



2026

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Pedagogical Lessons from Teaching Telehealth via Online Modes: A Systematic Review

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Abstract

Interest in telehealth has led to an increase in the availability of online telehealth courses. Understanding student perspectives of the learning experience and how the courses equip students with the skills for their future professions is warranted. To this end, five health, education, and social science electronic databases and a search engine (i.e., Pubmed, EBSCO, Proquest, Elsevier, and Google Scholar) were searched as part of a systematic review for peer-reviewed research published in English over 10 years (2013-2023). Ten studies were selected for the final review, resulting in the perspectives of 2,305 healthcare students and professionals. The curriculum content and student feedback were synthesised using thematic analyses and presented using a combination of flowcharts and tables. Each study was also assessed for bias using critical appraisal tools for qualitative, quantitative and mixed-method research designs. Key pedagogical themes emerged, including simulations, interprofessional collaboration, resources, self-directed learning, peer learning, feedback, and technology. The use of simulations and interprofessional collaboration emerged as the two most regularly cited aspects of teaching that students found useful. Recommendations described potential inclusion of pedagogical techniques when conducting online training, and teaching methodology requiring further investigation.

I INTRODUCTION

There has been an increase in telehealth practice since the COVID pandemic (Farrer et al., 2023; Sampaio et al., 2021). Whilst telehealth has been used by many clinicians, some continue to lack confidence when using this medium (Ariens et al., 2017). The foundations of telehealth are laid during health care courses, and its effectiveness is based on the application of these skills. During COVID, most university courses transitioned to online learning, creating greater flexibility for student learning which raised some pedagogical concerns (Stoehr et al., 2021). Understanding the lessons learnt from effective online teaching delivery, from the perspective of both students and lecturers, helps plan future training and subsequent delivery of telehealth services. This study describes a systematic review focussed on understanding the pedagogical lessons learnt through online training of telehealth practice.

The World Health Organisation describes telehealth as involving “the use of digital technologies to overcome distance barriers in the delivery of health services” (World Health Organization, 2022). The COVID-19 pandemic lockdown required healthcare services to increase their usage of telehealth (Halcomb et al., 2023).

With increased demand for telehealth services, many clinicians reported lacking confidence and knowledge when using telehealth tools which created barriers to implementation (Ariens et al., 2017). Thus, improving telehealth training has been identified as a service need (Halcomb et al., 2023).

Despite many health care courses including telehealth within their curriculums, Keep et al. (2021) noted that there is non-standardized teaching which may result in inadequate preparation of graduates. Whilst many studies report on the effectiveness of telehealth interventions, there is less reported on the consistency and development of training programmes (Chike-Harris et al., 2021). Some guidelines for creating telehealth training syllabus have suggested topics like simulations, learner preparation, teaching patient-centred virtual care, technology checks and debriefings (Alcocer Alkureishi et al., 2021). Whilst students are keen to learn how to use telehealth, negative experiences may impede learning to establish rapport with clients (Overby & Baft-Neff, 2017).

During COVID, tertiary teaching moved online, requiring more flexible delivery of teaching and access to programmes of study (Ali, 2020). Some studies have reported contradictory student reports of their online learning experiences, where on the one hand, some report that it is a more flexible way of learning, yet on the other hand they also report that teaching is less engaging and social compared to face-to-face classes (Briggs et al., 2023). There are also concerns focusing on technological and instructor competence, engagement, virtual comfort, and social presence (Van Wart et al., 2020).

This brief review of the literature has identified that there is a need to better understand how telehealth may be taught online, given its increased usage, and because some clinicians are not confident in using it. Furthermore, its inclusion in health care curricula has been inconsistent, which may result in some students lacking confidence in implementing it, in light of the move to online teaching. Thus, this systematic review attempts to answer two research questions:

RQ1. What is known about how telehealth curriculum content that has been taught online?

RQ2. What have been the student’s perceptions and experiences about what they have learnt?

II METHOD

The systematic review was conducted in accordance with the PRISMA guidelines and reported using the PRISMA 2020 expanded checklist (Page et al., 2021). As qualitative, quantitative and mixed method studies were reviewed, the PICO method was used to develop the search strategy for this systematic review: (1) *Population* students or professionals, (2) *Interest/Intervention* student perceptions of online courses with embedded use of telehealth, (3) *Context* research methodology of studies focussed on understanding online pedagogical instruction for students learning to do intake interviews using telehealth.

A Eligibility Criteria

The studies included in the systematic review could be qualitative, quantitative, or mixed-method studies that examined student perceptions of online learning in any field that used telehealth to conduct intake interviews. More specifically, the inclusion criteria were (1) students or professionals of any field undertaking online learning (i.e., certificate, undergraduate, postgraduate); (2) telehealth learning and simulations embedded into the teaching curriculum; (3) reports including student perceptions of the online course, and (4) student impressions on confidence and/or knowledge of telehealth. The exclusion criteria were: (1) face-to-face teaching, (2) blended modes of teaching, and (3) therapy (i.e., online or face-to-face) (See Table 1, Figure 1).

