

Clinical technology students' and academics' perceptions of clinical work-integrated learning to inform curricular change

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This study was undertaken within the Degree in Clinical Technology program at Durban University of Technology, South Africa. Clinical technology curricula in South Africa have undergone several changes in response to the demand for a more integrated curriculum. This served as a catalyst for this study, which explored students' and academics' perceptions of the factors that influence learning experiences during work-integrated learning (WIL). A qualitative exploratory research design within an interpretivist paradigm was utilized. The sample comprised 13 students registered for Clinical Technology in the Faculty of Health Sciences, and four academics. Four themes reflecting various factors influencing learning experiences during WIL emerged: learning culture, social nature of learning, student attributes and learning in the time of COVID-19. This study has shed light on factors that influence the learning experiences of Clinical Technology students during WIL and may inform possible improvements to learning experiences, as well as the WIL of students in other contexts.

Keywords: Clinical environment, learning environment, curriculum review, learning experiences

Health professions education encompasses many disciplines, including medicine, nursing, and physiotherapy. Clinical technology education, a small and specialized field, currently offered at higher education institutions in countries like the United States of America, Netherlands, and South Africa, also fits within the broader health professions education. The role of professionals who are qualified in this field is to "independently perform diagnostic, therapeutic and corrective procedures on patients using specialized health technology and techniques for the treatment of pathophysiological conditions in a hospital-based or a private practice setting" (Prakaschandra, 2015, p. 1). The graduate works as part of a multi-disciplinary team in one of the following specialist categories: Cardiology, Cardiovascular Perfusion, Critical Care, Nephrology, Neurology, Pulmonology, or Reproductive Biology, as well as engages in research, thereby contributing to the creation of new knowledge. For example, a Clinical Technologist in Cardiovascular Perfusion would run the bypass machines during open heart surgery; those qualified in Cardiology would perform adult and pediatric echocardiography monitoring during cardiac catheterization procedures, including interventions and pacemaker implantation; those in Nephrology would perform hemodialysis and peritoneal dialysis, plasma exchange, hemoperfusion, and continuous renal replacement therapies.

Like other health profession disciplines, clinical technology students must undertake work-integrated learning (WIL) in the clinical environment. In other words, WIL is mandatory for the clinical technology profession. WIL is defined broadly as "an educational approach involving three parties – the student, educational institution, and an external stakeholder – consisting of authentic work-focused experiences as an intentional component of the curriculum. Students learn through active engagement in purposeful work tasks, which enable the integration of theory with meaningful practice that is relevant to the student's discipline of study and/or professional development" (Zegwaard et al., 2023 p.39). Effective WIL allows students to integrate the content learned in the classroom into the clinical

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environment, thus allowing them to develop the knowledge and skills needed to function in their role. Trede (2012) takes this perspective further arguing that WIL is not just about disciplinary knowledge and skills but also about learning to be a professional, including communication, teamwork, and developing a professional identity. Quality WIL also creates opportunities for students to develop a critical understanding of work-based practices and assists students in considering their personal strengths (Billett & Sweet, 2015; Smith et al., 2022) as well as becoming part of the community of practice, by learning the values and practices of the workplace. Within the context of health professions education, this learning must take place within a supportive clinical environment.

The clinical environment has been described as an environment for learning, and broadly as “a multidimensional entity that directly affects the outcomes of students’ clinical placement” (Chan, 2002, p. 70). It is also described as an environment for “...social interactions, organizational cultures and structures, and physical and virtual spaces that surround and shape participants’ experiences, perceptions, and learning” (Larson, 2018, p. 36). Supportive clinical environments should afford students supervised participation in patient care, mentoring, assessment, and timely and constructive feedback (Teunissen et al., 2007). It has been established that a supportive clinical environment that is imbued with respect, is welcoming, collaborative, and conducive to learning (Tackett et al., 2017) while negative clinical environments are destructive and restrict participation and learning (Janz & Pyke, 2000). Various challenges within this environment are highlighted in the literature including high patient care demands (Arieli, 2013; Levett-Jones et al., 2009) resulting from insufficient staff for patient care. This ultimately influences staffs’ availability to support students’ learning (Al-Zayyat & Al-Camal, 2014; Blomberg et al., 2014; Jae Lee et al., 2018; Tharani et al., 2017). Other challenges include the growing complexity of healthcare organizations who expect enhanced student adaptability (Embo, et al., 2014; Meyer et al., 2022), the demand for integration of theory with practice (Berkhout et al., 2015; Crookes et al., 2013) and poor quality of mentorship (Kuiper et al., 2010). These factors are likely to have a significant influence on students’ learning experiences.

Like other healthcare disciplines, clinical technology curricula in South Africa have also undergone several changes, in response to the demand for a more integrated curriculum. This is a four-year bachelor’s degree that, in accordance with the exit level outcomes of the qualification, enables a graduate to apply scientific and technological knowledge to perform and monitor diagnostic, therapeutic, and quality assurance procedures in the clinical environment, for the management of patients in a field of specialization in accordance with statutory and operational requirements. Graduates will also be able to conduct research in a field of clinical technology in compliance with legislated and ethical research guidelines. This degree is offered across three universities in South Africa, so the projected intake into this course is approximately 130 students per year.

WIL has always been a critical component of the curriculum within this field. Before the re-curriculation, students completed a National Diploma in Clinical Technology, where they spent approximately 1800 hours per year. An additional 1800 hours were completed if they chose to complete the BTech in Clinical Technology degree. With the new degree, the WIL component has now increased to 3800 hours in total, undertaken concurrently with theoretical modules.

