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Telehealth and Occupational Therapy Education

Angela Patterson
Creighton University

Diana R. Feldhacker
Creighton University

Bobbi S. Greiner
Creighton University

Marion Russell
Creighton University

Victoria Bergen
Creighton University

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Abstract

Accredited occupational therapy education programs are required to include telehealth technology in their curricula as outlined by the Accreditation Council for Occupational Therapy Education. An innovative Doctor of Occupational Therapy program piloted a telehealth module with first- and second-year students. Both dynamic lecture content and active learning lab exercises were created to advance student knowledge in the use of telehealth technology and to inform occupational therapy telehealth education. The teaching approaches in lecture and lab were assessed using a mixed methods approach. A quantitative pre and posttest assessment of student self-efficacy and knowledge was collected at three time points. At the final timepoint, a post survey was also completed to collect qualitative perspectives of student experiences after the lecture content and lab exercise, to further explain quantitative findings. Results indicated that the students' knowledge significantly improved after the module. In addition, engaging in lab after lecture did add a significant improvement in self-efficacy of students' perception of their knowledge regarding telehealth as well as confidence in their ability to use telehealth. The outcomes of this study assist and inform occupational therapy education programs in determining an effective teaching format for instruction on the use of telehealth technology in practice.

Keywords

Telehealth, occupational therapy, education, student

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Telehealth and Occupational Therapy Education

Angela Patterson, OTD, OTR/L, FNAP

Diana R. Feldhacker, OTD, OTR/L, BCPR

Bobbi Greiner, OTD, OTR/L, BCP

Marion Russell, OTD, MOTR/L, SCFES

Victoria L. Bergen, OTD, OTR/L

Creighton University

United States

ABSTRACT

Accredited occupational therapy education programs are required to include telehealth technology in their curricula as outlined by the Accreditation Council for Occupational Therapy Education. An innovative Doctor of Occupational Therapy program piloted a telehealth module with first- and second-year students. Both dynamic lecture content and active learning lab exercises were created to advance student knowledge in the use of telehealth technology and to inform occupational therapy telehealth education. The teaching approaches in lecture and lab were assessed using a mixed methods approach. A quantitative pre and posttest assessment of student self-efficacy and knowledge was collected at three time points. At the final timepoint, a post survey was also completed to collect qualitative perspectives of student experiences after the lecture content and lab exercise, to further explain quantitative findings. Results indicated that the students' knowledge significantly improved after the module. In addition, engaging in lab after lecture did add a significant improvement in self-efficacy of students' perception of their knowledge regarding telehealth as well as confidence in their ability to use telehealth. The outcomes of this study assist and inform occupational therapy education programs in determining an effective teaching format for instruction on the use of telehealth technology in practice.

Introduction

Accredited occupational therapy (OT) education programs are required to include telehealth technology in their curricula as outlined by the Accreditation Council for Occupational Therapy Education (ACOTE, 2018). Prior to 2018, accredited OT programs throughout the United States were not required to include education on telehealth technologies or telehealth as a service delivery model in their curriculum. The ACOTE (2018) standard titled “B.4.15,” (p. 31), which took effect on July 31, 2020, requires that all accredited doctoral, master’s, baccalaureate, and associate degree level programs educate students on the use of telehealth technology in practice. Additionally, programs must train OT students in the various contexts of service delivery and advocate for existing and future service delivery models, which include telehealth or telemedicine (B.5.0, ACOTE, 2018). The expectation is that students demonstrate knowledge of the use of telehealth as a service delivery model in practice. Cultivating knowledge of the use of telehealth ensures OT students graduate as fully educated practitioners ready to move toward licensed practice. In order to meet these educational standards and ensure the safety and satisfaction of future service delivery recipients, OT programs must determine and implement the best teaching method for instruction on the delivery and use of telehealth services.

ACOTE’s inclusion of telehealth in their 2018 accreditation standards is reflective of the current healthcare landscape and needs. Healthcare professionals use telehealth services to deliver evaluation, intervention, consultation, monitoring, and supervision (Cason, 2015). The number of patients being seen using telehealth expanded exponentially during the COVID-19 pandemic (Wosik et al., 2020), including those offered by OT. Use of this technology improves access to a broader range of treatment options and is within the OT scope of practice (Cason, 2015). The American Occupational Therapy Association (AOTA) has emphasized OT’s contributions to the area of telehealth, including interventions geared toward skill development, assistive technology, home modification, and health promotion (Casey, 2014). For future OT practitioners to be properly equipped, they must learn how to build and maintain therapeutic rapport and client-centered practice through a technological medium. They must consider evaluation, intervention planning, and treatment implementation in the context of telehealth and be knowledgeable in the technology, licensure, reimbursement principles, and ethics surrounding patient care via a virtual platform. Despite this increasing need, there is little evidence within OT education regarding best practices for teaching telehealth as a service delivery model, representing a significant research gap at the intersection of telehealth and OT education. Occupational therapy curricula must include content on the use of telehealth technologies, and didactic, simulated, and experiential learning opportunities must be developed in order to ensure effective academic teaching and compliance with accreditation standards. The purpose of this study was to develop and pilot an innovative telehealth teaching module by incorporating it in the academic curriculum and assessing its effectiveness at improving student knowledge and self-efficacy in using telehealth as a service delivery model.