B Search

Relevant peer-reviewed studies over a 10-year period (i.e., 2013-2023) were searched using Pubmed, EBSCO, Proquest, and Elsevier. The institution's librarian was also consulted with regard to the search strategy and in developing the search terms. The search used MeSH terms and Boolean operators to identify relevant studies (see Table 1). A manual search using Google Scholar was also conducted for studies identified in an article's reference list that were not available in one of the databases used.

C Study Selection

The records obtained from the databases and search engines were initially screened for duplicates and whether the full text article was available. Following this, the remaining records' study titles and abstracts were scrutinised according to selection criteria. Three reviewers (i.e., Author 1, Author 2, Author 3) independently processed the agreement for potential inclusion. The selected records' full-text articles were subsequently retrieved and read in detail, which resulted in the final number of studies for the review (see Figure 1).

D Data Extraction

To conduct data extraction, Microsoft Excel was used to record the following information from each study: (a) study title and type (i.e., study, review, other), (b) analytic strategy (i.e., quantitative, qualitative, mixed), (c) incorporation of telehealth in the online course, (d) mode of learning (i.e., face-to-face, online, blended), (e) learner characteristics (i.e., student, professional), level of course (i.e., undergraduate, postgraduate, other) and field of study. Additional information was also recorded about each of the studies including technology used to engage in online learning, the type of mental or physical condition addressed in the intake interviews, pedagogy, course duration, mode of learning (i.e., synchronous, asynchronous, hybrid), delivery of teaching (i.e., didactic, interactive), and learning and teaching activities and methods. Three reviewers (i.e., Author 1, Author 2, Author 3) processed the agreement for acceptable study inclusion. Two reviewers independently screened all studies, first by the title and abstract, and followed by reading the full text (i.e., Author 1, Author 2). The final decision

for the selection of studies and any discrepancies between reviewers were resolved by a third reviewer (i.e., Author 3).

E Quality Assessment

To obtain a sense of the quality of the quantitative, qualitative and mixed methods studies, three assessment instruments were used. The Quality Assessment for the Systematic Review of Qualitative Evidence tool (Hawker et al., 2002) was used to assess the qualitative studies. The tool assesses aspects of the study including the abstract and title, introduction and aims, method, sampling, data analyses, ethics/bias, findings/result, transferability/generalisability, implications, and usefulness. The Quality Assessment Tool for Quantitative Studies was used to assess the quantitative studies (Thomas et al., 2004). The tool assesses aspects of the study that includes the selection, study design, confounders, subject blinding of study aims, data collection methods, and withdrawals and dropouts. The Mixed Methods Appraisal Tool was used to assess the studies employing a mixed methods design (Hong et al., 2018). The tool assesses the rationale for the design, study components, integration of qualitative and quantitative outputs, divergences and inconsistencies of results, and adherence of components to the criteria of method traditions. The first and second authors assessed each study using the tools independently, and any disagreement was moderated by the third author.

F Data Analyses and Certainty Assessment

The studies selected varied in their course type and structure, methods of attaining student perceptions, and the outcome variables. The authors synthesised both quantitative and qualitative data to capture the underlying themes. Data were thematically analysed to extract common themes across the studies via coding line-by-line text to identify and generate analytical themes. Verbatim extracts were taken from the eligible studies to code and independently identify themes by two authors (i.e., Author 1 and Author 2) and were approved by Author 3. Identifying the themes in this manner was used to help reduce reporting bias. Certainty assessment involved ensuring that study populations involved students from health care professions, utilised online course delivery which involved a variety of pedagogic approaches and included curriculum content which was relevant to telehealth.

III RESULTS

A Search and selection results

The initial search identified 107 records (i.e., Ebscohost [$n = 91$]; Pubmed [$n = 14$]; Google Scholar [$n = 2$]). 27 records were removed before screening (i.e., duplicates [$n = 9$]; no full text [$n = 18$]) (see Figure 1). The remaining 78 records were scrutinised for the study titles and abstracts. 63 records were subsequently excluded (i.e., focus on telehealth intervention [$n = 54$]; review article or non-telehealth focus [$n = 9$]). Following on, the full text articles of 15 studies were retrieved for in-depth review. Of this, a further 5 studies were removed as the telehealth course was not delivered online.

Ten studies were finally selected for the review that met the criteria for this study. This included four quantitative, four qualitative, and two mixed methods.

To understand what students found to be helpful for learning, the studies reported on feedback from online courses, were obtained at the end of each course. The quantitative studies used survey methodology, the qualitative studies used open-ended interviews, and the mixed methods studies employed surveys, open-ended interview questions and feedback comments. All the studies were cross-sectional in design, and none involved control groups. Data analyses for the quantitative studies primarily involved frequency tables, and the qualitative studies involved qualitative descriptions and thematic analyses, and the mixed-methods studies incorporated both types of analyses (see Table 2).

