12-2022

Effectiveness of Virtual and Technology-Based Learning Among Health Professional Students During COVID-19: An Evidence-Based Practice Project

Abigail Cheng

Melanie Dinca

Taylor Hoeft

Summer Jack

Iida Lehto

See next page for additional authors

Author

Abigail Cheng, Melanie Dinca, Taylor Hoeft, Summer Jack, Iida Lehto, Jo Nguyen, Valerie Parker, and Julie D. Bass

Effectiveness of Virtual and Technology-Based Learning Among Health Professional Students During COVID-19: An Evidence-Based Practice Project

Abigail Cheng, Melanie Dinca, Taiylor Hoeft, Summer Jack, Iida Lehto,

Jo Nguyen,Valerie Parker

Faculty Advisor: Julie D. Bass, PhD, OTR/L, FAOTA

St. Catherine University

EBP Project completed in partial fulfillment of the requirements
for the Evidence-Based Practice Course
in the Graduate Occupational Therapy Programs

Fall, 2022

Recommended APA citation:

Cheng, A.Y., Dinca, M.J., Hoeft, T.N., Jack, S.L., Lehto, I.S., Nguyen, J.A., Parker, V. C., & Bass, J.D. (2022). *Effectiveness of Virtual and Technology-Based Learning Among Health Professional Students During COVID-19: An evidence-based practice project.* Retrieved from https://sophia.stkate.edu/

Keywords: virtual learning, E-learning, educators, students, simulation, COVID-19, health professionals, occupational therapy

Table of Contents

Introduction

Evidence Based Practice

Evidence based practice is defined as the integration of knowledge from professional and clinical expertise, patient/client unique values and circumstances, and best research evidence (Straus, Richardson, Glasziou, & Haynes, 2005). The EBP courses in the St. Catherine University occupational therapy programs emphasize skill building in finding, analyzing, and synthesizing research.

The EBP Project

Occupational therapy graduate students at St. Catherine University complete an EBP project in partial fulfillment of the requirements for a course on Evidence-Based Practice.

The EBP Process

- Begins with a practice dilemma
- Dilemma is framed as an EBP question and PICO
  P (population/problem) I (intervention) C (comparison group) O (outcome(s) of interest)
- Background learning
- Search for the best evidence
- Initial appraisal and critical appraisal of the evidence
- Summary of themes from the evidence
- Recommendations for practice
- Next steps – implementation in practice

Six EBP Projects: Coronavirus Disease 2019 (COVID-19) and Occupational Therapy Research, Practice, and Education

1. Experiences and perspectives of occupational therapy practitioners and other health professionals who provided care and services during COVID-19
2. Lived experiences and perspectives of occupational therapy and other health profession students who had educational changes because of COVID-19
3. Experiences and perspectives of individuals regarding their performance and participation during COVID-19
4. Characteristics of, effectiveness of and satisfaction with virtual, telehealth and technology-based interventions provided by occupational therapy and other health professionals to clients during COVID-19
5. Characteristics of effective virtual and technology-based learning activities provided to occupational therapy and other health profession students during COVID-19.
6. Client factors, performance, and participation characteristics of individuals with long COVID-19

EBP Cases: COVID-19 and Occupational Therapy Practice, Education, and Research

COVID-19 was chosen as the focus for these projects because of the extraordinary changes in occupational therapy practice and education from 2020 to 2022. There is growing interest in understanding how COVID-19 influenced the lives of individuals with the condition, students preparing to enter the occupational therapy profession, and interventions provided in occupational therapy practice. Because of the recency of the COVID-19 pandemic and limited published research, interprofessional studies were also examined related to each EBP question.

