space; and finding opportunities in the time of crisis.
Conclusion. This study highlights the issues of preparedness for crisis situations by higher education institutions, academics and students and underscores the need for curricula to be more responsive to student and societal needs.

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In January 2020, the World Health Organization (WHO) announced the discovery of a novel coronavirus: SARS-CoV-2, which started as a viral outbreak of pneumonia. The health crisis rapidly impacted the economic and social spheres of society,[1] to which governments, in response, implemented national lockdowns. These measures also impacted the higher education (HE) environment, which had to transition quickly to remote learning to ensure continuity of teaching, learning and assessment. Schools and higher education institutions (HEIs) were closed in 185 countries, including South Africa (SA). Students and staff faced unprecedented challenges, which were particularly dire in under-resourced universities. It is envisaged that the consequences of these challenges will become apparent in the future when these students become independent practitioners. It is therefore important to understand the experiences of academics and students to mitigate the potentially deleterious effects of transitioning to remote learning, as HEIs currently prepare for the post-COVID-19era.[2]

The BHSc in Clinical Technology is a 4-year degree programme structured as two phases. The first phase (years 1 and 2) focuses on the theory aspect, covering subject content in the classroom. The second phase (years 3 and 4) focuses on the clinical aspect, where students are placed at different hospitals to undergo structured clinical training and study theoretical modules concurrently. This phase is a critical component of the curriculum for the acquisition of the requisite competencies.

The pandemic prompted a pedagogical shift from the traditional face-to-face contact method of teaching to the virtual approach. The clinical component was also affected by the lockdown, as teaching, learning and assessment in the clinical environment halted. This impacted negatively on students' progress, delaying their achievement of learning outcomes.

The three universities that offer this qualification in SA advocated for a blended learning approach. However, there are limited data on the learning experiences of students in clinical technology during the COVID-19 pandemic in SA. The findings in this article will contribute to the current discourse, particularly in other healthcare professions where the curriculum includes a theory and clinical component. This, in turn, could be used to refine curriculum structure and delivery in preparation for navigating the 'new normal' post-COVID-19era, into which the world is now moving.

Therefore, the overarching aim was to explore the challenges and opportunities of learning (theory, clinical and online) during the COVID-19 pandemic from the perspectives of academics and students in the clinical technology programme at a university of technology. It was also important to delve into this group of student healthcare professionals who would have to deal with multiple roles, i.e. administrative, clinical and educational, during the pandemic. Research has indicated that healthcare students and professionals not only experienced an effect on their mental, physical and social wellbeing, but had to grapple with the closure of

academic institutions and the disruption of clinics and hospitals, which affected their clinical training experience.[3] Moreover, studies have documented that the abrupt transition to synchronous online learning led to pervasive negative reactions among students at HEIs.[4] Of significance was that many of these institutions were caught unprepared, which threatened traditional face-to-face modes of curriculum delivery and assessments. As with other health professional students during the pandemic,[5] strategies such as oral examinations were implemented to assess the knowledge and competence of student clinical technologists. Accounting for their distinctive role in the healthcare team, and for the lack of data in this area, it was important to determine the impact of the COVID-19pandemic on their training. Moreover, it was also important to determine how academic leadership, collaborative peer learning, the know-how of digital technology and online learning tools[6] affected the online learning space.

The study was guided by the following questions:

- What challenges and opportunities did students and academics perceive from the transition to the virtual platform in response to the COVID-19pandemic?
- What were the effects of the COVID-19pandemic on students and academics in the clinical technology programme?

Methods

A qualitative, exploratory research design was used,[7] as it was considered most suitable to explore, describe and document aspects of a situation in its natural environment,[7] while simultaneously analysing the meaning and providing a detailed perspective of human experience.[8] The study was conducted at the Durban University of Technology (DUT), located in the metropolitan area of eThekwini, SA.