B Study Characteristics

All studies utilised online delivery of the telehealth curriculum (see Table 2). The students attending the courses came from a broad range of health professions (i.e., medicine, occupational therapy, physiotherapy, pharmacy, nursing, public health, psychology, speech pathology, social work). The studies were conducted across a broad range of countries (i.e., USA, Mexico, Guatemala, El Salvador, Costa Rica, Panama, Ecuador, Colombia, Venezuela, Guyana, Suriname, Brazil, Peru, Bolivia, Argentina, Uruguay, Israel, Australia, Canada, UK, South Africa, Ireland, Romania, India, New Zealand). The curriculum topics were relevant to telehealth (i.e., telehealth clinical practice guidelines, etiquette, video-conferencing systems hardware “camera, microphone, headsets” and software “zoom”, privacy and data storage, medico-legal considerations, electronic medical records, intakes, online interviewing skills, presenting oneself on screen, emergency resources, patient-practitioner relations, information on medical conditions, telehealth benefits). The course content was delivered in a variety of styles which included simulations, video reviews, self-directed learning, group discussions and role-plays. The length of the courses ranged from single 2-hour sessions to 2-day workshops to weekly sessions lasting 32 weeks. Subject matter assessments were evaluated through quizzes where students reported favourable experiences with regard to the programmes. In addition, students also provided positive feedback on the use of e-learning for curriculum delivery (Jones et al., 2021; Wu & Shea, 2022), programme content (Danesh et al., 2019; Rutledge et al., 2020), increased knowledge (Gafni-Lachter et al., 2024; Martin et al., 2022; Tokumaru et al., 2023), increased confidence with using telehealth (Jorge et al., 2021; Martin et al., 2022), and intended future usage of telehealth (Rutledge et al., 2020).

C Study Quality

There was agreement between the authors on the assessment of all studies reviewed. The GRADE approach (Belshem et al., 2011) for the quantitative and qualitative studies, and the GRADE-CERQual (Lewin et al., 2018) was used for the mixed-methods studies to indicate the methodological limitations of individual studies. The Quality Assessment for the Systematic Review of Qualitative Evidence tool (Hawker et al., 2002) was used to assess the quality of qualitative studies. Amongst the four selected qualitative studies, three studies (Browne et al., 2022; Jones et al., 2021; Wu & Shea, 2022) were rated as “High Quality” and one was rated as “Moderate Quality” (Danesh et al., 2019) (see Table 3). The Quality Assessment Tool for Quantitative Studies was used to assess the quality of the quantitative studies (Thomas et al., 2004). The assessment rated the quality of all the selected studies as “Moderate Quality” (Gafni-Lachter et al., 2024; Garcia-Gutierrez et al., 2023; Jorge et al., 2021; Rutledge et al., 2020) (see Table 4). The mixed methods design of the two mixed method studies were rated as “Moderate Quality” (Martin et al., 2022; Tokumaru et al., 2023), using the Mixed Methods Appraisal Tool (Hong et al., 2018) (see Table 5).

D Certainty of Evidence

The certainty of evidence was increased as the studies reviewed were representative of the students attending online telehealth courses. The final sample of studies included in this review also encompassed students from a broad variety of health care professions which included a variety of methods of online course delivery, across a range of time frames, and had curriculum topics that were relevant to telehealth.

E Major Findings

Line-by-line coding of the results of studies yielded seven themes related to the online teaching experience from the perspective of students. The data was analysed using Thematic Analysis, and the occurrence of themes was recorded in an Excel file, where personal bias in the interpretation of that data was reduced by independent recording by Author 1 and Author

2, and moderated by Author 3. Of the 10 studies reviewed, the themes and their frequency, and percentage, of reported occurrence within each study reviewed included simulations ($n = 6$, 60%), interprofessional collaboration ($n = 4$, 40%), resources ($n = 4$, 40%), self-directed learning ($n = 2$, 20%), peer learning ($n = 2$, 20%), feedback ($n = 3$, 30%) and technology ($n = 8$, 80%) (See Table 6).

1 *Theme 1: Simulations*

The use of simulations was reported as helpful for acquiring telehealth skills by six online teaching programs studies (Browne et al., 2022; Danesh et al., 2019; Jones et al., 2021; Martin et al., 2022; Tokumaru et al., 2023; Wu & Shea, 2022). These were reported to be a positive learning experience by pharmacy and nursing students (Tokumaru et al., 2023). Nursing students also reported that simulations helped with learning technical and non-technical skills (Danesh et al., 2019). Mock patient consultations were very effective as a “whole package” to develop knowledge and skills required for best practice for physiotherapists (Jones et al., 2021). Furthermore, simulations helped students to be comfortable when using telehealth technologies and learning about their potential for assisting with integrating skills among mental health clinicians and physiotherapists (Browne et al., 2022; Martin et al., 2022). However, some comments suggested that face-to-face simulations would have been more effective (Tokumaru et al., 2023). Occupational therapy students indicated that simulations would be more realistic if the clinician was actually in a hospital room or alternatively using a virtual hospital background, and if the mock patient dressed like a patient (i.e., dressed in a hospital gown and wearing an identification bracelet) (Wu & Shea, 2022).