Literature Review

Telehealth

Telehealth is a service delivery model through which healthcare providers utilize technology to provide remote care to patients, including evaluation, diagnosis, education, and treatment (Bagchi et al., 2018). The AOTA (2018) defines telehealth as “the application of evaluative, consultative, preventative, and therapeutic services delivered through information and communication technology (ICT)” (p. 1). Use of this technology allows practitioners to provide services as desired by the client and in context of where they work, live, and/or play. Information and communication technology can be categorized as synchronous, telehealth in real time, or asynchronous, “store-and-forward data transmission” (AOTA, 2018, p. 12). Occupational therapists may use telehealth to provide services to a variety of people and populations, such as children with developmental disorders or individuals and groups with orthopedic conditions, as well as in a variety of settings including hospital discharges, home assessments, and the school environment to name a few (Little et al., 2018; Ninnis et al., 2019; Ortiz-Piña et al., 2019; Rortvedt et al., 2019). Research by Cason (2015) suggested that telehealth may be used by OTs to achieve the Triple Aim of healthcare to improve patient experience and health and provide an affordable care option. While telehealth does provide patients with a convenient and cost-saving method for obtaining healthcare services, there are barriers to this method of delivery (Ninnis et al., 2019). These barriers include building therapeutic rapport, limited computer knowledge, liability, HIPAA compliance, and population unsuitability (Almathami et al., 2020; Ninnis et al., 2019; Zhou et al., 2019).

Telehealth and Healthcare Education

A review of the literature revealed that research on effective telehealth teaching methods in OT education is limited. While research studies have been published regarding the telehealth teaching effectiveness for nursing, physician assistant, and speech language pathology programs, there are few articles regarding best methods in OT academic programs. A study by Foti et al. (2014) examined the learning of 21 MSOT students paired with a physical therapist (PT) to provide telehealth recommendations for patients in Guatemala. Students completed an evaluation, assessment, goal planning, and recommendations for treatment while the PT implemented the suggested treatment. Results of the study showed improved learning in cultural awareness, the importance of flexibility, and the increased role that technology will have on OT in the future (Foti et al., 2014). Another study involved 139 OT, PT, and nursing students and examined student perceptions of telehealth and the therapeutic rapport between the medical provider and the patient (Randall et al., 2016). This study involved the disbursement of telehealth knowledge, simulated patient practice, and experience within an outpatient clinic. The results showed that students believed telehealth could be useful, but they found difficulty in using it and building therapeutic rapport in both the virtual and clinical settings (Randall et al., 2016). The study revealed the need for teaching students about barriers within telehealth and providing methods for decreasing those barriers. A recent scoping review identified six articles involving student experiences within telehealth learning from a variety of

medical education programs (Serwe et al., 2020). While the articles showed qualitative measures for gaining an understanding of student learning regarding telehealth, the method of service delivery, and populations that could be effectively served, they did not include quantitative measures for gauging student learning (Serwe et al., 2020). Future research should identify “optimal educational delivery models and specific learning outcomes” (Serwe et al., 2020, p. 14). Overall, the literature demonstrates a lack of research regarding the teaching of telehealth in OT education programs.

To equip OT students with the knowledge and skills needed to provide services using telehealth, ACOTE implemented telehealth as an accreditation standard in 2018. With evidence in OT education lacking, programs must gain knowledge from other professionals on the best practices in teaching telehealth as a service delivery model. Evidence on the implementation of telehealth within nursing and medical education have demonstrated positive student outcomes. A nursing education module, consisting of a lecture and a telehealth simulation activity, enhanced students’ practice skills in telehealth, to which they had limited to no exposure in any other clinical setting (Smith et al., 2018). The physician assistant program at the University of Texas implemented a teaching module utilizing telehealth simulation activities. Survey data revealed that 82% of participating students felt comfortable using this method of service delivery after completing the module (Erikson et al., 2015). This study addresses a gap in the literature on effective teaching methods for telehealth in OT education programs in order to enhance entry-level OT students’ comfort with and preparedness to utilize telehealth as practitioners. The research project was designed to investigate the most effective teaching approach for improving student competence utilizing telehealth as a service delivery model.

Methodology

Research Design

This study used a mixed-methods, explanatory sequential design of single-group, quantitative experimental-type research with repeated measures and a qualitative survey. Quantitative data were collected from participants at three timepoints: pretest, posttest 1, and posttest 2. The qualitative survey was conducted with all participants at posttest 2 only. The pretest was completed by students prior to participating in a lecture module, which included a PowerPoint presentation with video examples of intervention utilizing telehealth. Participants watched the lecture either face-to-face in a classroom or virtually. Posttest 1 was completed after the lecture module and before the lab exercises. Lab exercises were grounded in active learning theory of case-based learning (Cattaneo, 2017). In alignment with the cognitive science of case-based learning (retrieve, adapt, apply, and store information; Cattaneo, 2017), students were asked to retrieve their learning from the lecture and adapt it in order to work through an application situation during lab experiences. Participants completed assessments or interventions via a simulated telehealth environment during face-to-face lab sessions based on case studies created by the project investigators. The pediatric and adult case studies included a client diagnosis and occupational profile. Posttest 2 and the qualitative survey were completed after the lab exercises.