Setting, population and sampling

The study sampled third- and fourth-year students registered for clinical technology, as well as academic staff, in the Department of Biomedical and Clinical Technology, DUT. The DUT is a multi-campus HEI, with 6 faculties and ~33 000 students. The clinical technology programme is one of two programmes in the Department of Biomedical and Clinical Technology. The programme adopts a student-centred approach to teaching, learning and assessment. It also focuses on promoting and maintaining professional values and ethics in response to the needs of the community and the profession. The academics are specialists in the clinical technology field, with experience in health professions education.

A non-probability,[8] purposeful sampling strategy was selected and was appropriate for this study, as it enabled the researchers to target participants who could contribute to an understanding of the phenomenon being studied.[8] Academics and students were sampled from a population of 5 academics and 82 students. The final sample comprised 15 students and 4 academics, who were involved in teaching and supervision of students at various clinical departments. These departments are typically located in tertiary hospitals in the public and private sectors. At least 1 student from each of the 17 clinical departments where clinical training is undertaken was invited to participate. Each of these participants had to have sufficient exposure to the clinical environment to be able to contribute to the discussion. Participant recruitment and interviews were discontinued when data saturation was reached.

Inclusion criteria were all third- and fourth-year students registered in the clinical technology programme, who were placed in a clinical training unit. Academic staff were those involved in teaching in the programme from the first year onwards.

Exclusion criteria were students who were either not registered for this course, not in their third or fourth year or not placed in a clinical training unit. Academic staff who were outside the department, or who did not teach on this programme, were not invited.

Data collection process

Data were gathered by all three researchers, using in-depth, semi-structured interviews, based on an adapted version of Gibbs' cycle of reflection.[9] According to this cycle, 6 questions, underpinned by the findings from the literature review and modified specifically to the context of this study, were presented to each participant.

The semi-structured interviews were conducted in English and included questions such as: 'What challenges and opportunities did you face from the transition to the virtual platform in response to the COVID-19pandemic?' and 'What were the effects of the COVID-19pandemic on learning experiences?' Interviews ranged from 30 to 60 minutes and included open-ended questions. Probing and follow-up questions were also used for more clarification, where relevant.[8] The interviews were conducted virtually on Microsoft Teams (Microsoft Corp., USA), considering the COVID-19pandemic and associated restrictions, during May - December 2021. The purpose and the process of the study were explained to the prospective participants and all willing participants signed informed consent before the interview.

As one of the researchers was known to the students, there may have been the presence of a power dynamic where students may have felt that they should say certain things to avoid conflict. The researchers were well aware of this fact and therefore adopted a reflexive approach during data collection and analysis, maintaining an awareness of personal feelings and experiences, which could influence the study. Furthermore, it was emphasised to students that they could withdraw from the study at any time without any negative consequences to them.

Data analysis

The audio-recorded data were transcribed verbatim. This procedure of data transcribing allowed the researchers to become familiar with the data and to identify any similarities or patterns.[4] Inductive thematic analysis was used to analyse the data.[8] During analysis, the data were first grouped into smaller parts, i.e. 'meaning units'. These meaning units were condensed and codes were generated.[10] Similar codes were then grouped into categories and themes.[10,11]

Trustworthiness

To establish trustworthiness,[12] four criteria were considered, i.e. credibility, transferability, dependability and confirmability. Credibility refers to confidence that the findings are authentic and believable. Credibility was ensured by selecting participants who had personally experienced the phenomena being studied.[12] The findings were reviewed and discussed between the researchers during the development of categories and themes, with provisions made for member checking. Transferability refers to the extent to which the findings are applicable to other contexts. This was initiated by using detailed descriptive narratives about the context being studied.[12] Dependability refers to the stability of the findings over

time.[13] This was enhanced by using data triangulation, where students and academics were included as participants. Confirmability indicates a degree of neutrality on the part of the researchers and is supplemented by peer debriefing during the coding process and the development of an audit trail.[13] Careful documentation of the research process was maintained. All three researchers used reflexivity to identify potential areas of bias and to bracket it so that its effects on the research process could be minimalised. There was potential for one of the researchers to be biased, as she worked in the department. However, awareness of this and the presence of two independent researchers prevented same.

Ethical approval

The study was approved by the DUT Institutional Ethics Committee (ref. no. IREC 046/21). The three primary ethical principles of beneficence, respect for human dignity, and justice, were observed to safeguard study participants.