Several studies in the context of health professions education reveal variable student responses to curriculum change. Positive changes include amongst others, improvement in learning patterns (Van der Veken et al., 2009), better integration of theory with practice (McInerney et al., 2013), higher student confidence (Bissell et al., 2018), and better student-faculty relationships and student development (Gheihman et al., 2021). In contrast, studies also found that there were minimal changes to students’

academic performances (Arantes et al., 2020), that students felt a sense of inadequacy for certain subject content as well as a lack of preparation for clinical exams (McInerney et al., 2013).

Educators worldwide are becoming more aware of the need to understand WIL for improving the quality of learning experiences among students (McDonald et al., 2019; Venville et al., 2018). The outcomes of many studies related to WIL have culminated in the development of recommendations to improve particular WIL environments. Some of these recommendations include, amongst others, better preparation of students for WIL (Davis et al., 2020), the provision of resources on organizational, interpersonal, and individual levels to students before, during, and after WIL (Abery et al., 2015; Andersson et al., 2022), and nurturing a personal commitment by students to their own learning during WIL (Andersson et al., 2022). While these studies provide valuable insights, no studies have been undertaken to explore students' and academics' perceptions of WIL in the context of curricula change in a Clinical Technology degree program. This, therefore, served as a catalyst for this study. Within the context of a renewed curriculum for clinical technology, this article reports on a study that aimed to explore third- and fourth-year students' and academics' perceptions of the factors that influence students' learning experiences during WIL. This was undertaken to inform possible improvements to the new curriculum.

METHODOLOGY

Research Design

This study utilized a qualitative exploratory research design based on an interpretive framework (Korstjens & Moser, 2018). An exploratory design allows the researcher to gain a better understanding of a situation or phenomenon, that has not been previously studied or thoroughly explored (De Vos et al., 2011). On the other hand, from an interpretive perspective, human action is meaningful, and the goal of inquiry is to find out how people respond to and understand the meaning of social phenomena (Carpenter & Suto, 2008; Creswell & Poth, 2018). This design was appropriate for this study, as the primary aim was to explore third- and fourth-year clinical technology students' and academics' perceptions of the factors that influence the students' learning during WIL.

Participants and Recruitment

This study was conducted at the Durban University of Technology (DUT) located in the metropolitan area of KwaZulu Natal in South Africa. The target population comprised 82 third- and fourth-year students registered for the Clinical Technology program in the Department of Biomedical and Clinical Technology at the Faculty of Health Sciences. The program has two distinct phases. In the first two years, students attend lectures on campus where they are expected to develop foundational and advanced knowledge in clinical technology. Academics are responsible for facilitating their learning. The second phase is from the third to the fourth year where students undertake WIL at one of 13 clinical departments across different hospitals in South Africa (at the time of sampling), for the development of clinical skills. Students are placed within a particular unit, which is accredited for training by the South African Health Professional Council (HPCSA), in which they spend approximately 95 weeks (3800 clinical training hours). Assessment of predetermined stipulated clinical procedures is done continuously by clinical supervisors who are appointed by the university to do so. Each clinical department (training unit) is designated one clinical supervisor. Two cohorts were recruited from the Department for the study; students (n=13) and academics (n=4) who were involved in teaching students in the classroom and overseeing the placement of students at the hospitals.

Non-probability sampling was utilized consisting of purposive techniques, where at least one student from each of the 13 clinical departments was invited to participate. By using purposive sampling, the researchers deliberately selected the participants for this study (Elfil & Negida, 2017; El-Masri, 2017). Participants were contacted via email, where the study was explained. Those who agreed to participate were required to complete and submit the consent form before being interviewed. There are five academics involved in overseeing the placement of students in the clinical environment but do not supervise students on placement. These academics were also contacted via email. Eventually, four agreed to participate.

Data Collection

Data were collected using in-depth semi-structured interviews with both academics and students. According to McGrath et al. (2018, p. 4), “qualitative interviews afford researchers opportunities to explore, in an in-depth manner, matters that are unique to the experiences of the interviewees, allowing insights into how different phenomena of interest are experienced and perceived.”

After the completion and submission of the electronic consent forms by the participants, the interviews were held virtually on Microsoft Teams, due to the restrictions caused by the COVID-19 pandemic. The aim of the interviews was to acquire an understanding of students’ learning experiences during work-integrated learning in the clinical environment. In addition, the researchers wanted to explore academics’ perceptions of the enablers and challenges for students’ learning during WIL. Participants were afforded the chance to engage in reflective practice (Bulman & Schutz, 2013). To facilitate this process, the interviews were guided by an adapted version of Gibbs’ cycle of reflection (Palmer et al., 1994). According to this cycle, a series of six questions were presented to the participant. These adapted questions were based on the findings from the literature review and amended specifically to the context of this study. Examples of questions posed to participants include: describe how you have experienced your clinical placement, explain how the placement contributed to developing your knowledge, skills, values, and attitudes, and what factors enabled or constrained learning in the clinical environment. All interviews (13 with students and 4 with academics), which lasted between 30 and 60 minutes, were audio-recorded using a voice recorder. Audio recordings were transcribed verbatim immediately after each interview.

Data Analysis

The data was analyzed using thematic analysis as outlined by Braun and Clarke (2006). The steps in the thematic analysis involved: (1) analysis of the transcripts, establishing codes for similar ideas, and (2) evaluating and synthesizing the codes to determine any recurring categories and themes (Braun & Clarke, 2006). The transcripts were reviewed multiple times and codes were verified against the original transcript to maintain trustworthiness. The initial coding was conducted independently by one researcher and was then substantiated by the other two researchers. All researchers reviewed the extracted codes through an iterative process to identify categories and themes, and mutual consensus on the final thematic structure was then agreed upon.