Participants

Research participants were students recruited from a doctoral occupational therapy (OTD) program in the Midwest. Two hundred and twenty-six participants were recruited for the study. Participants were recruited by means of convenience sampling through integration into two current courses within the curriculum, one from the first professional year and one from the second professional year. Thus, participants were a mix of first year (n=123) and second year (n=103) OTD students within the program. This combination of first- and second-year students was intentional in order to examine any differences in outcomes between groups. Participants were each assigned a random identifier, and all data collected were de-identified. Participation in lecture and lab exercises were required as part of the students' coursework, but engagement in the research pretest, posttests, and survey was voluntary. An information letter was provided to all participants prior to engagement in the study.

Instruments/Measures***Quantitative***

The study investigators, with expertise in academia, assessment, OT, and telehealth, developed a self-efficacy and knowledge-based assessment tool regarding telehealth and OT. For the self-efficacy portion, four questions focused on student knowledge of telehealth, decisiveness of appropriate use, confidence, and beliefs in effectiveness. Students rated themselves on a scale of 0-100, as recommended by Bandura's (2006) guidelines for constructing self-efficacy scales. For the knowledge-based assessment, use of a multiple-choice, academic-style assessment was purposefully chosen in order to replicate typical classroom assessment through examination. A thorough literature review regarding telehealth, in addition to continuing education courses taken by investigators, informed development of the assessment questions. Multiple-choice questions were structured and revised to improve flow and ease of understanding as well as to reflect best practices in student assessment. In order to improve content validity, two subject matter experts in OT reviewed the assessment and provided feedback. From this feedback, questions were vetted and revised. The final assessment included 16 multiple choice, knowledge-based questions regarding telehealth and OT. To review the complete assessment tool, see Appendix.

Qualitative

The development of a qualitative survey was completed by the study investigators. The assessment tool consisted of two questions to identify if the student felt a change in knowledge after the lecture content and lab exercise. After the student identified yes or no, they were provided an open-ended question to explain the lack of or increase in knowledge. Two additional open-ended questions allowed the participant to provide any additional comments regarding the lecture module and lab exercise. The qualitative survey was distributed with the posttest 2 assessment and was reviewed by subject matter experts who provided feedback on question structure and validity. The intent of the qualitative survey was to gather additional participant perspectives on their perceived knowledge of telehealth not captured in the quantitative assessment tool, further explaining the quantitative results.

Procedures

Prior to beginning this study, approval was obtained from the university's Institutional Review Board (IRB). The participant was provided an anonymous link to the highly secure university online survey system (Qualtrics) to access the information letter and assessment tools. Informed consent was achieved through Qualtrics. Once the participant clicked on the link, they were provided an information letter inviting them to participate and outlining the risks of participation. The participant's continuation of the survey past the information letter served as informed consent for participation. The 226 students who consented to participate in the study were each assigned a random number to de-identify the data collection. This same identifier was used at all three timepoints (pretest, posttest 1 and posttest 2) in order to link data for analysis.

Baseline testing (pretest) using the self-efficacy and knowledge-based assessment was completed prior to study interventions. Following pretesting, all participants engaged in a lecture module. This included a preparatory reading of the AOTA Position Paper, *Telehealth in Occupational Therapy* (2018), and a 45-minute PowerPoint lecture and discussion led by an expert in telehealth in OT. Immediately following the lecture module, students completed posttest 1 using the same self-efficacy and knowledge-based assessment in order to assess changes from the lecture module alone. Within a week, students completed a pre-lab worksheet and attended their course lab for hands-on skilled practice of telehealth for an evaluation or intervention session. The pre-lab worksheet included tutorials on scheduling and conducting a telehealth session using Zoom. Additionally, the students were instructed to consider the environment, materials needed to conduct the session, and any essential communication to the client. The two-hour lab included two student-led telehealth sessions which lasted 20-40 minutes each. During the student-led session, student groups utilized a Zoom platform to facilitate a case study role play. Study investigators introduced typical telehealth challenges during the student role play, such as issues with audio and e-helpers/caregivers. Students were required to navigate these issues for the last 5 minutes of their sessions. The lab finished with approximately 15 minutes of debriefing including discussion of ethical considerations led by a telehealth expert. Notes of student comments were collected by investigators during the debriefing. Following the lab experience, students completed the self-efficacy and knowledge-based assessment (posttest 2) along with the qualitative survey.