To maintain beneficence, the participants were informed of the average interview duration.[7] Respect for human dignity was observed, as the participants were requested to sign an informed consent form to voluntarily participate in the study once they were satisfied with the information.[7] They were also made aware of their right to withdraw from the study at any time without any penalty or negative effects on their studies.[7] Justice was ensured by selecting participants based on the study's needs and explaining to them that there were no benefits to participating in the study.

During data collection, privacy was maintained by keeping all data confidential and using pseudonyms. Permission to record interviews on the virtual platform was requested and obtained from the study participants. This effectively resulted in the data not being traced back to an individual participant and being used only for the purpose of the study.[8] The data have been stored for a period of 5 years for possible future verification purposes.

Results

Following the analysis of the data collected from both samples, the following four themes emerged:

- support for teaching during the COVID-19pandemic
- impact of the pandemic on students' mental wellbeing
- transitioning to the online learning space
- finding opportunities in the time of crisis.

Theme 1: Support for teaching during the COVID-19pandemic

As was the case with many HEIs, the lockdown in response to the COVID-19 pandemic had a significant effect on teaching at the institution. There were some conflicting responses regarding the amount of institutional support received. One academic felt that the institution had done its best to move teaching from the traditional face-to-face mode to the online space, while another felt that the institutional support required during this time was not received:

> 'Well, from where I stand, I think the university did their best, it was just the actual situation that made it very difficult for anyone to streamline that support …' [P1]
>
> 'Because our university was not structured to go online as our other sister universities that have that experience and resources.' [P3]

There was a sense that it was not only the lack of support but also the absence of communication and preparation for online teaching that affected participants' ability to cope during the lockdown:

> 'Because I never knew processes, procedures, … how to do online assessment, learning the different offerings, not only MS teams but Moodle.' [P2]

Academics also reflected on the consequences of the trajectory of the pandemic and the need for greater support in preparing students for clinical learning. Some academics indicated that the pandemic presented multiple challenges for students, who required more university support:

> 'So that was the main problem, the unpredictability of the duration of the pandemic. But secondly, the problem with those students that all of a sudden had to be flung out of the residential areas, to some of the most remote areas where they didn't have access to facilities for virtual learning.' [L1]
>
> 'I think the room for improvement will be maybe to find some sort of support system via the university to give that additional support.' [L2]

Theme 2: Impact of the pandemic on students' mental wellbeing

The pandemic had an educational, physical and emotional impact. Some students still cohabited with their families and expressed great anxiety and fear of infecting their elderly family members, given the number of patients they encountered when on call:

> 'I think my biggest fear was bringing it home to my family.' [P4]
>
> 'You know, it's a big stress for we had a lot of COVID patients when we were on call, we had COVID patients it was really stressful …' [P11]

Conversely, those students who lived alone reacted poorly to the isolation and even developed mental health issues during this time. The negative effects on mental health also resulted in poor physical health and the inability to concentrate:

> 'But my health did suffer from it. I put on a lot of weight.' [P3]
>
> 'I find it difficult to pay attention during online lectures and so I preferred block [face-to-face] lectures because you have to pay attention when you are there.' [P12]

This finding was not unexpected, as students who faced learning in isolation may have lost their motivation to study. Furthermore, not everyone possesses the requisite self-discipline or the ability to adapt their study techniques to cope,[14] which inadvertently led to stress as the work accumulated.

A recent study reported that students' levels of stress, anxiety, loneliness and depression worsened during the COVID-19pandemic, with stressors shifting from fears of missing out on social life to worries about their learning and their future.[15] The impact of the pandemic on the learning of students in this cohort was evident:

> 'I just had to do as much work as I could, honestly, because even the number of patients that we had was already lower than what we were used to …' [P10]

Theme 3: Transitioning to the online learning space

This theme describes the perceptions of participants regarding the challenges with transitioning from the face-to-face mode of teaching to the

online learning space. The biggest issue with online learning was the lack of connectivity, which seemed to have affected mostly students who lived in remote rural areas:

