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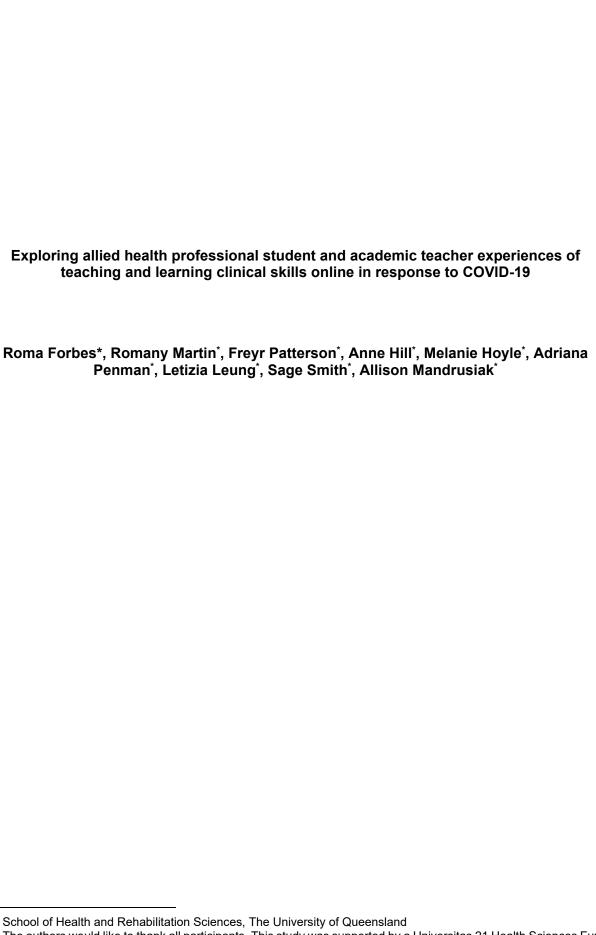
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Exploring allied health professional student and academic teacher experiences of teaching and learning clinical skills online in response to COVID-19

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Abstract

Background: The COVID-19 pandemic has resulted in a shift in the teaching and learning of health professional clinical skills from traditional face-to-face approaches to online platforms in Australia. To date, no research has explored fully online teaching and learning of clinical skills from the perspective of students and academic teachers in the health professions.

Aims: The aim of this study was to explore student and academic teacher experiences of teaching and learning clinical skills online due to COVID-19.

Methods: A qualitative interpretative phenomenological approach was used to investigate health professional student (n=17) and academic teacher (n=10) experiences. Data was analysed thematically and a thematic network tool was applied to identify common themes between the two participant groups.

Results: Three overarching themes were generated: 1) rapid adaptations, 2) additional needs in online learning, and 3) what the future holds.

Conclusion: The findings of this study have highlighted the importance of providing opportunities for effective practice of, and feedback on, clinical skills when using online platforms. Outcomes of the study reveal the need for clinically relevant teaching and learning resources and integrating clinically relevant and authentic activities from the perspective of health professional students and their academic teachers.

I   INTRODUCTION

The COVID-19 pandemic has led to sudden and significant changes in teaching and learning across higher education. Social distancing measures have prevented in-person teaching, forcing many education providers to switch rapidly from face-to-face to online learning (Crawford et al., 2020; Rose, 2020).

Traditional health professional education training relies on face-to-face teaching and learning, with an emphasis on practicing 'hands-on' clinical skills and practical-based assessment. In recent years, there has been an increasing use of a blend of face-to-face and online learning in health professional education (Valentina et al., 2019), however, given the practical nature of clinical skills, complete replacement of face-to-face interactions with online learning has been less frequently reported. Although some research has investigated the effectiveness of online learning on the clinical skills of health professional students, most has centred on blended learning approaches, where online learning is supported with traditional face-to-face teaching (Coyne et al., 2018; Valentina et al., 2019).