Ethical Consideration

Ethical clearance for this study was obtained from the DUT institutional ethics committee (IREC 046/21). Prior to the commencement of data collection, all participants were informed verbally as well as by email that their participation was completely voluntary; that they could withdraw from the study at any time without consequences; that anonymity would be observed thoroughly; and that their

identifying details would be kept confidential. They were also informed that there would be no financial reimbursement for participating in the research.

TRUSTWORTHINESS

Trustworthiness is a notion associated with qualitative research. It incorporates truth value, credibility, applicability, transferability, consistency, dependability, neutrality, and reliability confirmable (Davies & Dodd, 2002). The researchers adopted a reflexive approach sustaining an awareness of personal feelings and experiences, which could influence the study. A team-based research approach strengthened the confirmability of the data (Elo et al., 2014). Dependability was ensured by maintaining field notes, having team discussions during the analytic processes, and using two different samples to corroborate findings (students and academics). Authenticity was ensured by providing a clear description of the research context, recruitment of participants, and data collection and analysis procedures.

RESULTS

There were three students interviewed in 3rd year and 10 in 4th year, with a preponderance of women, and students of African ethnicity, as is reflective of the intake in this program. Four academic staff (three male and one female) were interviewed (Table 1).

TABLE 1: Demographic details for the participants.

	3rd year student		4th year student		Academic staff	
	Male	Female	Male	Female	Male	Female
Gender	1	2	3	7	3	1
Age range (years)	20	20-21	20-24	20-24	38-62	39
African	1		3	4	2	
Caucasian				1		
Asian Indian		2		2	1	1

Four themes were identified, namely, learning culture, social nature of learning, student attributes, and learning in the time of COVID-19. These themes reflect various dynamics which influence learning during a work-integrated learning context for clinical technology students. The themes supported by participant quotes are presented below. Participants are identified by role and unique identifying letters, for example, in S-SS, S refers to student and SS refers to the unique identifier, and in, A-MD, A refers to academic with a unique identifier.

Theme 1: The Learning Culture

The first theme relates to the learning culture within the clinical environment and seems to have been the central theme across the findings. This theme encompasses three categories namely a supportive learning environment, constraints within the clinical environment, and affordances within the clinical environment.

A supportive learning environment

A supportive learning environment is reflected in the way the clinical environment's management supported teaching and learning of students. Some students indicated that they had been provided with opportunities to learn and work independently, implying that they felt supported in their learning "you were putting what you learned in the third year into actual practice and now you were doing everything independently. It was a good experience" (S-SS) and "yes, he had a plan for us every week what we were going to do, and he planned everything for us" (S-KM). Other students reported that they were often left unsupervised, with no guidance in terms of learning "you know, they're supposed to be supporting us but was not really doing that" (S-AS).

The degree of coordination between academics at the university, clinical supervisors, and staff at the hospitals, was also linked to the way in which a supportive learning environment was created. Academics suggested that a lack of coordination in terms of teaching and learning created tensions in the implementation of procedural guidelines between the university and hospitals, as well as a sense of distrust. One of the academics suggested that a more structured framework for teaching guidelines would assist in improving coordination among these two stakeholders:

So, I think if we have a strong MOU [memorandum of agreement] between the university and facilities, they will also know that they are governed by some document with set principles that everyone must follow, including us at the university. (A-MD)

A supportive learning environment also seems to have been influenced by staff (clinical technologists and nurses) and clinical supervisors' attitudes to teaching and learning, which determined the way students experienced learning. Students described instances where staff displayed negative attitudes, including demeaning comments about their performance. Students also felt that there was an expectation that they needed to know everything and were often bombarded with questions. Some reported that experiences were negative when support from clinical supervisors in terms of learning, was not always available "I had very insulting comments said to me a lot of times; things that indicated that I shouldn't be studying at all" (S-SS) and "you know not a lot of people wanted to teach at that point and it was kind of every day, because I'd be interrogated with questions the following day" (S-ST).

Negative attitudes of staff towards teaching were linked by some students to the nature of the degree program. Since this is a new program, staff were not clear about the scope of students' function in the training unit, which affected the level of support received, and ultimately influenced students' learning experiences in a negative way "it was really hard; we didn't get that support. I felt like there was that thing because we were doing degrees, so they had some attitude towards us" (S-AS).

Conversely, some indicated that there were higher expectations from students undertaking the degree program that resulted in additional pressure on students:

Because we are a degree group so yeah, so I mean, doing a lot was expected from us, to say the least, and a lot was asked from us. So, we had to perform at a very high level, and you know apply ourselves at a higher level. (S-NM)

Students also had varying opinions about the doctors' attitude towards them and their learning. Although doctors are not directly responsible for supervision in the clinical environment, their negative attitudes, such as harsh and aggressive behaviors, made the learning environment unpleasant for students. Furthermore, this experience diminished their confidence in performing tasks, as well as

eroded their participation in the healthcare team “the doctors would lash out, you know, so for me, I knew ‘okay, you're not even responsible for those kinds of things’, so it sort of like crushes your confidence” (S-NM).

A more supportive learning environment was described as instances when clinical supervisors and other members of the healthcare team were eager to teach and helped to integrate theoretical content with clinical skills “some of our supervisors were eager to teach us, they didn't just do it because it was sort of their job, but you know, you'd know that this is something they want to do” (S-NM), and “because all the doctors there, you can talk to them, they did help you with whatever problem you had regardless of whether it's school, or it's not related to school” (S-AK).