2 *Theme 2: Interprofessional Collaboration*

The opportunity to find out about, and work with peers, from other health disciplines whilst learning telehealth was cited by four studies (Browne et al., 2022; Gafni-Lachter et al., 2024; Tokumaru et al., 2023; Wu & Shea, 2022). Psychiatric mental health nurse practitioners, pharmacy, and social work students indicated that interprofessional education, and collaborating with peers, were a beneficial part of the course that focused on telehealth for rural health (Browne et al., 2022; Wu & Shea, 2022). However, pharmacy and nursing students reported that courses that incorporated communication between inter-disciplinary teams could have been improved with an in-person experience (Tokumaru et al., 2023). Furthermore, some students suggested that having additional time for intra-professional discussion on discipline-specific topics would have been beneficial (Gafni-Lachter et al., 2024).

3 *Theme 3: Resources*

The availability of online resources to guide learning was cited by four studies as helpful with the learning process (Gafni-Lachter et al., 2024; Jones et al., 2021; Jorge et al., 2021; Martin et al., 2022). Jorge et al. (2021) reported that the resources provided to the students which included patient information booklets (53.0%), clinician resources (42.3%), and video library (28.9%), were reported to be useful. Other studies reported the availability of therapy tools, games, and case studies and useful video examples of complete mock telehealth consults, as helpful for learning (Gafni-Lachter et al., 2024; Jones et al., 2021; Martin et al., 2022).

4 *Theme 4: Self-Directed Learning*

Having the opportunity to self-direct ones' own learning was cited by two studies as beneficial for online learning of telehealth skills (Jones et al., 2021; Jorge et al., 2021). Student physiotherapists perceived the asynchronous aspect of the self-directed e-learning modules as user-friendly and were positive about the self-paced nature of the programs which were reported to be effective (Jones et al., 2021; Jorge et al., 2021).

5 *Theme 5: Peer learning*

Two studies reported that collaborating with a peer was beneficial (Gafni-Lachter et al., 2024; Wu & Shea, 2022). Occupational therapy students working in the area of spinal cord

and traumatic brain injury, and bipolar disorder, appreciated working with a peer (Wu & Shea, 2022). They commented that when there were gaps in the learning process, their peers were able to step in to assist and help reduce the anxiety when doing online simulations. In addition, psychologists, social workers, speech-language pathologists, physiotherapists, and occupational therapists working in paediatrics, reported the benefits of intra-professional peer learning and requested more (Gafni-Lachter et al., 2024).

6 Theme 6: Feedback

Receiving regular feedback on performance was reported by three studies, as a valuable part of learning (Gafni-Lachter et al., 2024; Tokumaru et al., 2023; Wu & Shea, 2022). Immediate feedback following simulations was beneficial for learning (Tokumaru et al., 2023; Wu & Shea, 2022). Psychologists, social workers, speech-language pathologists, physiotherapists, and occupational therapists working in paediatrics requested more practicums with feedback (Gafni-Lachter et al., 2024).

7 Theme 7: Technology

Technology was cited by eight studies, as sometimes being a benefit to understanding how digital technologies work, and in other instances a challenge to use (Browne et al., 2022; Danesh et al., 2019; Gafni-Lachter et al., 2024; Garcia-Gutierrez et al., 2023; Jones et al., 2021; Martin et al., 2022; Rutledge et al., 2020; Wu & Shea, 2022). On the positive side, the use of telehealth simulations ensured that students understood the importance of practising how to use technology early, and to create contingency plans for disruptions in the service (Browne et al., 2022). In addition, the students also indicated that they appreciated using Polycom technology for most of the class content. These positive experiences were reported as increasing confidence and knowledge of technology skills (Danesh et al., 2019; Gafni-Lachter et al., 2024; Martin et al., 2022; Rutledge et al., 2020). From a negative perspective, unstable internet connections, background noise and difficulty choosing the correct viewing option made the online learning process more difficult (Wu & Shea, 2022). Some students also reported that there were issues with internet connectivity which was linked to students being inexperienced with using telehealth technologies (Browne et al., 2022). Physiotherapy students also reported that unwieldy technological features of the delivery platform (i.e., Zoom, Learning Management System) could be frustrating (Jones et al., 2021). In addition, some health students reported being worried about data-security breaches when using online health related tools (Garcia-Gutierrez et al., 2023).

IV DISCUSSION

This systematic review sought to identify how telehealth curriculum content has been taught online and the students' perceptions about their learning activities. The review included quantitative, qualitative and mixed methods study designs. The 10 studies reviewed addressed the research questions and noted that telehealth has been taught online using the following methods: simulations and feedback, providing online resources, and demonstrating interprofessional collaboration. Furthermore, the studies suggest that students found that online teaching can provide positive opportunities for self-directed learning, encourage peer learning, and help with understanding telehealth technologies.

Students found simulations helpful when presenting the subject in a practical manner. This result is not surprising given that simulations have been widely recognised as a pinnacle in educative practices, particularly in healthcare professions. Pedagogically, learning outcomes may be achieved through interactive case-based scenarios, role-play tele-consultations, virtual patients, physical assessment using mouse-driven interfaces, and electronic health records (Bouamra et al., 2021). Experiential learning creates a shared vision aiding communication and teamwork (Policard, 2014). When developing an understanding of psychomotor and communication skills from a cultural perspective, some palliative care hybrid

nursing programmes have developed the simulation content in collaboration with indigenous communities (Kristoff, 2022).