Positive student attitudes toward online learning of clinical skills (Mukhtar et al., 2020) indicate that health professional students discern greater flexibility regarding the time, place and speed at which they can participate in learning activities through an online mode (Keis et al., 2017). Furthermore, the capacity to revisit and review online learning materials has also been recognised as a useful tool for consolidating knowledge (Rutt, 2017). Students learning clinical skills online have reported a heightened sense of ownership and responsibility for their own learning outcomes (Gaida et al., 2016), supporting research that online learning may direct health professional students to become more autonomous, self-directed learners (Mukhtar et al., 2020). These attributes have additionally been recognised as promoting the development of lifelong learning skills which are deemed essential professional competencies (Mukhtar et al., 2020). It must be considered however that the perspectives of students towards online teaching and learning of clinical skills has focused on small modules of online learning or where only blended learning approaches are used.

The transition from traditional methods of teaching clinical skills, or those using a blended approach, to a completely online platform exposes several concerns for students and academic teachers (Cleland et al., 2020). Students and academic teaching staff report significant apprehension towards replacing clinical skills teaching in a face-to-face setting with an online approach, outlining specific concerns relating to students' ability to acquire entry-level health professional competencies (Cleland et al., 2020; Mukhtar et al., 2020). The need to adjust to unfamiliar learning platforms when learning online has been documented as a cause of stress for health professional students (Hammarlund et al., 2015). Further concerns for student welfare were raised by Smyth and colleagues (2012) who reported that poor communication between academic teachers and health professional students in online learning created feelings of frustration and anxiety. Health professional students have reported feelings of isolation from their peers and teachers when learning fully online (Wong et al., 2020), potentially impacting their general well-being (Kaup, et al., 2020). These negative experiences associated with online learning may not only impede students' motivation and learning but also may fail to meet their needs and expectations in preparation for healthcare delivery (Regmi & Jones, 2020).

Little research to date has investigated the effectiveness of clinical skills training when delivered fully online. A randomized controlled trial by Maloney and colleagues (2013) compared the efficacy of a face-to-face tutorial, a pre-recorded video tutorial and student-produced videos with remote tutor feedback in the teaching of two clinical skills to physiotherapy students. Student performance in the objective structured clinical examination were comparable between the three groups but concerns regarding the inability to practice with peers and the lack of real-time feedback from tutors were raised by students (Maloney et al., 2013). Furthermore, this online delivery replaced a small topic-specific module of clinical skills teaching, rather than an entire curriculum. Although the literature has explored student experiences of blended learning and small modules of clinical skills teaching online, no research to date has explored the experiences

and perspectives of health professional students or academic teachers towards online learning of clinical skills when used as a complete replacement for traditional pedagogies. Understanding the experiences and perspectives of students and their academic teachers will provide invaluable insights for education providers and the wider health professions to design, deliver and support online clinical skills pedagogies when required as a replacement for traditional learning approaches. Therefore, the aim of this study is to explore the experiences and perspectives of health professional students and their academic teachers when moving to fully online teaching and learning of clinical skills during COVID-19.

II   METHOD

Ethical clearance for this study was obtained from The University of Queensland Ethics Committee (approval number #2020000951).

A   *Study Design*

A qualitative interpretative phenomenological approach was used to investigate student and academic teacher experiences of learning clinical skills fully online. This approach enabled a detailed exploration of the phenomenon from participants' perspectives by allowing their narration of feelings and lived experiences without any distortion or restriction (Alase, 2017). Semi-structured interviews and focus groups were used to facilitate open, authentic discussions of the phenomenon, allowing participants to express freely in their own terms (Cohen & Crabtree, 2006).

For the purposes of the current study, online learning refers to teaching and learning in which (1) the learner is at a distance from the teacher, (2) the learner uses technology to access learning materials and, (3) the learner uses technology to interact with the teacher and with other learners (Anderson, 2011). Clinical skills teaching and learning was further defined by the research team as teaching and learning activities designed to teach or practice skills required for patient care including communication skills, hands on assessment and management skills and other skills including but not limited to interprofessional skills, handling skills and manual therapy skills that would normally be delivered in face-to-face settings.

B   *Participants*

Entry-level allied health professional disciplines were selected purposefully at a single university. Disciplines were selected based on those that were traditionally delivered predominantly in face-to-face settings and required a complete shift to online learning due to circumstances associated with COVID-19. This shift occurred over a one-week period during March 2020, which saw academic teachers prepare and move all traditionally classroom delivered teaching and learning activities to online platforms. The disciplines selected for inclusion were physiotherapy, occupational therapy, speech pathology and audiology. Students and academic teachers experienced the delivery of online clinical skills teaching for all clinical subjects for the remainder of the university semester (March – June, 2020). The study was designed to specifically capture these experiences during the online delivery of all clinical skills teaching. Learning activities which shifted to an online mode were activities that were usually completed in a classroom setting including lectures, tutorials, and practical classes.