Data Analysis

Quantitative

Pretest, posttest 1, and posttest 2 data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 26 (IBM Corporation, 2019). Self-efficacy and knowledge-based portions of the assessment were analyzed separately. Self-efficacy data (knowledge, appropriate use, confidence, and effectiveness) were analyzed using Friedman's repeated measures ANOVA due to the ordinal nature of the scale. The knowledge-based assessment data were first scored for overall percent correct, similar to a typical academic exam. Then, data were formally tested for violation of normality ($p < 0.05$) using the Shapiro-Wilk test; data violated assumptions of normality and thus

nonparametric statistics were used in analysis. A Friedman's repeated measures ANOVA was conducted to analyze changes in means as assessed across multiple timepoints (pretest, posttest 1, and posttest 2) within and between subject factors to determine if there was a difference in knowledge of telehealth and OT, using the combined assessment scores. In addition, data were split to analyze for differences between first- and second-year students for the knowledge-based assessment. These were compared using the Kruskal-Wallis test. For all analyses, alpha was set at 0.05 with a 95% confidence interval; thus, a p -value at 5% level was considered statistically significant.

Qualitative

Qualitative data were collected through open-ended questions at the last point of data collection, survey, and posttest 2, following the telehealth lab exercise. The open-ended questions allowed participants to comment on their perception of knowledge growth following the telehealth lecture module and lab exercise. Participants also had the opportunity to provide additional feedback regarding their learning experience related to the lecture module and lab exercise. This qualitative feedback was analyzed by three of the study investigators (AP, BG, MR). Data were initially coded openly using Saldana's (2016) methodology. Data were analyzed independently by three investigators of the project through constant comparative method (Bogdan et al., 1997). Each investigator themed responses to the four questions prior to meeting for further discussion, analysis, and development of the themes. Overall themes for each question were identified and data supporting the themes were acknowledged.

Results

Quantitative

All 226 participants completed the same research procedures; however, significantly fewer completed assessments at all data collection points. Final analysis of self-efficacy data included knowledge ($n=110$), appropriate use ($n=105$), confidence ($n=95$), and effectiveness ($n=116$). Final analysis of the knowledge-based multiple-choice assessment included 119 responses from 89 first year and 30 second year students.

Overall, students reported statistically significant ($p<0.001$) improvements in all areas of self-efficacy including knowledge, appropriate use, confidence, and effectiveness (see Table 1). Pairwise comparisons indicated significant changes between pretest and posttest 1 ($p<0.001$) and pretest and posttest 2 ($p<0.001$) for all areas of self-efficacy. Pairwise comparisons between posttest 1 and posttest 2 indicated a statistically significant improvement of knowledge ($p<0.001$) and confidence ($p=0.004$); however, there was not a significant difference for use ($p=0.084$) and effectiveness ($p=1.000$).

Table 1*Average Scores and Significance of Self-Efficacy Areas (Scale 0-100)*

	M ± SD			P-value
	PRE	POST-1	POST-2	
Knowledge: <i>I am knowledgeable regarding telehealth in the field of occupational therapy.</i> (n=110)	29.61 ± 20.26	64.87 ± 15.05	67.79 ± 18.39	<0.001
Appropriate use: <i>I am knowledgeable in deciding when telehealth is appropriate for occupational therapy client treatment.</i> (n=105)	25.41 ± 18.51	60.26 ± 17.99	61.37 ± 21.19	<0.001
Confidence: <i>I am confident in my ability to use telehealth to provide occupational therapy services.</i> (n=95)	21.23 ± 19.52	47.11 ± 22.76	51.87 ± 22.56	<0.001
Effectiveness: <i>I believe that occupational therapy services (evaluation and intervention) can be effectively delivered through telehealth.</i> (n=116)	53.28 ± 23.27	73.38 ± 19.52	72.45 ± 18.95	<0.001

On the knowledge-based multiple-choice assessment, students demonstrated statistically significant ($p<0.001$) improvements across all combined timepoints. Pairwise comparisons were conducted to test which timepoints had more significant improvements, if any. There were statistically significant improvements between pretest and posttest 1 ($p<0.001$) as well as pretest and posttest 2 ($p<0.001$). Analyses did not indicate a statistically significant improvement from posttest 1 to posttest 2 ($p=1.000$).

Data were split to analyze first- and second-year students separately and to conduct between-group comparisons. There was not a significant difference between groups for baseline results. Results indicated statistically significant improvements for both first-year ($p<0.001$) and second-year ($p=0.004$) students across all timepoints. Pairwise comparisons of first year students indicated a significant improvement from pretest to posttest 1 ($p=0.004$) and pretest to posttest 2 ($p<0.001$) as well as second year students from pretest to posttest 1 ($p=0.006$). There was not a significant difference for first years from posttest 1 to posttest 2 ($p=0.882$) nor for second years from pretest to posttest 2 ($p=0.099$), or posttest 1 to posttest 2 ($p=0.999$). Between group comparisons found a significant difference at posttest 1 for first- and second-year students ($p<0.001$).