The learning culture was also reflected in the way teaching and learning activities were embedded in the everyday practices of the clinical environment. Some students suggested that the learning culture was not conducive to learning, because teaching rounds were not tailored around the needs of clinical technology students:

So, you get there, and the doctors have all the interns, and they all come in, and they have a huge program that you are welcome to join. But it's not aimed at us, so it is a little bit above what we need to know. (S-MB)

Constraints within the clinical environment

Students felt that the constraints to learning in the clinical environment stemmed from several different workforce-related factors including understaffing, resulting in students having limited time to focus on their learning objectives “and you're working the whole day, you want to just come home, and do your own thing. But sometimes by the time you get home, you're so tired” (S-PG). Furthermore, some suggested that outdated practices by staff created confusion among students:

So, some of this stuff was a little bit outdated when we were learning it, and if you ask someone for help, they'll tell you oh, yeah, this is how we used to do it you know back in the day. (S-MA)

Academics echoed the students' views, highlighting several constraints within the clinical environment. These included the lack of exposure to the necessary procedures, the lack of opportunities to learn, and the hesitancy of hospital management to accept students. There seemed to be an expectation from academics that staff in the hospital needed to know what students should do as well as create opportunities for students to learn “so, they need to be given, that opportunity to do the work that is related to academia” (A-DCM).

Affordances within the clinical environment

There were also many affordances during work-integrated learning as suggested by students. There was a sense that learning within the clinical environment broadened the student's perception of their abilities. Some even indicated that there was a surplus of work-based training, such as workshops provided by external companies, as well as through exposure to a variety of procedures, and people with skills “I enjoyed the training that we were offered. We were offered quite a few and that helped us with our CPD points. So, in that sense, the training was absolutely good, and I've learned quite a lot” (S-ST). It is clear that the experiences of students across the different training units varied.

Theme 2: The Social Nature of Learning

Students' learning experiences were influenced, to a great extent, by the quality of their interactions with different individuals in the clinical environment. These included staff, peers, and clinical supervisors. Students indicated that their learning experiences were positive when staff in the clinical environment were accommodating, and respectful. Some students went to the extent of saying that the interactions with staff resulted in them learning to be professional and respectful. This highlights the critical benefits of role-modeling in the clinical environment, as indicated by two students "the one thing I'm happy about is the environment because no one ill-treats you, no one is gossiping" (S-PG), and "I have seen how people carry themselves at work. You just learned that you have to be professional at all times and show respect" (S-KM).

Disrespectful, demeaning, and unpleasant behaviors from staff were described as limiting and preventing effective learning from taking place. The limitation on learning was further perpetuated by a perceived lack of empathy from staff "you know there wasn't a very understanding point of view. I had very insulting comments said to me a lot of times things that indicated that I shouldn't be studying at all" (S-SS).

Interactions with peers seemed to have been rewarding for students and the sharing of similar experiences with peers helped them cope. Others suggested that the fact that peers were involved in teaching made their learning experience more positive, highlighting the benefits of peer teaching:

I also found that it was quite nice having the small group of us at one hospital because it, I found that it helped with the teamwork, we buckle down and worked as a team and bounced off each other and helped each other along the way. (S-MB)

It was expected that interactions with the clinical supervisors would play a critical role in students' learning experiences, and this was described by students in this study. Positive interactions occurred when clinical supervisors were supportive, easy to approach, and motivated students to perform better "she's that type of clinical instructor who always pushes for the best and if you don't give the best, she's not happy. So, I feel like she helped me a lot" (S-SS).

However, this was not the case for all students. Some reported that experiences were negative when they had to deal with the authoritative way of the clinical supervisors "they make you feel so inferior. In my previous unit, my supervisor will swear at me in front of patients. That used to make it seem like I'm even more incompetent for no reason at all" (S-PG), "well, our supervisor was super strict and sometimes it's really hard to work with her" (S-AS).

Theme 3: Student Attributes

This theme reflects how the attributes of the students influenced their learning experiences and relate to the level of motivation of the student, how they fit into the clinical environment, and the various coping strategies they developed during this experience. Academics had various ideas about how students' attributes influence their learning experiences, such as student diversity (in terms of learning differences); language, and level of prerequisite knowledge (secondary school level) in certain fields e.g., science "students lack certain skills needed to understand the theory" (A-SG); "In my field, you absolutely have to understand the science and you have to have a strong grasp of the language. So that is one of the problems again with our students" (A-PG).

Students also voiced the struggles that influenced their WIL experience. Echoing what the academics reported, they spoke of language issues since many of them were from different parts of the country “we don't speak the same language. We went to Pretoria and people were speaking Tswana; Venda whatever language and we couldn't understand that” (S-AK). Furthermore, challenges such as adjusting to working as a full-time employee, time management, and communication with the healthcare team were highlighted “I think the students struggled when it came to time management and communicating” (S-MA).

There were however various coping mechanisms that students reported which assisted them to adapt to the clinical environment. There was a sense that although this environment was initially overwhelming, the various challenges they were confronted with eventually assisted in increasing their level of maturity, adaptability as well as ability to excel in academics:

Although I felt like I was under a lot of pressure, I did very well for the year. I think for most of my modules I got distinctions which is surprising because I felt like the fourth year was the pressurizing year. But I think also the maturity came into play that now you mature enough. (S-SS)

The clinical environment also assisted students in developing resilience, improving confidence, assertiveness, time management, leadership attributes, and communication. It appeared that the pressures and stresses of the clinical environment contributed positively to students' self-development:

So, I think you develop a lot of resilience throughout your degree because you always have to keep pushing and I mean it is challenging it's just that you have to work out to overcome the challenges. I think with me, my confidence grew by being in the working environment because you realize that if you don't speak up and if you just sit you tend to get forgotten in the background. (S-MA)