Two participant groups were involved in this study: (1) students and (2) academic teachers. Students were invited to participate if they were in the first three years (physiotherapy, occupational therapy, speech pathology) or two years (audiology) of their full-time entry-level program. This was to ensure that potential participants had experienced the shift from face-to-face to online learning of clinical skills to enable reflection on recent experiences. Purposive sampling was undertaken of academic teachers from each discipline to reflect diversity of educational roles. This sampling purposefully aimed to include those with and without coordination roles where there was responsibility for development of learning activities in addition to student communication and teaching delivery to ensure a breadth of experiences. All

recruitment occurred in June 2020 near the completion of semester one course requirements and following at least 6 weeks of full-time online learning.

Student participants were invited to participate in the study via direct email correspondence from the project team and through advertisements on their course learning sites. Academic teachers were invited by direct email from the research team. The initial invitation, outlining the study topic and inclusion criteria, invited participants to reply with their availability for interviewing (students) or focus groups (teachers). Following participants' email reply, a second email was sent to arrange a mutually agreed time for interviewing (students) or focus group (teachers).

C   *Procedure*

The semi-structured interview and focus group frameworks (Figure 1 and 2) were developed by the research team, as informed by previous literature in the field. The draft frameworks were reviewed in iterations to ensure questions were unbiased, unambiguous, and appropriate to address the research aims. The interview framework was piloted on two individuals to ensure clarity and appropriate timing of questions, as well as to foster interviewers' familiarity and confidence with the interview procedure (Minichiello et al., 2008). The interviews were performed by two members of the research team separately (RF, RM) and the two research members used the same interview framework and met after each interview to ensure consistency and to monitor and update the interview framework as required. Both focus groups were conducted by the same researcher (FP). Interviews and focus groups were conducted over Zoom (2020) and audio recorded. Interviews were transcribed verbatim by the interviewers (RF, RM) and focus group data were transcribed by members of the research team who were present during the focus groups (SS, LL). Twenty-seven students responded to the email expressing interest to participate. Nineteen student respondents were then purposively selected to reflect a range of disciplines, gender, and years of study and were emailed in response. Seventeen respondents consented for interviewing. All remaining potential student participants were informed via email that participation was no longer required. Of the 12 academic teachers who were purposively selected and emailed by the research team, 10 were available for participation in one of two focus groups. Interviews were a mean of 32 minutes and focus groups were 52 minutes and 49 minutes in duration, respectively.

D   *Data Analysis*

Transcripts from the interviews and focus groups along with corresponding field notes were analysed concurrently with corresponding data collection. This was performed initially by the lead researcher (RF), with all processes repeated independently by a second researcher (RM), who are both experienced in qualitative research. An interpretative phenomenological analysis approach was used as it seeks to uncover the meaning of lived experiences (Thomas, 2006), allowing an in-depth and nuanced examination of participants' experiences and perceptions. Data analysis followed the framework described by Smith and colleagues (2009). Firstly, data immersion occurred through listening to, and completing transcription of interview and focus group recordings, followed by repeated reading of transcripts by the lead researcher (RF). An inductive approach was used to generate initial codes. Codes were gathered into subthemes, which were further integrated into overarching themes if commonalities or interrelationships were recognized. The emerging subthemes were pursued further through subsequent interviews (students) if required, then were validated, or disqualified, depending on the findings. The candidate themes and subthemes were subjected to continuous comparison and differentiation to ensure appropriate categorisation and eventual consensus between the two lead authors (RF, RM). Candidate themes and subthemes were shared within the research team across several meetings. A thematic network tool was used to further identify and establish consensus on commonality of themes between both participant groups by the lead researcher (RF) (Attride-Stirling, 2001). A thematic network assists the thematic analysis process through organising qualitative data and facilitating "structuring and depicting of these themes" (Attride-Stirling, 2001, p. 387). This included grouping of themes, with concurrent and relevant subthemes reflecting

ideas from individual, or both participant groups. These were further organised into overarching themes that were able to summarise the data (Attride-Stirling, 2001). This process was repeated independently by the second lead researcher (RM), with the research team meeting at further intervals to allow discussion and agreement on final themes.