Table 2

Average Scores (as Percent Correct) and Significance of Knowledge-Based Assessment

	M ± SD			P-value
	PRE	POST-1	POST-2	
Combined (<i>n</i> =119)	78.28 ± 11.03	83.97 ± 6.83	83.64 ± 9.78	<0.001
First year students (<i>n</i> =89)	77.97 ± 10.75	82.56 ± 7.78	82.58 ± 12.22	<0.001
Second year students (<i>n</i> =30)	77.75 ± 15.00	86.28 ± 9.42	85.25 ± 7.39	0.004

Qualitative

Participants were asked yes/no questions to assess if their knowledge improved after the lecture content and if their knowledge improved after the lab exercise. The yes/no questions were followed by open-ended responses requesting additional comments to further explain the participants' answers. Of those who responded to the yes/no question, 96 percent believed their knowledge improved after the lecture content, with 131 participants adding additional comments on their post lecture knowledge. Eighty-six percent of the respondents believed their knowledge improved after the lab exercise with 135 participants adding additional comments on their post lab knowledge. Participants were then invited to provide additional comments regarding the telehealth lecture content (67 participant responses) and the telehealth lab exercises at the end of the posttest 2 survey (91 participant responses).

Analysis of the qualitative data revealed nine total themes across three categories: lecture themes, lab themes, and preferred teaching methods.

Table 3

Themes from Qualitative Analysis

Category	Theme
Lecture Themes	Little to no prior knowledge.
	Limited understanding of OT's use of telehealth.
	Effectiveness of expert clinicians as teachers.
Lab Themes	The hands-on experience.
	What can go wrong?
	Preparation enhances quality.
Preferred Teaching Methods	More videos, please.
	Clarification of lab expectations.
	1:1 telehealth simulation versus a group approach.

Lecture Themes

Little to No Prior Knowledge. The participants reported that they had little to no knowledge of telehealth prior to completing the lecture module. “I really had no foundation for understanding telehealth prior to this experience.” Students repeatedly commented that the lecture provided foundational knowledge of telehealth, including a review of basic terminology and technology options. “I understand the basic concept of it more than I did prior.” An increase in this foundational knowledge led to opportunity to learn more about the use of telehealth as a service delivery model in OT practice.

Limited Understanding of OT’s Use of Telehealth. The second theme that emerged was OT students’ lack understanding for how OT utilizes telehealth as a service delivery model. One participant noted that they had “no idea that occupational therapy services could be delivered via telehealth...”. The lecture content also provided detailed information about policy, licensure laws, and clinical reasoning that influence utilization of telehealth in OT practice. The lecture content expanded student understanding, as evidenced by a participant commenting, “I now have a greater understanding of when, where, why and how to use telehealth.”

Effectiveness of Expert Clinicians as Teachers. Participants felt that their gain in knowledge was due to lecture content being presented by OTs with expertise in telehealth. Many participants remarked on gaining a better understanding of the reality of providing telehealth services when learning from an expert clinician. One participant noted:

I think hearing from an OT who practices in telehealth was really helpful in helping understand what their interventions and daily schedules look like. Hearing examples from our guest speaker really brought the idea of telehealth to reality and helped me understand how it is used in practice.

Lab Themes

The Hands-on Experience. Participants found the lab exercise to be fun, engaging, and informational and provided an actual scenario of a telehealth session that further enhanced their knowledge. One student’s reflection summarizes this benefit of the lab exercise. “The telehealth lab exercise had me actively engaged in learning about telehealth and helped me to have a better understanding of what telehealth would look like in the field of OT.” In the lab exercise, students appreciated the hands-on learning that came with role playing multiple perspectives of the telehealth session as one student said, “It was very beneficial to actually engage in the Telehealth session as the client AND therapist versus just being taught about it in a lecture.” The hands-on experience developed into an overall theme of being able to self-identify what a participant knows and what they need to continue to learn. Hands-on experience was noted in the following comment:

...[A]ctually practicing the telehealth made me realize what else I could work on if I were to go into telehealth. We got to experience what it would be like to be in a telehealth session and we got to see what skills we would need to work on for it to run smoothly.

What Can Go Wrong? The second theme relates to the students' experiences of what could go wrong during a telehealth session. Students experienced planned and organic opportunities to trouble shoot technology failures and environmental barriers experienced during a telehealth session. One student narrated "I understand how efficient or inefficient telehealth can be, how flexible you need to be as well." Students experienced frustration during the lab exercise due to the unexpected challenges they encountered leading to another aspect of reflection. One student noted, "Experiencing the struggles with Telehealth helped me understand when this could be beneficial for patients and when it may not be successful." Participants seemed to relate this experience as a frustrated student to that of a frustrated client, providing an appreciation of the multiple perspectives of the service provider, client, and caregiver.

Preparation Enhances Quality. The lab exercise not only taught the experience of an OT intervention utilizing telehealth but also the required preparation for a telehealth session. This theme was recognized by participants feeling underprepared for their simulated telehealth session. They realized the importance of multiple components that go into telehealth such as technology, communication, and intervention planning.

We should have contacted them and had a dialogue about priorities before the session. I would not have thought about the importance of doing that before this lab. It gave me a good idea of how prepared you have to be and how you need to explain interventions with more detail and imitate what you want the client to do.