Students offered various recommendations for improving their own learning experiences including using every available opportunity during work to practice skills; reflecting on their experiences to identify any potential shortfalls in their preparation, adopting good time management, and setting clear goals for each day. Other recommendations were taking charge of their learning through initiating learning sessions with staff and clinical supervisors; setting a pace for learning that ensures learning objectives are covered; adopting a more positive attitude to learning and maintaining a more holistic view of their studies by trying to view the outcome (that is the completion of rotations). Finally, they recommended finding a way to balance work, study, and life:

I set little goals...So I would say to myself, okay, this week, I'm focusing on getting comfortable with the stress tests, and I would then watch and ask questions and read up on my own, and then I would feel a lot more comfortable doing it. (S-MB)

Theme 4: Learning in the time of COVID-19

Although the study did not look specifically at the influence of the COVID-19 pandemic on learning experiences, this factor inevitably surfaced in the data, as restrictions related to the pandemic were dominant at the time of data collection. The pandemic seemed to have mostly negative influences on students' learning experiences, where due to the restrictions to prevent the spread of COVID-19, fewer patients attended the clinics, resulting in students having decreased exposure to procedures and opportunities to practice:

At first, it kind of just put a pause on everything. So, our clinical training stopped. And we didn't go in for quite a while and then when we came back; we found that even though we were coming into work, our clinics were all closed. So, we had a lot fewer patients that we saw. (S-MB)

COVID-19-related changes in schedules also created uncertainty, and confusion and caused students to lose concentration:

So, you had to work one week, go home two weeks. So, within that period, that whole two weeks, you're not doing anything. In a month, you're only working one week. So, it became a problem that you are going to forget you're going to sit in your room and forget that you even have school. (S-AK)

Even after restrictions were lifted, students seemed to have had adjustment issues, for example, they felt out of practice "but with those four months, I stayed at home doing nothing and having to go back to the unit and then they having to shout at you that you have forgotten how to get this view" (S-AK). There also seemed to be huge gaps in their practical exposure as they needed to rotate to training units that required them to work as staff. Ultimately this time created a huge level of anxiety since students had to also make up the lost time and procedures "so, in terms of my practical aspects, there was a huge gap because I wasn't at work every day" (S-NP).

Many participants highlighted the impact of the COVID-19 pandemic on their emotional states, including psychological strain due to insecurity, the anxiety of not finishing timeously due to COVID-19, or not completing their qualifications. They also cited the feeling of uncertainty in terms of how they were going to be viewed by future employees, due to completing a qualification during the time of the pandemic.

Other factors that contributed to the negative emotional state include isolation due to the lockdown restrictions placed on them, fear of infecting others, and fear of being infected "so, my biggest fear was bringing that home to my family and if something happened to anyone, I would feel personally responsible" (S-MA).

DISCUSSION

This study aimed to explore students' and academics' perceptions of the factors that influence students' learning during their WIL in the third and fourth year of the Clinical Technology Degree program. Through interviews with 13 students and four academics, four themes emerged that influenced students' learning, namely, learning culture, social nature of learning, student attributes, and learning in the time of COVID-19.

WIL serves a distinct purpose, which is to produce competent graduates who can function across diverse settings (Cooper et al., 2010). WIL in the context of health professions education should be structured in a way that allows students to integrate knowledge learned in the classroom with skills in the clinical environment. The findings from this study reveal that the support students received in their learning can be inconsistent. These inconsistencies often led to students feeling a sense of confusion and distress, as they didn't know what to expect. Furthermore, although positive learning experiences are at times created by the clinical supervisor and student, these experiences are in most cases influenced by the way the management prioritizes patient care over the teaching and learning of students.

WIL involves a partnership between the educational institution, students, and external partners (Cooper et al., 2010). In the case of this study, this would be the university, students, and staff in the hospitals. The lack of coordination across different stakeholders was evident in this study, with a clear indication of the negative effects on learning experiences. Furthermore, the variability in teaching and learning guidelines seems to create a fragmented WIL structure that creates uncertainty amongst students and their role within the clinical environment. These findings suggest that there is an expectation by both students and academics that the institution needs to provide more structure to create an environment that enables learning. In the case of the clinical environment, these structures could include aligning patient care with teaching and learning so that students are able to learn as they work. It is also necessary to acknowledge the contextual variation that exists across the different clinical environments and develop guidelines on how to prepare students for these variations. Furthermore, greater cooperation and collaboration between various departments across the institution is desired. Considering that clinical environments are often dynamic and variable, there is a need to understand the opportunities in different types of clinical environments and maximize these opportunities for student learning.

The learning culture seems to be the central factor that influences the learning of students. The dissatisfaction of students about the way they were treated by staff is not a unique problem and was evident in other health professions education contexts (Bisholt et al., 2013; Flott & Linden, 2016). These studies report that students' level of motivation to learn was affected by the healthcare teams' attitude to teaching and learning and that students expected to be exposed to learning objectives and also wanted some sort of emotional support from others, including the doctors and the nursing managers. It is thus critical to understand what students need in order to learn, to determine what makes a conducive learning environment. Pertinent aspects raised by students in this study were the need to be treated more like members of the team, and greater sensitivity towards their learning needs.

Most effective WIL takes place when students are given opportunities to actively participate in learning activities within a team (Andersson et al., 2022; Trede, 2012). In this study, it appeared that some healthcare teams were either unaware of or disinterested in what was expected of students and, therefore, did not include students in procedures that were necessary to develop clinical skills. This lack of support by individuals in the healthcare team within the clinical environment has been echoed in many studies related to student learning (Abery et al., 2015; Berkhout et al., 2015; Prakaschandra et al., 2023). However, in this case, perhaps it is not the healthcare team's lack of willingness to teach but the lack of insight into the requirements of the new degree and lack of knowledge of their role in teaching students. There is thus a need to make explicit the role of the individuals in the healthcare team so a more coordinated and communicative effort can be made to teach students in the clinical environment.