Several strategies were employed to maximize rigour and reflexivity throughout data analysis. Clear, rigorous documentation of data analysis was implemented to minimize the researchers' potential biases and assumptions. Preconceptions were bracketed during data collection and analysis to distinguish the participants' stories and perceptions from the researcher's own personal experience (Neubauer et al., 2019). It was ensured that interviewees were not personally known to the interviewer and personal questions were avoided during the interviews and focus groups. Further measures were employed to enhance credibility and validity of the study, including weekly team meetings to resolve differences in data interpretation. To ensure accuracy of interpretation, a second researcher (RM) repeated the entire data analysis process independently, and results were compared with the lead researcher (RF). Member checking was implemented to confirm the authenticity and trustworthiness of data collected, where the transcripts were returned to all participants via email to allow checking of data (Creswell, 2014).

III   RESULTS

Student participants were aged between 18 and 49 (mean=26 years), with a higher female (n=13) representation. The sample consisted of physiotherapy (n=8), occupational therapy (n=4), speech pathology (n=3) and audiology (n=2) students. Most participants were in their first year of their program (n=9) and were domestic students (n=15). Three participants had completed previous formal higher education that included substantial components taught in an online setting, however these were not related to clinical skills (Table 1).

Table 1
Student demographic information

Student participant	Discipline • Bachelor (B) • Masters (M)	Age	Year of program	International • Yes (Y) • No (N)	Previous formal online learning experience in higher education
1	Speech Pathology (B)	18	1	N	N
2	Audiology (B)	34	1	N	N
3	Occupational Therapy (B)	21	3	N	N
4	Occupational Therapy (B)	45	1	N	N
5	Speech Pathology (B)	22	3	N	N
6	Audiology (M)	48	2	N	Y
7	Occupational Therapy (B)	23	1	N	N
8	Speech Pathology (B)	18	1	Y	N
9	Occupational Therapy (B)	26	1	N	N
10	Physiotherapy (B)	22	1	N	N
11	Physiotherapy (B)	49	1	N	Y
12	Physiotherapy (M)	25	2	Y	N
13	Physiotherapy (B)	35	3	N	N
14	Physiotherapy (B)	18	2	N	N
15	Physiotherapy (B)	27	2	N	N
16	Physiotherapy (B)	18	3	N	N
17	Physiotherapy (B)	24	3	N	Y

Academic teacher participants reflected all disciplines and included a range of those in coordinator and academic teacher (n=4) and academic teacher only (n=6) roles (Table 2).

Table 2
Academic Teacher demographic information

Educator Participant	Discipline	Co-ordinator Role
1	Physiotherapy	Y
2	Speech Pathology	Y
3	Physiotherapy	N
4	Speech Pathology	N
5	Occupational Therapy	N
6	Occupational Therapy	N
7	Speech Pathology	N
8	Occupational Therapy	Y
9	Audiology	Y
10	Physiotherapy	N

Three overarching themes were generated following analysis: 1) rapid adaptations, 2) additional needs in online learning, and 3) what the future holds, with sub-themes within each.

A   Theme 1: Rapid Adaptations

Within this theme, subthemes of 'coming to terms with change' and 'bespoke resource development and use' were identified. These subthemes are bolded within the text.

Students and academic teachers described a transition to online learning that was unexpected and rapid, requiring significant changes to teaching and learning expectations, delivery, and assessment. Academic teacher participants felt that **coming to terms with change** required immediate upskilling and allowed little time to plan teaching and learning interventions to the ideal standard.

"It wasn't like 'in six months, you will deliver an online course', it was literally overnight" (Academic teacher 1).

"There was an abbreviated, fast grief process that (staff) went through. Like denial, anger, frustration, but acceptance all within the process of 24 hours. So initially, I felt like it was that we've got to get our heads around this and we don't really know how to and we've got to let go" (Academic teacher 8).

The notion of **rapid adaptations** and the efforts needed to move clinical skills online were recognised by students, especially with learning opportunities through **bespoke resources** designed for the setting.