Students found it helpful to observe clinicians from different disciplines working collaboratively. Other studies note that interprofessional competencies to be developed include interprofessional communication, patient and community centred care, role clarification, team functioning, and conflict resolution (Orchard et al., 2010). Curricula that incorporated interprofessional education reported that students' confidence increased when making clinical decisions, and increased awareness of teamwork (DuBose-Morris et al., 2023). Students also developed an understanding of the skills they needed and were able to structure their training to include telehealth. The interprofessional experience also required students to prioritise communication and role clarity (Walker et al., 2022). Despite these positive learning outcomes, many health professionals are unaware of the competencies they need to develop or maintain, interprofessional collaboration when using telehealth (Poitras et al., 2024). Thus, the focus of courses often tends to emphasise interprofessional communication and being patient/client/family/community-centred, and less on interprofessional conflict resolution.

Online resources such as information booklets, clinician resources, video resources, and telehealth tools were reported as useful. Research suggests that regular use of online digital resources supplements learning and facilitates self-confidence and self-directed learning (Berre et al., 2025; Scott et al., 2018). Media resources help with visual representations of bioscience concepts (Montayre & Sparks, 2018). Thus, written and audio materials would provide clinically relevant information (Jorge et al., 2021), while video demonstrations of consultations may guide best practices (Martin et al., 2022). Providing a variety of resources may promote learning in diverse learners who may respond better when delivered in certain modalities such as video, audio or text, and manuals for navigating software tools (Lehtola et al., 2014; McGill & Fiddler, 2021).

Self-directed learning was reported as helpful for learning, as it enhanced self-directed learning, fostered transformational learning, promoted emancipatory learning and social action (Merriam & Caddarella, 1991). This enhances learning and creates awareness on ones' ability to learn (Loeng, 2020). When health students with prior qualifications have been involved in choosing learning resources, there have been greater course knowledge and skills outcomes (Murad et al., 2010). Online self-directed course content makes learning easier and more flexible, given that course materials may be accessed at convenient times and in ways that best suit students (Almomani et al., 2023). Additional self-learning benefits appear to include being motivated, increased self-efficacy, grit and intention to succeed, better time management, and lower levels of students' internet cognitive fatigue (Abbott et al., 2008; Artino & Stephens, 2009; Broadbent, 2017; Cho & Shen, 2013; Shao et al., 2022).

Peer learning was reported to be helpful for learning. Research on learning processes indicated that enhanced learning occurs when it involved students learning through explaining their ideas to their classmates, and by taking part in activities through which they can learn from one another, which helped with completing assignments (Raymond et al., 2016). Following peer discussions, students also experienced increased communication skills and developed positive interpersonal relationships (Mendieta-Aragon et al., 2023). As a result, students reported that they developed confidence following discussing course materials with peers (Tullis & Goldstone, 2020).

Feedback from educators and peers was reported as helpful. This links to the earlier finding that simulations were found to be useful, with regard to feedback following simulated practice. Teaching methodology research indicates that peer feedback promotes knowledge enhancement and engagement via interaction and shared reflection (Gikandi & Morrow, 2015). In contrast, educator feedback is important for the acquisition of skills (Washburn et al., 2021). Feedback on specific experiences, such as simulations are perceived as particularly effective when provided immediately (Tokumaru et al., 2023), presumably as it allows students to recognise targeted areas of improvement in real-time (Noronha et al., 2022).

Students reported both positive and negative experiences with technology involving simulations and learning. The negative experiences are not surprising, given that online learning comes with inherent challenges such as unstable internet connectivity, individual variations in digital literacy, and limits to data security. Both a stable online connection and digital literacy can profoundly impact the learning outcomes of students (Ilias et al., 2020; Kasimoglu et al., 2022). Many reports indicate that since COVID, digital literacy has become a necessity, affecting students who are not confident with using learning technologies (Lokmic-Tomkins et al., 2022). Consequently, some students may require further support to attain digital literacy.

A Limitations

Despite this review spanning a period of 10 years and accessing multiple databases, a potential limitation was the exclusion of unpublished postgraduate dissertations during the search. Despite this, Vickers and Smith (2000) suggest that when a thorough search of peer-reviewed and published work has been conducted, the conclusions of these unpublished dissertations do not affect the conclusions of a review's findings. This review was limited to studies published in English language databases, which suggests a limited understanding of the use of online modes of teaching telehealth, and excludes research written in non-English language publications. Conclusions derived from this review also note that most studies have used convenience samples, and many lack pre-post collection of data, which limits our understanding of how students' learnings have changed through online delivered courses. An additional limitation involves the lack of a priori protocol for this systematic review.