Students and academics highlighted various enablers and constraints to learning during clinical technology students' placements. It appeared that the way learning was integrated into work-based practices played a fundamental role in how students were able to cope with the demands of being a student. Ultimately these findings demonstrate that the clinical environment in which students undertake work-integrated learning is a dynamic space. Within this space, many contextual and interrelated forces influence students' learning experiences. Exploring these forces while attempting to maximize these for the benefit of learning, may assist in improving the learning experiences for students.

The social nature of learning speaks to current literature on health professions education where students learn by interacting with others (Swanwick, 2008; Walton & Steinert, 2010). Lave (1991) argues that students learn to apply knowledge and skills within specific contexts by being socialized into the community of practice. Critical to this socialization is the development of relationships that foster respect and mutuality, contributing to a more enabling environment for learning (Wenger, 2000). The findings reveal that students' interactions with others in the environment were variable, with some being positive and others negative. There is an expectation from students that staff, doctors, peers, and clinical supervisors need to contribute to their learning. This points directly to the communication between the university and the clinical environment of the expectations of the different role-players in the learning environment. Although these tensions have been reported in other universities around the world (Rowe et al., 2022), a consensus amongst all stakeholders involved in the training of students must be reached particularly regarding disciplinary knowledge and graduate attributes (Hill et al., 2016). Furthermore, students need to harness the learning opportunities in the clinical environment by making an effort to contribute meaningfully to the healthcare team, which in itself, requires a measure of initiative.

Results suggest that even though those in the clinical environment acknowledge the presence of students, it is mostly work-driven with less priority given to learning. The demands of work are a reality in the clinical environment which needs to be acknowledged by management, students, and academics. This trend is in keeping with the shifts seen in the higher education space, where alignment between the goals of business, government, and education appears to drive the 'commodification of teaching and learning' (Cribb & Gewirtz, 2013) agenda. However, although this evolution in higher education may be inevitable, there must be more attention to balancing working and learning by planning the allocation of students more purposefully, as well as enhancing those generic graduate capabilities which would allow students to function effectively in the clinical environment.

The findings are also consistent with the literature on self-regulated learning where it is suggested that students' level of motivation influences their learning experiences (Ballouk et al., 2022; van Houten-Schat et al., 2018). It is clear that the student's level of motivation influenced how they adapted to the challenges of the clinical environment. Students also have diverse learning needs, and these learning needs are influenced by various factors such as culture, language, life circumstances, and responsibilities. While it is not always possible to address each individual need, there must be an awareness that students learn differently (Hess & Frantz, 2014). With this understanding, there should be flexibility in teaching and accommodating students during the learning process. Furthermore, there needs to be a focus on what students need to do to learn and what they believe is their role in their learning.

The effects of the COVID-19 pandemic on students' learning experiences were highlighted in this study. While these effects need to be acknowledged and students need to be supported, there must be a more concerted effort to prepare academics, clinical supervisors, and students for the unpredictable nature of the learning environments. Similar ideas have been reported by Al-Fadhel et al. (2022), who recommended a blended learning approach to accommodate the needs of students, as well as the development of teachers to prepare them for teaching across different environments. In concurrence with these authors, our study recommends that these individuals must be equipped with the skills to adapt to any environment while making the most of the teaching and learning opportunities available.

This study also highlights the significant influence of the hidden curriculum on students' learning experiences, which is often quite different from what was planned in the formal curriculum.

Furthermore, the idea that many of the professional behaviors were learned from observing others highlights this notion of the power of the hidden curriculum (Benbassat, 2014). So, although the new curriculum may have been well planned to integrate the theory with clinical skills, a more structured approach is needed in terms of creating enabling learning experiences for students across both spaces for learning, by considering what the hidden curriculum has to offer.

Limitations of the Study

This study was undertaken in the context of a Clinical Technology Degree program in South Africa with a limited number of participants. A similar study across other or many disciplines with a greater number of participants would provide deeper insights.

CONCLUSION

This study has shed light on factors that influence the learning experiences of Clinical Technology students during WIL. The implications of these findings for students undertaking WIL in South Africa as well as clinical supervisors and managers of healthcare settings where students are placed for clinical learning, have been highlighted. The reality is that the clinical environment is a dynamic space offering various challenges and affordances for learning. There are also contextual variations across different learning spaces, and these variations could cause conflicts or create newer learning opportunities. Shifting the focus to harnessing these contextual variations, to create a more adaptable learning experience for students would seem to be relevant for those implementing health professions education curricula, particularly in an era where shifts in higher education are being driven by other stakeholders like industry and government. A balance between vocationalism and achieving the required depth of specialized knowledge and skills for the profession needs to be achieved. Whilst improvements in the clinical environment might influence students' learning experiences positively, perhaps more essential is empowering students to adapt to the dynamic and variable nature of this environment, which hinges on students becoming co-creators of their own learning experiences.