"The staff (recreated) simulations that were meant to be done at uni, they were put on online, so we could still get that real experience" (Student 2).

There were however concerns regarding the quality and relevance of resources that were provided.

"There were some subjects that just ripped lectures from last year. And it was a bit confusing, whereas I am thankful that (our lecturer) re-recorded their lectures for us, so it kind of made more sense and it made the transition a bit easier because it kind of felt like they were still there and they still knew what was going on" (Student 10).

B   Theme 2: Additional needs in online learning

Within this theme, subthemes of 'high levels of engagement and facilitation', 'application to context', 'challenges with practice' and 'the critical role of feedback' were identified. These subthemes are bolded within the text.

There was a strong perception that online teaching of clinical skills was preferred where there were **high and sustained levels of facilitation**. This included features such as setting plans, providing specific activities and topics to students in advance so that they were prepared to

participate, and staff actively facilitating learning rather than leaving students to lead activities or discussion.

"I think one thing that I expected was a little bit more interaction with the (teachers). I think I imagined it to be more similar to actual, like attending your uni? So, like a timetable sort of approach, with more organised learning rather than just a recording being put up online" (Student 4).

"Some of the prac classes are just a panel question and answer session so only helpful if you have questions prepared and want questions answered." (Student 14).

I think some teachers were better, probably in person than they were online. Some teachers just didn't know how to, you know, facilitate and bring the group in and try to make something of the time that we had (Student 15).

Some participants felt that facilitation could be more easily achieved in smaller group settings.

"It's better to be across smaller practical classes. So it's a little bit more individual and I feel like I'd rather ask an embarrassing question in front of 30 people instead of 140" (Student 14).

Academic teachers also recognised the need for **additional facilitation and engagement** when using online platforms.

"I throw a poll out there, and you'd get five out of, maybe 20 students that you knew were online doing it and you had to kind of go 'what's happening to the rest of the 15? Have you walked away from your computer?' Online, I felt like I was just throwing things out to the universe and not necessarily knowing who was on the other side" (Academic teacher 2)

"I found that basically anything that they would feel intimidated doing in a classroom, they felt intimidated doing in an online environment. So if you wouldn't expect a student to be able to put a hand up in a practical class in front of the entire class and say 'I don't get this or can every single person look at me doing this?' It didn't translate to the online environment" (Academic teacher 1).

Some participants had a strong preference that online tutorials and practical classes should focus on learning how to 'apply' skills in relevant clinical contexts. Participants felt that activities with application or clinical context gave them a sense of enacting critical skills required in their profession. Importantly, participants also felt that engaging in activities where content was applied allowed them to synthesise vast theoretical content. Student participants described a range of resources and delivery models that they felt met these needs:

"Short educational videos, or instructional videos, just with somebody explaining what it is to do or how to go about that particular element, I think would be invaluable and really, really help us to get an overall handle on things" (Student 6).

"Rather than just talking through the techniques or showing the videos and answering questions, they then started doing case studies of whatever specific condition that we were learning that week. So then people had to, you know, start thinking about how they would handle that case in real life. So, I found that better because there was a lot more participation from a lot more people" (Student 13).

"We had the experience that students got a little bit sick of us (teachers). So much so that we hit the school up for some conference cameras and put them out into some external clinics that (couldn't) take our students but did agree to take a camera. I think it was a sign that they just wanted to see some clinical experience that was not university driven. They wanted to see some real clinicians" (Academic teacher 9).

Apprehension about, or inability to, **directly practice clinical skills** while at home was a key concern raised by students and their academic teachers. Most felt that their home environment, access to others willing to help and the inability to interact directly with peers or academic teachers were major barriers to practicing skills outside of the university setting.

"When you've got your peers, it's so much easier to talk to them and ask them questions. So, I've had to do it myself and rely on my own kind of thoughts to get me through it…I kind of miss the fact that we can help each other out in a peer sense" (Student 3).

"For the clinical aspects, students had enormous trouble to find appropriate spaces, people to practice on, and adaptations to be able to practice independently. We tried to troubleshoot that with them, but I

think that was really difficult. As first years, they didn't have experience to draw on to practice, or even what that would look like, despite the video resources" (Academic teacher 1).