'Because the virtual one, sometimes you might have problems with the devices and then you can't attend.' [P1]

'I think we should get the data issue sorted out. That would, I think, be the best way to get around this challenge.' [L1]

Academics also experienced their own challenges with moving to the online learning system:

'I was literally thrown into the deep end and having to swim because you couldn't tell the students sorry, I don't know ...' [P2]

In addition to circumventing the challenges of transitioning to the virtual platform, academics had to contend with finding creative ways of ascertaining whether students were present. A general concern was the lack of participation and accountability for learning:

'The challenge was not knowing if the students are present or not. In the class, you can see a student is not paying attention to you. Their mind is wandering.' [L2]

It is now established that academics need to be developed in this pedagogy, which was not possible at the onset of the pandemic.

There were also concerns about the online assessment. Academics and students alluded to the fact that their main challenges in online assessment were academic dishonesty, infrastructure and the commitment of students to submit assessments:

'The fact that we at some point, we're not sure whether we could do the assessments and then you do the assessments online. And then some students get 90% when they were actually 45% students.' [L1]

Notwithstanding the challenges posed by COVID-19, the pandemic has also offered HEIs, particularly in resource-constrained countries, an opportunity to glimpse at how fair and equitable access to HE may be advanced if a blended learning approach is adopted. As encapsulated by one student:

'That [online lectures], I think, might have been the best thing that could have happened.' [P11]

Theme 4: Finding opportunities in the time of crisis

While the pandemic posed a multitude of challenges, some students and academics saw these challenges as opportunities. Firstly, it was acknowledged that the pandemic had catapulted the teaching and assessment practices out of sheer necessity:

'When the COVID-19came it drastically sped up the process of where we are now with using the technology in delivering our theory, or even the practicals.' [L3]

Moreover, the efforts of academics to increase student-academic interaction were appreciated by students. Some students felt that these attempts enabled more individual engagement compared with face-to-face lectures:

'I really enjoy the virtual classes … it was interactive and not only the lecturer was talking, we were also engaged.' [P6]

'I actually miss, face to face seeing the lectures interacting with them, but I prefer the online lectures as well.' [P3]

While some students experienced challenges with transition to online learning (theme 3), most students suggested it offered opportunities to interact with study material, exposure to technology and a reduction in travelling time and financial burden:

'The recordings are very beneficial because unlike in campus like when we miss certain aspects while the lectures are going on we missed it and can't get it back.' [P3]

'I didn't really have challenges in that way because I was fortunate to always be, you know, exposed to technology.' [P4]

'I think the online lectures were better than the DUT lectures and with less traveling the less stress of finding a place to stay …' [P2]

The benefits of assessment offered by this situation must also be highlighted, as it forced academics to explore creative forms of assessment, which shifted the focus from testing knowledge through rote and recall towards manifestation of the higher-order knowledge and skills required for a specific module, using Bloom's taxonomy. For example, the traditional short-answer questions were changed to case-based questions, where students were required to apply knowledge to specific case scenarios. Furthermore, lower-order knowledge-type multiple-choice questions (MCQs) were adapted to assess students' ability to analyse and synthesise rather than simply recall facts and show understanding.

Discussion

This study explored the learning experiences of students registered for the clinical technology programme during the COVID-19pandemic. The pandemic brought with it unprecedented changes to life as we know it. Countries affected by the pandemic implemented drastic measures to slow down the spread of the coronavirus, including the shutting down of HEIs. The pandemic forced the implementation of social distancing, and this required the closure of HEIs, which brought teaching, learning and assessment to a halt.[12] This situation has greatly exposed the unpreparedness of most institutions to traverse the virtual platform for the continuation of the academic programme. Although DUT has encouraged academics to adopt online teaching since the past decade, the reluctance of some academics to adopt this mode of instruction may have inadvertently led to a lack of preparation. However, even though DUT experienced a few hurdles, the overall muster of students and academics ensured that most of the lost work was recouped. Notwithstanding this, the hiatus caused a disruption of curriculum, with emotional and other negative effects.