REFERENCES

- Abery, E., Drummond, C., & Bevan, N. (2015). Work integrated learning: What do students want. A qualitative study of Health Sciences students' experiences of a non-competency-based placement. *Student Success*, 6(2): 87-91.
- Al-Fadhel, H., Aljalalma, A., Almuhanadi, M., Asad, M., & Sheikh, U. A. (2022). Management of higher education institutions in the GCC countries during the emergence of COVID-19: A review of opportunities, challenges, and a way forward. *International Journal of Learning in Higher Education*, 29(1), 83-97.
- Al-Zayyat, A. S., & Al-Camal, E. (2014). Perceived stress and coping strategies among Jordanian nursing students during clinical practice in psychiatric/mental health care courses. *International Journal of Mental Health Nursing*, 23, 326-335.
- Andersson, A., Graneheim, U. H., & Nilsson, M. S. (2022). Newly graduated nurses' work-integrated learning: A qualitative study from an educational and occupational perspective. *Nurse Education in Practice*, 59, 103290.
- Arantes, M., Andrade, P. J., Barbosa, J., & Ferreira, M. A. (2020). Curricular changes: the impact on medical students' knowledge of neuroanatomy. *BMC Medical Education*, 20, 20-25.
- Arieli, D. (2013). Emotional work and diversity in clinical placements of nursing students. *Journal of Nursing Scholarship*, 42(2), 192-201.
- Ballouk, R., Mansour, V., Dalziel, B., McDonald, J., & Hegazi, I. (2022). Medical students' self-regulation of learning in a blended learning environment: A systematic scoping review. *Medical Education Online*, 27(1), 2029336, <https://doi.org/GOI.ORG/10.1080/10872981.2022.2029336>.
- Benbassat, J. (2014). Role modeling in medical education: The importance of a reflective imitation. *Academic Medicine*, 89, 550-554.
- Berkhout, J. J., Helmich, E., Teunissen, P. W., Van den Berg, P. W., Van der Vleuten, C. P. M., & Jaarsma, A. D. C. (2015). Exploring the factors influencing clinical students' self-regulated learning. *Medical Education*, 49, 589-600.
- Billett, S., & Sweet, L. (2015). Participatory practices at work: Understanding and appraising healthcare students' learning through workplace. In J. Cleland & S. J. Durning (Eds.), *Researching medical education* (pp. 117-128). Wiley.

- Bisholt, B., Ohlsson, U., Engstrom, A. K., Johanssen, A. S., & Gustafsson, M. (2013). Nursing students' assessment of the learning environment in different clinical settings. *Nurse Education in Practice*, 14(3), 304-310.
- Bissell, V., Robertson, D. P., McCurry, C. W., & McAleer, J. P. G. (2018). Evaluating major curriculum change: The effect on student confidence. *British Dental Journal*, 224(7), 529-534.
- Blomberg, K., Bisholt, B., Engstrom, A. K., Ohlsson, U., Johansson, A. S., & Gustafsson, M. (2014). Swedish nursing students' experience of stress during clinical practice in relation to clinical setting characteristics and the organisation of the clinical education. *Journal of Clinical Nursing*, 23, 2264-2271.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2):77-101.
- Bulman, C., & Schutz, S. (2013). *Reflective practice in nursing* (5th ed.). John Wiley & Sons.
- Carpenter, C., & Suto, M. J. (2008). *Qualitative research for occupational and physical therapists: A practical guide*.
- Chan, D. S. (2002). Development of the clinical learning environment inventory: Using the theoretical framework of learning environment studies to assess nursing students' perceptions of the hospital as a learning environment. *The Journal of Nursing Education*, 41(2), 69-75.
- Cooper, L., Orrell, J., & Bowden, M. (2010). *Work integrated learning: A guide to effective practice*. Routledge.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design choosing among five approaches* (4th ed.). SAGE Publications.
- Cribb, A., & Gewirtz, S. (2013). The hollowed-out university? A critical analysis of changing institutional and academic norms in UK higher education. *Discourse: Studies in the Cultural Politics of Education*, 34, 338-350.
- Crookes, K., Crookes, P. A., & Walsh, K. (2013). Meaningful and engaging teaching techniques for student nurses: A literature review. *Nurse Education in Practice*, 13, 239-243.
- Davies, D., & Dodd, J. (2002). Qualitative research and question of rigor. *Qualitative Health Research*, 12 (2), 279-289.
- Davis, C., King, A. A., Clemans, A., Coles, J., Crampton, P. E. S., Jacobs, N., McKeown, T., Morphet, J., Seear, K., & Rees, C. E. (2020). Student dignity during work-integrated learning: A qualitative study exploring student and supervisors' perspective. *Advances in Health Sciences Education*, 25, 149-172.
- De Vos, A. S., Strydom, H., Fouche, C. B., & Delport, C. S. L. (2011). *Research at grass roots for the social sciences and human service professions* (4th ed.). Van Schaik.
- Elfil, M., & Negida, A. (2017). Sampling methods in Clinical Research: an Educational Review. *Emergency*, 5, e52-54.
- El-Masri, M. M. (2017). Non-probability sampling. *The Canadian Nurse*, 113(2), 17-18.
- Elo, S., Kaariainen, M., Kanste, O., Polkki, T., Utrianen, K., & Kyngas, H. (2014). *Qualitative content analysis: A focus on trustworthiness*. Sage Open.
- Embo, M., Driessen, E., Valke, M., & Van der Vleuten, C. P. M. (2014). Framework to facilitate self-directed learning, assessment and supervision in midwifery practice: A qualitative study of supervisors' perceptions. *Nurse Education in Practice*, 14, 441e-446e.
- Flott, A., & Linden, L. (2016). The clinical learning environment in nursing education: A concept analysis. *Journal of Advanced Nursing*, 72(3), 501-513.
- Gheihman, G., Callahan, D. G., Onyango, J., Gooding, H. C., & Hirsh, D. A. (2021). Coproducing clinical curricula in undergraduate medical education: Student and faculty experiences in longitudinal integrated clerkships. *Medical Teacher*, 43(11):1267-1277.
- Hess, D., & Frantz, J. M. (2014). Understanding the learning styles of undergraduate physiotherapy students. *AJHPE*, 6(1), 45-47.
- Hill, J., Walkington, H., & Derek, F. (2016). Graduate attributes: Implications for higher education practice and policy. *Journal of Geography in Higher Education*, 40(2), 155-163.
- Jae Lee, J., Clarke, C. L., & Carson, M. N. (2018). Nursing students' learning dynamics and influencing factors in clinical contexts. *Nurse Education in Practice*, 29, 100-109.
- Janz, T. A., & Pyke, S. A. (2000). A scale to assess student perceptions of academic climates. *Canadian Journal of Higher Education*, 30(1), 89-122.
- Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, 24(1), 120-124.
- Kuiper, R. A., Murdoch, N., & Grant, N. (2010). Thinking strategies of baccalaureate nursing students prompted by self-regulated learning strategies. *Journal of Nursing Education*, 49(8), 429-436.
- Larson, T. (Ed.). (2018). *Improving environments for learning in the health professions: Proceedings of a conference chaired by David M. Irby*. Josiah Macy Jr. Foundation
- Lave, J. (1991). Situating learning in communities of practice. In L. B. Resnick, J. M. Levine & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 63-82). American Psychological Association.
- Levett-Jones, T., Lathlean, J., Higgins, I., & McMillan, M. (2009). Staff-student relationships and their impact on nursing students' belongingness and learning. *Journal of Advanced Nursing*, 65(2), 316-324.
- McDonald, R., Bobrowski, A., Drost, L., Rowbottom, L., Pretti, J., Soliman, H., Chan, S., & Chow, E. (2019). Student perspectives on the impact of an undergraduate work-integrated learning program on admission and transition to medical school. *Journal of Cancer Education*, 34, 768-774.