B Future Research

Whilst this review has highlighted useful instructional techniques for student learning, there are areas that might benefit from further examination. Whilst simulations are clearly well accepted as a tool for teaching, future research could focus on the debriefing and reflective process that follows to better understand the mechanisms by which students learn from the experience. Future research would need to focus on determining optimal training program configurations that account for multiple disciplines, and how they might operate within differing health systems, and barriers to interprofessional collaboration, such as health professionals' reluctance to collaborate (Poitras et al., 2024). Whilst a variety of resources are important, it may be beneficial to examine the content of resources that are particularly effective in enhancing knowledge of, and contributing to knowledge and professional development in telehealth. From the perspective of self-directed learning, further research could examine the types of assignments that are relevant to students' interests that promote self-directed reflection, and the use of reflective journals to enhance awareness of the lessons learnt (Brouse, 2007). In addition, evaluating the types of learners and educational settings that may be most appropriate for self-directed learning would help enhance decisions on the presentation of the online curriculum. The ease in which different technological platforms may facilitate peer discussion and learning, and subsequently, the characteristics of students who would find this process useful, is an area of further research that would help match users to technology. This would also lead to an investigation that focuses on determining what type and mode of delivery of feedback may contribute to the different areas of competency in delivering telehealth. Finally, examining the impact of technology on online telehealth learning may benefit from understanding the aspects of online learning that enhance confidence in technology skills and how pre-existing digital literacy may impact learning outcomes in telehealth.

V CONCLUSION

As greater access to health increases, so too will the way health care is delivered. Telehealth, as a mode of health care delivery, will no doubt become one of the pillars, and thus understanding how to effectively train future clinicians in its use would become a priority. This review has highlighted several pedagogical techniques that students find useful during online courses and similarly pointed to some areas that would benefit from greater scrutiny. These would have an impact on the content and consistency of delivering online telehealth training programmes. As technology advances, so too must the understanding of how human beings learn, to facilitate quality health care.

Other Information

A priori protocol for this systematic review was not registered with any organisation. Furthermore, no sources of funding were provided for this study, and the authors declare no conflicts of interest regarding this study.

Table 1

Inclusion and Exclusion Criteria Parameters and Search Terms

Parameters	Inclusion criteria	Exclusion criteria	Search terms
Interest	Telehealth learning and simulations embedded into the teaching curriculum	Courses unrelated to telehealth, interventions	Telehealth OR Telemedicine OR E-health OR Teleconsult* OR ehealth OR e-consult OR econsult OR telenursing OR ediagnos* OR telediagnos* OR telecare OR telecounsel* OR "mobile health" OR "digital health"
Population	Students or professionals of any field undertaking online learning (certificate, undergraduate, postgraduate)		Instruct* OR Educ* OR Course OR Curriculum OR Learning OR Student* OR Registrar OR Intern* OR Undergrad* OR Postgrad* OR "Higher Educ*" OR "Tertiary Educ*" OR college
Learning mode	Online learning	Face-to-face learning	e-learning OR elearning OR Learning OR m-learning OR "online education" OR "online learning" OR "online training" OR "online course" OR "online stud*" OR "remote education" OR "remote training" Or "remote stud*" OR online OR remote OR distance
Study type	Quantitative or qualitative or mixed methods research studies	Reviews	NOT review