It has been established that students need social networks to help them deal with stress, and in so doing, help them to be more effective academically.[16] Our findings are reflective of other studies described in the literature,[17] as the loss of a daily routine, as well as social isolation, triggered several negative emotions such as fear, anxiety, confusion, frustration and anger. However, the emotional consequences also helped build resilience, confidence and a degree of self-actualisation in our students.

Students' abilities to derive the most from learning during their clinical placements were hampered owing to lower patient numbers during the pandemic, which consequently decreased their exposure to a variety of pathophysiological conditions. Our future models should incorporate creative strategies for practical exposure to harness the full benefit of the virtual platform for both theory and clinical activities.

Most participants experienced the virtual platform in a favourable manner, as it provided a more flexible delivery approach and offered the

option of a blend of synchronous learning with asynchronous learning. Other researchers have also highlighted the benefits and challenges of online instruction in HE, citing, for example, work-home balance, lack of social interactions, virtual classroom opportunities for working professionals, academic integrity and cyber scam issues.[18,19] Although participants initially experienced difficulties with the transition to the online platform, it also catapulted the capacitation in this pedagogy. Other studies similarly found that because students were emotionally distressed by the quality of feedback provided by instructors and clarity regarding course arrangement, they began to use self-regulated learning strategies to facilitate their learning. These strategies included time management applications and lecture videos, which exemplified the importance of technology related to self-study.[20,21]

In HE, formative and summative assessments are used to support learning in conjunction with appropriate feedback linked to module outcomes. The COVID-19pandemic required a re-analysis of how the dominant mode of teaching, learning and assessment was done, moving from face-to-face to virtual. Most HEIs, particularly those in resource-constrained settings, faced an additional challenge due to lack of preparation of those institutions, academics and students, especially in ensuring the integrity of assessments in the absence of a proctoring system. Similar concerns have been raised by authors in the Middle East.[22] Although there were challenges with the integrity of online assessment, the institution is refining this aspect so that lifelong learning, which is ensconced by the perspectives of the digital environment, adaptive graduates and a distinctive education in the ENVISION2030 plan, becomes a reality.

Conclusion

The impact of the COVID-19pandemic has prompted an evolution of the HE environment into the virtual space, and it appears that these new hybrid teaching strategies are here to stay.[23] There are currently no known models to follow; however, a blended learning approach, which has been shown to provide more learning opportunities than the traditional face-to-face mode, is proposed. A combination of face-to-face learning activities in the classroom, synchronous learning (learning activities in the virtual classroom on a learning management system), and asynchronous learning (clinical placement training, structured practical activities) provide students with a variety of opportunities for learning theoretical content while mastering the fluency necessary in their specific module.[23] The use of the flipped classroom approach has also been shown to contribute to students' active participation and motivation to learn. This approach allows students to study foundational content materials through pre-classroom activities, such as reading an article, watching a multimedia presentation or listening to a lecture (asynchronously).[24] Classroom time is then used to reinforce and build on knowledge. Learning can be enhanced through using additional reading, quizzes and fora. Furthermore, the flipped classroom approach will assist students to develop the necessary informational and technological literacy skills.[24] In terms of assessment, the use of questions ranging from the very basic to higher-order critical analysis was created on a digital learning management system. This practice is supported in a recent article by Husain,[25] who strongly recommends the use of digital Bloom's taxonomy through integrating information and communication technology tools for creating reliable and effective online assessments. This aspect can be incorporated into current health professions education curricula.

In addition to the requisite institutional support and infrastructure, curriculum refinements should be undertaken, with due cognisance to both the online and face-to-face workload demands, as well as ensuring that staff and students are capacitated to undertake the online learning and assessment approaches that will have to form part of this model. A recent article by Cobo-Rendón *et al.*[26] recommends continuous institutional assessment of practices to ensure that the quality of the teaching and learning process is upheld.

Although the focus of the current study was on a particular programme, the findings warrant dissemination, as these offer a glimpse into how the curriculum can be refined, with the inclusion of the virtualisation of academic activities, so that students and academics are better prepared to cope in the new normal post-COVID-19era.

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