One student contrasted the difficulty of learning clinical skills online with the ease of being able to "*grab your friend and go and practice stuff*" (Student 14) when learning clinical skills in a face-to-face setting. This was viewed as a potentially negative impact on their future as a health professional.

"It's hard to be competent in important skills without practice, and then you just feel bad, like I just feel guilty that I might be going into the workforce and not be able to do something properly" (Student 14).

Strongly linked to the challenge of practicing at home, participants felt a significant challenge was the loss of the ability to seek and receive **immediate and regular feedback on their skills** from staff and peers as they would in face-to-face classes. One participant reported that if "*you just want to quickly clarify something, you miss that opportunity*" (Student 2*)* which was an adjustment that they were challenged with when learning online.

"(Before) you had your tutors there and you could practice and you could get that immediate feedback from the person whether or not you were doing it appropriately. Whereas it's a lot harder to get that feedback or interpret that feedback online" (Student 9).

Some participants used strategies for learning that were outside direct physical practice, such as mental rehearsal, and writing down clinical procedures. Most participants however felt that they would wait until they could interact with peers or had returned to class where equipment, immediate feedback and group discussion were available to physically practice these skills.

"It's kind of just reading the steps and trying to picture it as best you can, but it's hard not having the real thing" (Student 1).

"…it's never going to be the same as a hands-on experience. And particularly in, like, from an audiology perspective, we don't have the tools that we would use in a real clinical consultation" (Student 2).

Some participants were concerned that they would be forming bad 'habits' if they were to initiate and continue to practice skills in an independent setting that may be incorrect.

"With (face to face) tutorials you can sit and discuss it, but you feel, oh, I've done all this wrong. I'm not doing this right. So I just feel like I'm behind the eight ball all the time. Because my perception has been wrong. And there's been, like, no one to correct (me) because of the situation being at home" (Student 11).

"Practicing at home on family members or friends when you get access to them, you could say 'yeah I'm feeling this, I'm doing it, I'm getting it, I've got it right' and you've got it completely wrong. I had no idea and I think it's going to be harder to try and unlearn what I've probably told myself is the wrong way to do something than starting from scratch" (Student 13).

Academic teachers also recognised the challenges for student learning where there were barriers to feedback even in situations where students were provided with opportunities for feedback over an online platform.

"A lot of it is tactile feedback, and feedback in the moment based on up-close observation. You just can't do that online" (Academic teacher 10).

One academic teacher felt that they had lost the valuable opportunity for themselves to get feedback from students that they had previously relied on for their own teaching in an iterative way.

"I always like to co-design or get input from my students around the course. And even though it may not be a deliberate co-design every year, it's an iterative kind of process that gets built on my feedback from students and my experience from the previous year. So it always has ongoing student input, especially when changes are made" (Academic teacher 1).

C   Theme 3: What the future holds

Within this theme, subthemes of 'real practice is necessary to become a professional', 'anxiety and concern for future practice', 'looking to future opportunities' and 'reflecting on the value of some online delivery' were identified. These subthemes are bolded within the text.

All participants reflected on the value of learning and practice of clinical skills in face-to-face settings. Having access to a learning environment where skills could be practiced with peers, receiving feedback and safe spaces where questions and discussion could be more naturally performed were viewed as valuable, especially in **becoming a professional.**

"You can study teaching online, you can study science online. But I think if you really looked at trying to become a doctor or a physio or an occupational therapist online there aren't really any options available for a reason, because clinical skills are at the heart of what we do. And I think having conversations and connecting with people is the core of being a health professional" (Student 14).

"I think it kind of sets you back a bit, because it's hard to kind of know exactly what to do just from reading something and writing it down, you kind of don't get the full picture" (Student 1).

Most participants voiced a **sense of anxiety and concern** regarding the potential impact of online learning on their clinical competence, with concern for not meeting future standards for clinical immersions or professional practice.

"It's still like I have learned a little bit of clinical stuff but I would not feel confident implementing it outside of university, or out in placement without more practice and guidance" (Student 5).

In the end, we have to go for like physical clinical settings and maybe that can be a bit intimidating for us" (Student 8).

"What happens when we get to the end of the year and these students have missed out on all of this hands-on... how are we going to make that up? Can they graduate without having ever, you know, done that (clinical) content? Those were the sorts of thoughts and concerns that were running in the back of my mind and not necessarily right at the beginning but thinking forward. What do we do after this?" (Academic teacher 10).