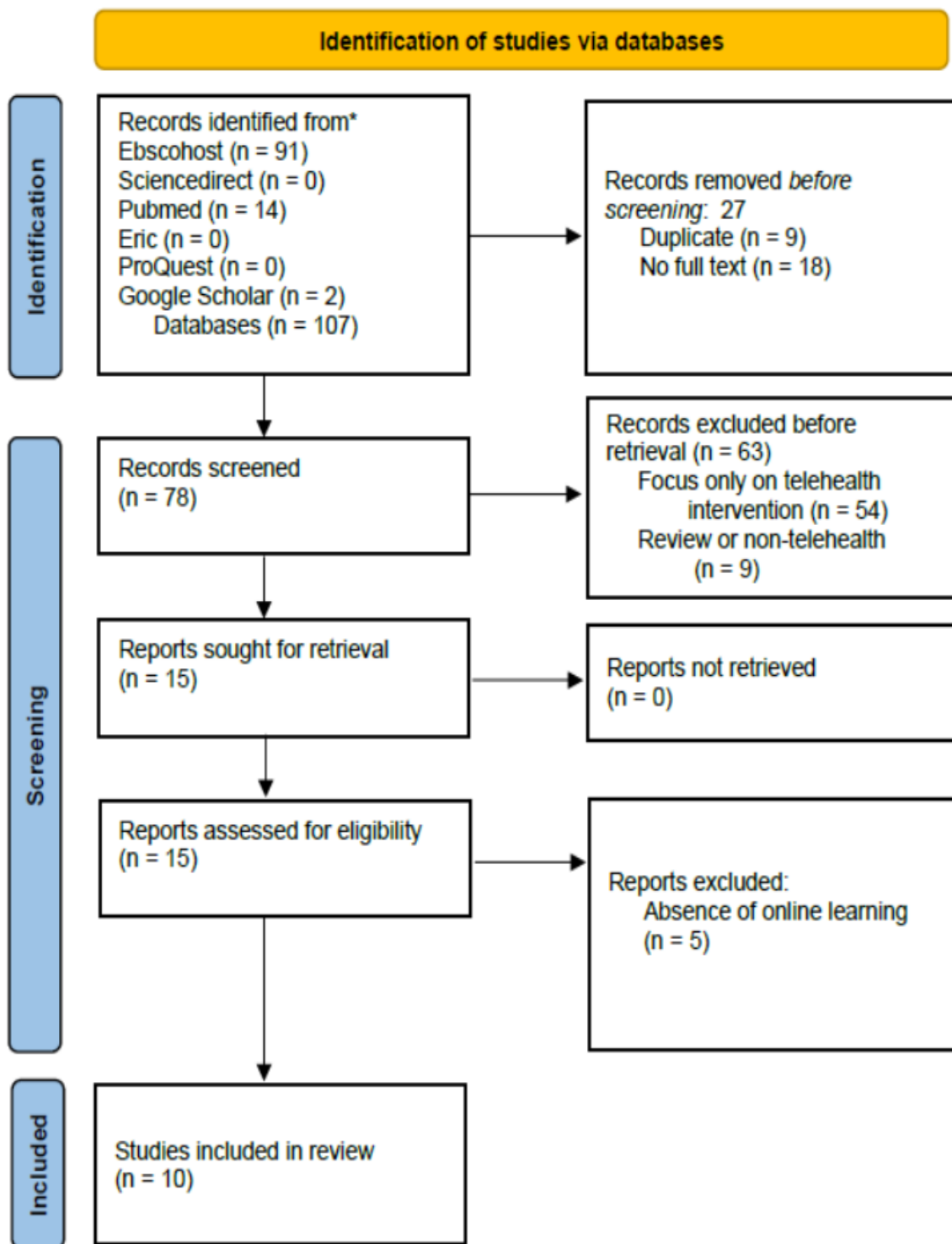


Figure 1. PRISMA 2020 flow diagram (Page et al., 2021).

Table 2

Description of Studies of Courses in Telehealth

Study details			Course details				Method and findings		
First author, Year	N	Sample characteristics	Teaching mode (Online/ blended)	Course structure	Teaching delivery	Course duration or time required to complete	Analytical design and Qualitative data analyses method	Quantitative Outcome measures	Main outcomes
Rutledge et al., 2020	67	Medical, athletic, counselling, and social work students	Online	1. Phase I: group discussions, 3 modules 2. Phase II: video reviews 3. Phase III: presentation in interprofessional teams	Asynchronous and synchronous	2 weeks	Quantitative cohort design with qualitative responses were taken from open-ended questions.	1. Confidence in planning for telehealth 2. Telehealth etiquette knowledge 3. Confidence in providing telehealth	Significant increases for all three scales from pre- to post-course outcomes. The Qualitative comments were related to the implementation of telehealth in future practice, learning telehealth and regulatory changes, and technology.
Wu & Shea, 2022	5	Occupational therapy students	Online	Simulations	Asynchronous and synchronous	6 weeks	Qualitative analyses: Content analysis using interview data		Six qualitative themes were identified including a stepping stone for learning, realism of the experience, physical fidelity, peer learning, limitations of

Jones et al., 2021	15	Physiotherapists	Online	1. Self-directed e-learning modules with quizzes 2. Mock initial consultation via videoconferencing 3 Four practice video consultations	Asynchronous and synchronous	32 weeks/ 32 hours	Qualitative analyses: Thematic approach		being online, and curriculum design and implementation. Five qualitative themes were identified including the experience of self-directed e-learning, practice makes perfect, the telehealth journey, the whole package, and implementation in broader clinical practice
Browne et al., 2022	44	Pharmacy, social work, nursing, public health students	Online	1. Didactic coursework 2. Telehealth simulations with standardised patients 3. Telehealth encounters with clinic patients	Asynchronous	14 weeks	Qualitative analyses: Content analysis using interview data		Four qualitative themes were identified including student benefits from the course, patient benefits, clinic benefits, and technological challenges.
Danesh et al., 2019	36	Nursing students	Online	1. Video on remote presence technology 2. Simulations	Asynchronous	32 weeks/ 32 hours	Qualitative analyses: Phenomenological experiential narratives		qualitative Feedback Reports: Remote simulations using robotic technology were reported as sustainable and useful for simulations.
Jorge et al., 2021	1318	Physiotherapists	Online	1. Evidence-based best-practice knee OA management	Asynchronous	3-4 hours	Quantitative cohort design	Levels of confidence measured using a 10-	Significant increase in confidence scores from pre- to post-

				2. Telehealth delivery via zoom 3. PEAK program (a structured physiotherapy treatment protocol)				point numeric rating scale.	course out of 10 for confidence with videoconferencing and videoconferencing for people with knee OA, and likelihood to use education, strengthening exercise, and physical activity. All six telehealth competencies relating to perceived knowledge, skills, and self-efficacy significantly increased from pre- to post-course.
Martin et al., 2022	72	Physiotherapy students	Online	1. 19 hours of online learning modules 2. 6 hours of telehealth simulations	Asynchronous	25 hours	Mixed Method quantitative and qualitative cohort design Qualitative analyses: Identified themes generated from focus-group data.	Items designed by the authors.	Two qualitative themes were identified including the perceptions of telehealth following the curriculum and feedback regarding the curriculum structure.
Gafni-Lachter et al., 2024	96	Paediatric therapists, psychologists, social workers,	Online	1. 10x 2-hour synchronous lecture	Asynchronous and synchronous	10 weeks/ 30 hours	Quantitative cohort design	1. Telehealth competency questionnaire	Participants' knowledge and skills relating to telehealth,