An EBP project always begins with background learning on definitions and key characteristics. The Centers for Disease Control and Prevention (CDC) provided background information on the disease related to the history, variants, transmission, risk factors, and variants (2021). The virus, SARS-CoV-2, was discovered in Wuhan, China around December, 2019 and caused the disease, Coronavirus Disease 2019 (COVID-19). The virus was very contagious and COVID-19 was associated with severe respiratory symptoms for many people. Individuals with certain medical conditions and older adults were at higher risk of severe illness and death from COVID-19.

Many occupational therapy organizations provided general resources on COVID-19. For example, the American Occupational Therapy Association (AOTA) published practice decision guides and case examples for outpatient, inpatient, telehealth and home health settings (n.d.). The Accreditation Council on Occupational Therapy Education (ACOTE) provided guidance to educational programs regarding distance education and allowed broad flexibility to support completion of fieldwork requirements (n.d.). The National Board for Certification in Occupational Therapy (NBCOT) provided regular new items to summarize how they were monitoring government guidelines for test centers (n.d.). The World Federation of Occupational Therapists (WFOT) provided information, resources, and an online forum for the global community of occupational therapy professionals (2022).

Our understanding of COVID-19 and its influence on occupational therapy practice and education is still in the early stages. In occupational therapy education, academic courses and fieldwork experiences were altered to minimize in-person requirements and adjust to quickly changing circumstances in clinical settings. In practice, occupational therapy professionals

provided services using new or modified approaches and were recruited to serve in expanded capacities to meet growing needs. There were also growing concerns regarding long COVID or post-COVID conditions as well as the mental health of health profession students and practitioners. The findings from recent research now adds depth to our understanding of the characteristics, outcomes, and implications of these far-reaching changes due to COVID-19. These EBP projects will serve to summarize the evidence and lessons learned from COVID-19.

Appraisals of Best Evidence, Themes, and Recommendations

After searching and finding evidence available from library databases and alternative sources, students conducted an initial appraisal to evaluate the quality and relevance of the evidence and select the best research for further review. Then they conducted critical appraisals of the best formal reviews of primary research (e.g., systematic reviews, meta-analyses) and/or primary/original research studies. One of the steps in the critical appraisal process is to evaluate the strength or level of the research design and the types of conclusions that are possible from each design.

Initial Appraisal

- Quality of the evidence
    - type of evidence and research design
    - investigator qualifications and journal/publication/website
    - journal/publication/website
- Relevance of the evidence

Critical Appraisal

- Appraisal of methods, results, and implications
- Classification of type of research study
    - Reviews of primary research (e.g., systematic reviews, meta-analyses)
    - Qualitative studies
    - Psychometric studies
    - Primary quantitative research studies
        - Level 1: randomized controlled trials
        - Level 2: two groups, nonrandomized/cohort and case control
        - Level 3: nonrandomized, pretest/posttest and cross-sectional
        - Level 4: single subject
        - Level 5: case report

After completing initial and critical appraisals, themes are summarized related to the EBP question and other findings that emerged from the evidence. Recommendations for practice and reflection on participating in an EBP project are identified in the conclusions.

References

American Occupational Therapy Association. (n.d.). Occupational therapy in the age of coronavirus (COVID-19). https://www.aota.org/practice/clinical-topics/covid-19

Accreditation Council on Occupational Therapy Education. (2016). C standards FAQ. https://acoteonline.org/frequently-asked-questions/

Centers for Disease Control and Prevention. (2021). Basics of COVID-19. https://www.cdc.gov/coronavirus/2019-ncov/your-health/about-covid-19/basics-covid-19.html

Morris, Z. S., Wooding, S., & Grant, J. (2011). The answer is 17 years, what is the question: understanding time lags in translational research. *Journal of the Royal Society of Medicine, 104*(12), 510-520. https://doi.org/10.1258/jrsm.2011.110180

National Board for Certification in Occupational Therapy. (n.d.). News. https://www.nbcot.org/news-events/news