- McGrath, C., Palmgren, P. J., & Liljedahl, M. (2018). Twelve tips for conducting qualitative research interviews. *Medical Teacher*, 41(9), 1-5.
- McInerney, P., Green-Thompson, L. P., & Manning, D. M. (2013). Experiences of graduating students from a medical programme five years after curricular transformation: A descriptive study. *AJHPE*, 5(1), 34-36.
- Meyer, R., Archer, E., & van Schalkwyk, S.C. (2022). The private healthcare setting as a place for educating nurses: A qualitative exploration. *International Journal of Africa Nursing Sciences*, 17,100483.
- Palmer, A. M., Burns, S. E., & Bulman, C. (1994). *Reflective practice in nursing the growth of the professional practitioner*. Wiley.
- Prakaschandra, D. R. (2015). *Programme overview: Curriculum map (Including Ecp/Foundation provision)*. Durban University of Technology.
- Prakaschandra, D. R., Meyer, R., & Bhagwan, R. (2023). An exploratory study of the clinical technology undergraduate program in South Africa: Preparedness of students for clinical practice. *Journal of Education and Health Promotion*, 12, 20-28.
- Rowe, A. D., Ferns, S. J., & Zegwaard, K. E. (2022). The future of work-integrated learning: Vision and insights. In S. J. Ferns, A. D. Rowe, & K. E. Zegwaard (Eds.), *Theories, practices and research in work-integrated learning in Australia: Enhancing employability capabilities for a sustainable future* (pp. 251-268). Routledge.
- Smith, C., Ferns, S. J., & Russell, L. (2022). A quality framework for developing and assuring high-quality work-integrated learning curricula. In S. J. Ferns, A. D. Rowe, & K. E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future* (pp. 107-120). Routledge.
- Swanwick, T. (2008). See one, do one, then what? Faculty development in postgraduate medical education. *Postgraduate Medical Journal*, 84(993), 339– 43.
- Tackett, S., Wright, S., Lubin, R., Li, J., & Pan, H. (2017). International study of medical school learning environments and their relationship with student well-being and empathy. *Medical Education*, 51(3), 280-289.
- Teunissen, P. W., Scheele, F., Scherpbier, A. J. J. A., Van Der Vleuten, C. P. M., Boor, K., Van Luijk, S. J., & Jaam, V. D. S. (2007). How residents learn: Qualitative evidence for the pivotal role of clinical activities. *Medical Education*, 41, 763–70.
- Tharani, A., Husain, Y., & Warwick, I. (2017). Learning environment and emotional well-being: A qualitative study of undergraduate nursing students. *Nurse Education Today*, 59, 82-87.
- Trede, F. (2012). Role of work-integrated learning in developing professionalism and professional identity. *Asia-Pacific Journal of Cooperative Education*, 13(3), 159-167.
- Van der Veken, J., Valcke, M., De Maeseneer, J., & Derese, A. (2009). Impact of the transition from a conventional to an integrated contextual medical curriculum on students' learning patterns: A longitudinal study. *Medical Teacher*, 31(5), 433-441.
- van Houten-Schat, M. A., Berkhout, J. J., van Dijk, N., Endedijk, M. D., Jaarsma, A. D. C., & Diemers, A. D. (2018). Self-regulated learning in the clinical context: a systematic review. *Medical Education*, 52(10), 1008–1015.
- Venville, A., Lynch, B., & Santhanam, E. (2018). A systematic approach to the evaluation of the student experience in work-integrated learning. *International Journal of Work-Integrated Learning*, 19 (1), 13 - 21.
- Walton, J. M., & Steinert, Y. (2010). Patterns of interaction during rounds: Implications for work-based learning. *Medical Education*, 44(6), 550-558.
- Wenger, E. (2000). Communities of practice and social learning systems. *Organization*, 7(2), 225-246.
- Zegwaard, K. E., Pretti, T. J., Rowe, A. D., & Ferns, S. J. (2023). Defining work-integrated learning. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook of work-integrated learning* (3rd ed., pp. 29-48). Routledge.