Preferred Teaching Methods/Enhancements for the Learning Experience

Overall, participants found the lecture content informative, and lab exercises enjoyable, engaging and an enhancement to their learning. Additionally, the qualitative data revealed common feedback related to the participants' preferred teaching methods to further enhance the learning experience. Three themes related to the participants' desire to see what telehealth looks like, clarify the expectations of them as learners, and provide dedicated practice delivering OT services using a telehealth model.

More Videos, Please. In addition to participants valuing presenters with OT telehealth expertise helping them understand the logistics of providing care in this format, participants expressed wanting to see more videos of an actual telehealth session during lecture. The students commented on understanding asynchronous and synchronous delivery models because the presenters had experiences with the two models. Expertise knowledge was "useful and beneficial" to the students' learning. The participants voiced they would have liked the expert presenters to provide more recorded examples of their telehealth sessions.

I think more stories and real-world examples in lecture would have fleshed out the picture for me a bit better. Provide more examples from different settings of populations. A video of an actual session would be useful.

Clarification of Lab Expectations. Students wanted more details on what a simulated telehealth session looked like prior to performing it in their groups or view a mock session prior to beginning their sessions. They also felt they needed more time to prepare versus being provided their case scenarios at the beginning of the lab session. They offered additional suggestions for how to design the lab exercise to enhance their preparation such as providing a rationale for why the simulated telehealth session is beneficial to their learning, ensuring that the simulated lab telehealth exercise did not include new concepts or skills, “It was confusing how it was supposed to look and nerve racking to administer something we have never seen or practiced” and allowing more preparation time between the lecture and lab to ensure adequate time, “...to prepare for an accurate and meaningful session.”

1:1 Telehealth Simulation Versus a Group Approach. Participants revealed that completing lab exercises one-on-one versus in a group would enhance their learning. The simulated telehealth sessions consisted of two sets of student pairs role playing a case scenario, alternating roles as the therapist, the client and the caregiver or e-helper. Students desired to complete telehealth with one-person role playing the occupational therapist and one-person role playing the client. They found it difficult to adjust to the role of co-treatment and working with a client and their caregivers. One participant stated, “I think it would have been more effective if we were doing it one-on-one instead of groups....”. Additionally, some participants felt their learning could have been enhanced if they did not have to share the therapist role in the simulated case scenario allowing more individual practice time with completing assessments and facilitating intervention using a telehealth service delivery model. The following comments illustrate this perspective: “I would have enjoyed the telehealth lab exercise more if I were the only therapist conducting the session” and “...one-on-one would have been more educational and given us each more practice.”

Discussion

It is required and essential that OT students in all levels of degree programs receive training in telehealth. It is also necessary to understand the best practices in teaching telehealth as a service delivery model. This research project focused on the development of a lecture module and a lab exercise for increasing OT students’ knowledge, decisiveness and ethical considerations regarding the appropriate use, confidence, and beliefs in effectiveness of telehealth. Additional focus on the students’ perspectives and reflections on the change in their knowledge as well as feedback on the lecture module and lab exercises was completed through survey questions and helped to further explain their quantitative feedback.

In the quantitative portion of this study, students demonstrated significant improvements in all areas of self-efficacy following both lecture and lab. However, pairwise comparisons indicated that engaging in lab after lecture did add a significant improvement in self-efficacy of students' perception of their knowledge regarding telehealth as well as their confidence in their ability to use telehealth. This is similar to prior research which found that hands-on learning was more effective in developing clinical reasoning and critical thinking skills among OT students (Coker, 2010) and that "Learning by Doing" builds self-efficacy (Vaz et al., 2021, p. 1). When aiming to promote student self-perceived knowledge of and confidence in using telehealth, providing a hands-on learning lab which allows students to practice with the technology for service delivery is recommended.

When it came to performing on a multiple-choice exam to assess knowledge-base of telehealth, engaging in a lab exercise did not significantly enhance student performance beyond lecture. Evidence has shown that active learning may not significantly improve acquisition of knowledge, depending upon the content, though it has been found to impact student satisfaction (Andrews et al., 2017; Sadeghi et al., 2014; Soper, 2017). OT educators should consider the overall learning objectives of their course. While a knowledge-based assessment, such as a multiple-choice exam, could meet the ACOTE standard to "demonstrate knowledge of the use of ... telehealth technology" (ACOTE, 2018, p. 31), educators should be mindful that success on such an assessment may not mean students will feel confident enough to utilize telehealth in practice. In addition, results of this study found that there was a significant difference between first- and second-year student performance on the knowledge-based assessment following lecture, with second-year students gaining in knowledge-base more significantly after lecture. It may be that novice students who have not yet had fieldwork experiences may need more hands-on lab opportunities to gain knowledge of new or unfamiliar information regarding telehealth.