		speech-language pathologists, physiotherapists, and occupational therapists		2. 10x 1-hour asynchronous learning activities				2. Satisfaction survey 3. Follow-up survey	planning and managing telehealth services, working with diverse clients, and telehealth technologies and practice guidelines, as well as attitudes and feelings towards telehealth significantly increased from pre- to post-course.
Tokumaru et al., 2023	238	Pharmacy and nursing students	Online	Telehealth simulations	Synchronous	2 days	Mixed Method quantitative and qualitative cohort design Qualitative analyses: Assigned themes from students' responses to open-ended questions.	1. ICCAS 2. mSDS 3. The modified McMaster-Ottawa Individual rating scale	Significant improvement in ICCAS (21/21) and mSDS (12/15) scores from pre- to post-course. Common qualitative themes included interprofessional collaboration for approach to patient care and interprofessional teamwork collaboration.
Garcia-Gutierrez et al., 2023	161	Medical students and physicians	Online	Information not provided	Information not provided	Information not provided	Quantitative group differences	Adapted scale on the perception of	Medical students reported higher perception of the disadvantages of

telemedicine
technology telemedicine than
physicians.

Note: The table presents quantitative and qualitative studies published between 2019-2023. *N* indicates the sample size that completed the surveys. Cohort design (precourse v. postcourse comparison assessing changes using surveys). ICCAS (Interprofessional Collaborative Competencies Attainment Survey). mSDS (modified National League for Nursing Simulation Design).

Table 3**Critical Appraisal of Qualitative Studies using The Quality Assessment for the Systematic Review of Qualitative Evidence tool (Hawker et al., 2002)**

Author	Abstract /Title	Introduction /Aims	Data Collection	Sampling	Analysis	Ethics /Bias	Results	Generalisability	Implications	Grade	Classification
Danesh, 2019	4	2	4	4	1	1	4	4	4	28	Moderate
Jones, 2021	4	4	4	4	4	4	4	4	4	36	High
Browne, 2022	4	4	4	3	4	4	4	4	4	35	High
Wu, 2022	4	4	4	4	4	4	4	4	4	36	High

Table 4**Critical Appraisal of Quantitative Studies using the Quality Assessment Tool for Quantitative Studies (Thomas et al., 2004)**

Authors/Year	Overall Selection Bias rating	Overall Study Design rating	Overall Confounders rating	Overall Blinding rating	Overall Withdrawals and dropouts rating	Global Rating	Global Classification
Jorge, 2021	1	2	1	3	2	2	Moderate
Garcia-Guiterrez 2023	1	2	1	3	1	2	Moderate
Gafni-Lachter 2013	1	2	1	3	1	2	Moderate
Rutledge et al., 2020	1	2	1	3	1	2	Moderate

Table 5**Critical Appraisal of Mixed Method Studies using the Mixed Methods Appraisal Tool (Hong et al., 2018)**

Authors/Year	Q. 5.1	Q. 5.2	Q. 5.3	Q. 5.4	Q. 5.5	Rating Classification
Martin et al., 2022	Yes	No (complementary rather than explicit integration)	Yes	Yes	Yes	Moderate
Tokumaru et al., 2023	Yes	No (complementary rather than explicit integration)	Yes	Yes	Yes	Moderate

Note:

Q. 5.1: Is there an adequate rationale for using a mixed methods design to address the research question?

Q. 5.2: Are the different components of the study effectively integrated to answer the research question?

Q. 5.3: Are the outputs of the integration of qualitative and quantitative components adequately interpreted?

Q. 5.4: Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?

Q. 5.5: Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?

Table 6

Theme Frequency of Quantitative and Qualitative Studies

First author, Year	Frequency	Themes						
		1. Simulation	2. Interprofessional collaboration	3. Resources	4. Self-directed learning	5. Peer-learning	6. Feedback	7. Technology
Danesh et al., 2019		*						*
Rutledge et al., 2020								*
Jones et al., 2021		*		*	*			*
Jorge et al., 2021				*	*			
Browne et al., 2022		*	*					*
Martin et al., 2022		*		*				*
Wu & Shea, 2022		*	*			*	*	*
Gafni-Lachter et al., 2024			*	*		*	*	*
Garcia-Gutierrez et al., 2023								*
Tokumaru et al., 2023		*	*				*	
Total		6	4	4	2	2	3	8
Percent%		60	40	40	20	20	30	80
Rank		2	3	3	5	6	4	1

Note: The table presents quantitative and qualitative studies published between 2019-2023. Simulation (simulation, roleplay, and interaction), interprofessional collaboration (peer interaction, collaboration with other professionals, and interdisciplinary collaboration), resources (course learning resources and tools), self-directed learning (various approaches to asynchronous study), peer-learning (learning involving interactions with peers), feedback (feedback from educators and peers), technology (positive and negative experiences with technology involved in simulations and learning).

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