Looking toward the future, most participants felt that some aspects of learning could be suited to the online environment, and that where possible this option should be made available for students balancing other commitments.

"I think the lectures are working well online and I think it's nice to have the option whether you want to be there in person or whether you want to... whether you want to participate via video link online, particularly for students who have difficulty in traveling to campus" (Student 6).

There were some things that were actually better (online). I don't think they were easier for the students, but I think they were better for the students in some ways in terms of their skill development" (Academic teacher 8).

Some participants expressed concerns outside the direct teaching and learning of clinical skills, for both students and academic teachers. Feelings of isolation and stress, and negative perceptions of the learning process resulted as a consequence of online learning, and these were raised as considerations for future online teaching.

"I think we are going to need to keep a close eye on mental health, emotional status, the well-being of staff and students. I think we've seen some of the fallout so far, but I think there's plenty more fallout to come. A lot of energy's gone in and I think that we're going to start to see the price paid more and more if those energy levels are needed to be continued to the end of the year" (Academic teacher 9).

IV   DISCUSSION

The aim of this study was to explore student and academic teacher experiences of teaching and learning in fully online modalities during the COVID-19 pandemic. Overall, the results have highlighted key concerns regarding teaching and learning of clinical skills solely online, from the perspective of both students and academic teachers across four health disciplines. In doing so, the results indicate potential avenues for enhancing the engagement and experiences of students in the teaching and learning of clinical skills where online modalities are utilised.

The results from this study reinforce the important role of tailored learning resources specific to the online context, to support clinical skill acquisition. Where the COVID-19 pandemic has disrupted in-person clinical skills training, academic teachers have designed, developed and delivered online learning resources to support clinical skills teaching and learning in a short period of time. Consistent with previous literature, audio-visual resources and virtual clinical experiences were viewed as critical to learning and improving clinical skills (Hurst et al., 2016; Valentine et al., 2019) and for providing flexibility for learning (Srinivasa et al., 2020). Video resources outlining clinical skills were perceived by both students and academic teachers to be valuable in 'bridging gaps' between online learning and clinically-relevant contexts (Gardner et al., 2016), and were considered integral when in-person clinical skills teaching could not be achieved (Mukhtar et al., 2020). However, academic teachers recognised the significant time and support required to develop such resources to support learning (Srinivasa et al., 2020). Despite online resources being perceived as helpful in clinical skill acquisition, given the 'hands-on' nature of manual skills development, the use of online video resources was still regarded by both students and academic teachers as a complement to conventional pedagogies, rather than a replacement for face-to-face teacher-led teaching and learning (Hurst, 2016).

A major theme emerging from the results of this study was that students and academic teachers reflected a strong preference for maintaining face-to-face learning of clinical skills, especially where skills were considered practical or clinically contextual in nature. Students felt that they were missing out on valuable opportunities for teacher and peer interaction that was considered an important part of developing as a professional (Barisone et al., 2019). Immediate academic teacher feedback, correction of technical skills and positive reinforcement in teacher-led activities are considered necessary for skill acquisition (Hurst, 2016), and this was supported by both students and academic teachers especially for activities that are perceived to benefit from high levels of interaction and feedback. These findings support collaboration between individuals in a social learning environment as an essential aspect of the educational experience (Maisto et al, 1999). Although online learning may be utilised in a way that promotes interactive and collaborative learning (Rose, 2018), these findings suggest that health professional students and academic teachers may be missing opportunities for 'joint construction of knowledge' (O'Connor, 1998) that were perceived as more readily accessible within a classroom environment. These challenges extended to opportunities for feedback. Some students were unable to access family members to practice their skills, and when they were able, apprehension to practice persisted due to concerns around the quality and accuracy of feedback needed to enhance their clinical skills (Maloney et al., 2012; Mukhtar et al., 2020). Consideration for teaching clinical skills online must also be given to ensuring clinical skill acquisition is developed and demonstrated to a level of competence required for practice (Australian Health Practitioner Regulation Agency, 2021). Although this study has not investigated the attainment or assessment of clinical skills, it is critical that online learning of clinical skills is designed to facilitate success in appropriate assessment of competence prior to practice.