Qualitative data showed that participants recognized that their knowledge of telehealth as a service delivery model for OT increased after completing a lecture module and subsequently after a lab exercise. Teaching telehealth in both the classroom and lab setting is beneficial to increasing student knowledge, as students reported their knowledge increased after the lab exercise despite having already completed the telehealth lecture module. Participants pinpointed that having instruction in telehealth from OT practitioners with expert knowledge and experience in the utilization of telehealth increased their interest and confidence that telehealth can be successfully utilized in patient care. It was found that additional video examples or modeling of telehealth sessions was desired by the students.

The active participation during the lab experiences provided participants exposure to what is needed to successfully complete an intervention or assessment using telehealth. Participants found the active learning in the lab experience beneficial, as role playing both the patient and therapist engaged them in experiences that cannot be gained through lecture alone. They realized that communication is a key component during telehealth sessions. Participants had to practice verbal and nonverbal

communication through technology which may also carry over in in-person intervention. Unplanned struggles with technology or communication through technology provided hands-on learning that can translate into their OT practice. The frustration students experienced in lab through role playing may translate to the perspective of the work a therapist has to complete to set up and conduct a telehealth session as well as the disturbances of the client. The students had to conduct the sessions with patience, and the compassion required to use telehealth as a service delivery model.

Faculty discovered that teaching telehealth as a new clinical skill should occur after the student has already learned how to complete an intervention or assessment. Teaching a new skill concurrently with using telehealth distracted from the participant's focus on increasing competence with telehealth. Although participants stated a desire to have the case prior to lab, providing the case at the beginning of lab required the students to be adaptable and problem solve. The participants reflected that using telehealth takes adequate planning.

Limitations

The research was completed with one cohort of first year students and one cohort of second year students. Additional assessment of future groups of students may provide increased understanding of the effectiveness of the lecture module and lab exercises. The participants role-played a telehealth session with other students. Role playing with simulated patients may provide a more realistic and meaningful learning experience. The participants' skills and behaviors during the telehealth session were not assessed. This knowledge could benefit the students' development of virtual etiquette to prepare them for engaging in telehealth during fieldwork experiences. The timing of teaching the telehealth module limits the related evaluation and interventional knowledge students have prior to their telehealth experiences. There was a notable difference in the response rate for the first-year students versus the second-year students at all timepoints which created a limitation in data analysis. Finally, the lack of follow up with the students, especially after utilization during lab, limits the understanding of the carry over in learning.

Implications for Occupational Therapy Education

Student experiences with telehealth extend beyond the lecture and lab environments within an academic institution. Students are now tasked with utilizing telehealth to complete fieldwork and capstone experiences. It is essential that they are prepared through practice-based coursework to have the knowledge, confidence, and competence to utilize telehealth in order to successfully pass clinical education experiences. Students need the hands-on experience of completing a treatment session across the lifespan with telehealth to be prepared to effectively communicate, grade activities, maintain confidentiality, and develop virtual etiquette. OT academic programs should incorporate lecture and lab content into course(s) to teach telehealth as a service delivery model.

Faculty with telehealth training and experience are beneficial to teaching telehealth. Continued education in telehealth platforms would assist faculty understanding on the best techniques in teaching telehealth. Combining telehealth practice experience with knowledge of development of lecture content and lab exercises was found to be the best practice for telehealth education. Future studies should investigate the use of telehealth simulations with standardized patients or other performance-based measures to further assess student behaviors and skills utilizing telehealth as a service delivery model.

Conclusion

Occupational therapy education regarding telehealth is not only required by ACOTE but has also been proven to be a key curricular topic during the current Covid-19 pandemic. Little research exists regarding the best approach to teaching telehealth to OT students. This study shows outcomes on the level of student knowledge, appropriate use, confidence, and effectiveness of telehealth as well as their perception of knowledge gained through completion of a lecture module and lab exercise. Knowledge and skills gained through student experiences in lecture and lab can be applied to clinical education and eventual practice. Students' increased knowledge, confidence, and competence in learning telehealth as a service delivery model will benefit their future clientele as multiple practice settings have begun utilizing telehealth.

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Appendix

Pre-test/Post-test Assessment

The assessment was set-up electronically as a quiz with one question per page and did not allow going back (to prevent learning from questions). Correct answers underlined and italicized.

1. I am knowledgeable regarding telehealth in the field of occupational therapy.

sliding scale 0-100 (mark 0: Not knowledgeable at all, 50 Moderately knowledgeable, and 100 Highly knowledgeable)

2. I am knowledgeable in deciding when telehealth is appropriate for occupational therapy client treatment.

sliding scale 0-100 (mark 0: Not knowledgeable at all, 50 Moderately knowledgeable, and 100 Highly knowledgeable)

3. I am confident in my ability to use telehealth to provide occupational therapy services.

sliding scale 0-100 (mark 0: Not confident at all, 50 Moderately confident, and 100 Highly confident)

4. I believe that occupational therapy services (evaluation and intervention) can be effectively delivered through telehealth.

sliding scale 0-100 (mark 0: Do not believe at all, 50 Moderately believe, and 100 Highly believe)

5. What is telehealth? (As defined by AOTA, 2018)
 - a. An in-person treatment session that educates on telecommunication and information technologies
 - b. *A service delivery model that uses telecommunication and information technologies*
 - c. A type of treatment that uses telecommunication and information technologies
 - d. A remote diagnosis and treatment of patients by means of telecommunications technology.