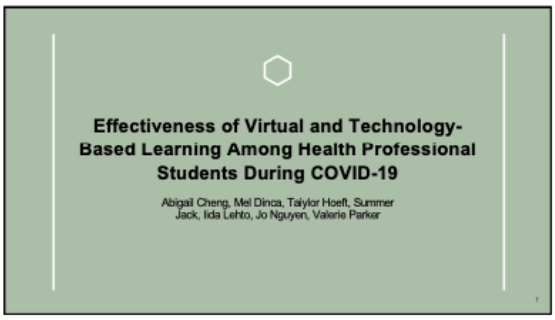
Straus, S. E., Richardson, W. S., Glasziou, P., & Haynes, R. B. (2005). How to practice and teach EBM. Evidence-Based Medicine. Third edition. Elsevier, 13-29.

World Federation of Occupational Therapists. (2022). COVID-19 pandemic information and resources. https://wfot.org/covid-19-information-and-resources-for-occupational-therapists

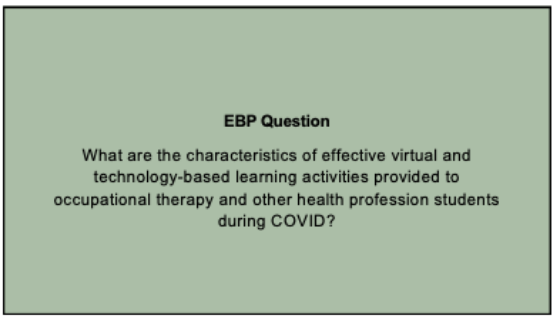
EBP Question

What are the characteristics of effective virtual and technology-based learning activities provided to occupational therapy and other health profession students during COVID?