Both academic teachers and students reported that high levels of facilitation were essential in online learning of clinical skills to be effective. Active guidance from academic teachers in online classes was highly valued by students (Rutt, 2017) and students reflected that facilitation and pre-planning from academic teachers strongly impacted on their engagement with learning clinical skills, mirroring the findings of Du et al. (2013). Online student engagement was thus perceived as inherently different from face-to-face interaction. Research has supported the assertion that

individual student factors, such as experience with technology and attitude towards online learning significantly affects engagement and satisfaction with online learning (Ashouri et al., 2018; McCutcheon et al., 2014; Regmi & Jones, 2020). It was therefore not unexpected that student engagement and active participation was viewed as critical by both participant groups for effective online learning of clinical skills (Fyre, 2020).

Academic teachers faced challenges primarily relating to time and support in creating online environments that would promote active learning, as well as ensuring that students were meeting learning expectations (Kastner, 2019). Providing students with preparation around learning activities was valued by both academic teachers and students, highlighting the 'cognitive presence' expected of academic teachers in focusing on student preparedness for participation and learning online (Anderson, 2001). Reinforcing the importance of accessing online learning resources in advance to prepare for clinical skills teaching sessions also ensured that resources supported teacher-led activities (Rutt, 2017). Furthermore, academic teacher guidance regarding expectations of interacting and engaging in online learning were perceived to be useful (Mukhtar et al., 2020). These findings support existing literature that highlight the importance of online learning that is structured, yet provides opportunities for interaction to promote student self-regulation (Keis et al., 2017; Mukhtar et al., 2020) and satisfaction with learning (Wong et al., 2020).

Lastly, the findings of the current study reinforce learning as a social phenomenon where interaction and collaboration between students and academic teachers is an important process that fosters academic dialogue and promotes professional socialisation (Regmi & Jones, 2020). Conversely, it was recognised that online learning may lead to feelings of isolation, highlighting the potential consequences of online platforms for social processes of learning (Adams & Timmins 2006; Du et al., 2013). These findings highlight the role of the academic teacher in maintaining a social presence whereby open lines of communication are maintained, especially in the absence of spontaneous student-student and student-teacher interactions that occur naturally in face-to-face settings (Anderson et al., 2001).

V   IMPLICATIONS

The findings of this study indicate that academic teachers and learning designers should consider approaches to online learning of clinical skills that facilitate student participation and engagement. This should also consider the clinical relevance and context of the skills being taught or practiced and embed these into online learning where feasible. The results also highlight the time and support required by academic teachers for the development of online clinical skill teaching resources. Strategies to provide opportunities for feedback should be considered, given the critical role of feedback in learning clinical skills (Kneebone et al., 2005). This study provides a benchmark for investigation into other health disciplines, such a nursing, medicine and dentistry that also feature clinical skills learning. Further research is warranted to better understand the long-term outcomes and impacts on students transitioning into clinical placement settings and impacts on the workforce readiness of these graduates.

VI   LIMITATIONS

The study was conducted at a single university site which may limit the generalisability of the findings to wider settings. However, students and academic teachers reflected a range of year levels and disciplines and therefore represented teaching and learning across a range of clinical skills. Furthermore, no year specific or discipline specific differences emerged from the data. Participants were volunteers and, therefore, a self-selecting group. Issues may have been missed that related specifically to students and academic teachers who did not volunteer, for example, academic teachers or students who have a particularly negative or positive view of online learning or students who discontinued study. Lastly, perspectives of online assessment were not explored within the study.

VII   CONCLUSION

This study is the first to explore health professional student and academic teacher experiences and perspectives of the teaching and learning of clinical skills in an entirely online environment. The findings of the study highlight the role of tailored and specific resources designed to support online learning of clinical skills and the importance of embedding clinically relevant and contextual activities into online learning. This study has raised concerns regarding opportunities for effective practice of and feedback on clinical skills from the perspective of both students and academic teachers, which may benefit from additional administrative and pedagogy training and support for use in an online setting. Enhancing and providing curricula and academic teacher support for the development of opportunities for peer and teacher feedback may facilitate student learning and contribute to the experiences of health professional students learning clinical skills online during, and beyond, the COVID-19 pandemic.

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