6. Which of the following are benefits to using telehealth for service delivery? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Increase accessibility of services to clients who live in remote or underserved areas
- b. Improved access to providers and specialists
- c. Prevent delays in receiving healthcare
- d. Enhance the workforce through consultation and research

7. What telehealth method improves a client's participation in occupational therapy?

- a. Homework
- b. Collaboration and carryover
- c. Guaranteed accessibility
- d. Controlled environment

8. An occupational therapist determines that asynchronous telehealth services would be effective for treatment of a client. Which of the following technologies could be used with an asynchronous approach? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Mobile videoconferencing
- b. Cameras (photographs)
- c. Virtual reality store-and-forward technologies
- d. Telephone

9. What must an occupational therapist consider in order to provide client-centered telehealth services? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Language
- b. Income
- c. Values and beliefs
- d. Health literacy level

10. Which of the following is an example of how an occupational therapist can reduce environmental limitations through telehealth?

- a. Build ADA compliant ramps and widen doorways
- b. Provide 24/7 live assistance
- c. Provide HIPAA secure room and recommendations
- d. Recommend modifications: Improve lighting, decrease noise, and reduce clutter

11. What are some of the challenges of telehealth service delivery? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Privacy
- b. Accessibility
- c. Confidentiality
- d. Consent of Care

12. Which of the following issues must occupational therapists consider before using telehealth with clients? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Liability and malpractice coverage
- b. Technology use with HIPAA compliance
- c. Reimbursement
- d. State licensure

13. Occupational therapy services provided in-person result in more effective outcomes than those provided through telehealth. However, research concludes that for clients who would not otherwise receive services, these less effective outcomes with telehealth are still a better alternative.

- a. True
- b. False

14. What must an occupational therapist consider when communicating with clients via telehealth? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Building rapport and considering cultural preferences when addressing client
- b. Providing specific verbal and/or written instructions to the client
- c. Utilizing synchronous (real time) and asynchronous (stored) discussions
- d. Speaking only to a live assistant, when present, to prevent client confusion

15. Which of the following ethical considerations must an occupational therapist consider when utilizing telehealth technologies? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Providing services that are within their level of competence and scope of practice (Ex: They must have telehealth experience and training)
- b. Maintaining confidentiality in all communication, including with HIPAA regulations, except when clients pay privately
- c. Obtaining consent before evaluating or providing intervention services
- d. Assessing the effectiveness of interventions provided through telehealth by consulting current research evidence and conducting ongoing monitoring of client response.

16. Which of the following technologies can clients utilize to engage in synchronous telehealth? (Choose all that apply) *Multiple select with credit for correct answers*

- a. High speed internet
- b. Webcam
- c. Any online meeting platform
- d. Telephone

17. For which state(s) must licensure requirements be reviewed before working with a client via telehealth?

- a. The state in which the therapist provides services.
- b. The state in which the company is based.
- c. The states of both the client and the therapist.
- d. There are no specific license requirements for telehealth.

18. What method of video conferencing is considered HIPAA compliant and appropriate for telehealth services?

- a. Zoom for Healthcare
- b. Skype
- c. Google Hangout
- d. Facetime

19. Case Study (Adapted from AOTA, 2017): Carrie is a licensed occupational therapist in Ohio and West Virginia and is an expert in seating and positioning. Sam is a licensed occupational therapist in West Virginia and has requested Carrie's consultation with a client who has an obsolete seating system (13 yr. old Becky) utilizing real-time videoconferencing. Sam and Carrie explained how the videoconferencing session would work to Becky and her mother, and consent to care was obtained. In this scenario, why may Carrie consult in the case?

- a. Both Carrie and Sam are licensed in West Virginia.
- b. Carrie is licensed in West Virginia and consent of care was given.
- c. Carrie is an expert in seating and positioning.
- d. Sam is the primary therapeutic provider and adhered to the principle of Autonomy in obtaining consent of care.

20. Case Study (Adapted from AOTA, 2013) Ethan is a 55-year-old self-employed entrepreneur who has severe depression, anxiety, and isolation after head and neck cancer resection surgery. The surgery left one side of his face disfigured. He plans to have reconstructive surgery in the future. Meanwhile, Ethan has difficulties with eating, activity tolerance, facial-body image, depression, and pain. He lives alone approximately 50 minutes away from the hospital/outpatient therapy clinic. Ethan was seen by an occupational therapist in the hospital and prescribed outpatient occupational therapy for his physical and mental impairments. Due to travel distance to the outpatient therapy clinic and anxiety associated with being seen in public, Ethan is interested in the option to continue his therapy at home through secure videoconferencing technology. Which of the following are services that an occupational therapist can safely provide to Ethan via telehealth? (Choose all that apply) *Multiple select with credit for correct answers*

- a. Compensatory eating techniques
- b. Pain management
- c. Relaxation techniques
- d. Progressive physical activities