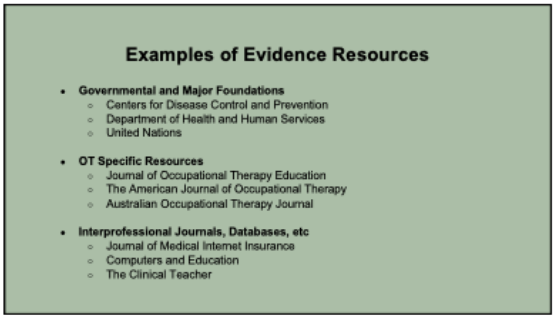
Professional Presentation



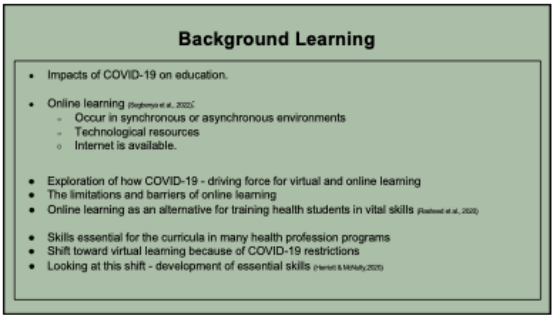
1



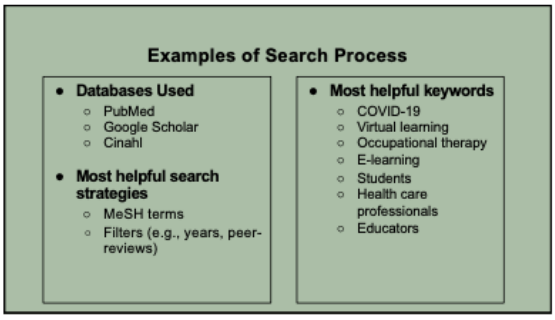
2



3

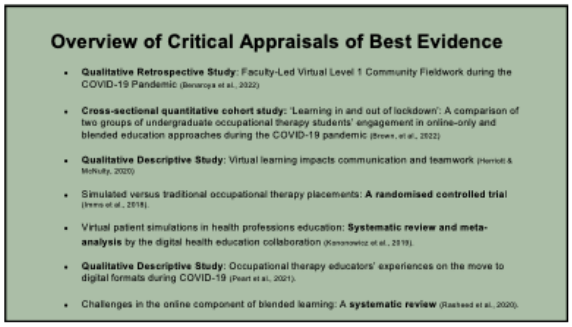


4

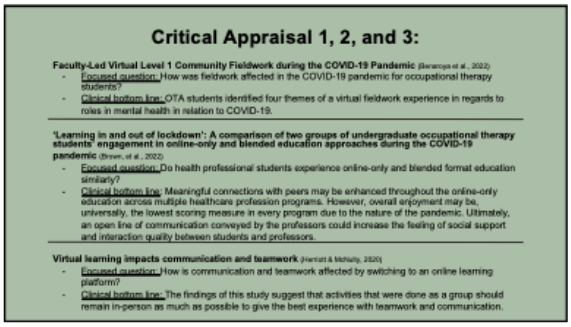


5

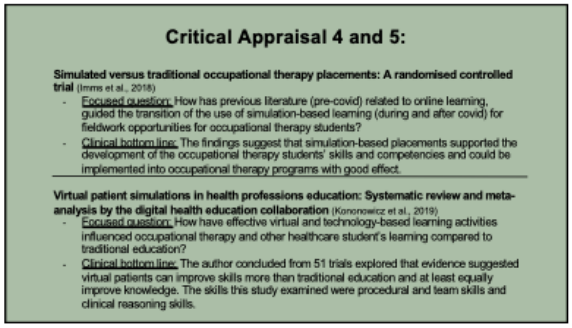
6


Overview of Critical Appraisals of Best Evidence
Qualitative Retrospective Study: Faculty-Led Virtual Level 1 Community Fieldwork during the COVID-19 Pandemic (Benaroya et al., 2022)
Cross-sectional quantitative cohort study: 'Learning in and out of lockdown': A comparison of two groups of undergraduate occupational therapy students' engagement in online-only and blended education approaches during the COVID-19 pandemic (Breen, et al., 2022)
Qualitative Descriptive Study: Virtual learning impacts communication and teamwork (Harriott & McNulty, 2020)
Simulated versus traditional occupational therapy placements: A randomised controlled trial (Imms et al., 2018).
Virtual patient simulations in health professions education: Systematic review and meta-analysis by the digital health education collaboration (Kononowicz et al., 2019).
Qualitative Descriptive Study: Occupational therapy educators' experiences on the move to digital formats during COVID-19 (Peart et al., 2021).
Challenges in the online component of blended learning: A systematic review (Rasheed et al., 2020).

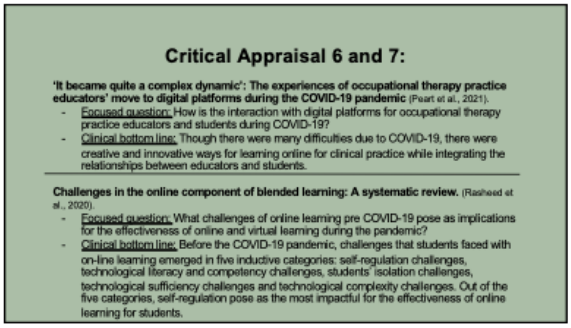
7


Critical Appraisal 1, 2, and 3:
Faculty-Led Virtual Level 1 Community Fieldwork during the COVID-19 Pandemic (Benaroya et al., 2022)
Focused question: How was fieldwork affected in the COVID-19 pandemic for occupational therapy students?
Clinical bottom line: OTA students identified four themes of a virtual fieldwork experience in regards to roles in mental health in relation to COVID-19.
'Learning in and out of lockdown': A comparison of two groups of undergraduate occupational therapy students' engagement in online-only and blended education approaches during the COVID-19 pandemic (Breen, et al., 2022)
Focused question: Do health professional students experience online-only and blended format education similarly?
Clinical bottom line: Meaningful connections with peers may be enhanced throughout the online-only education across multiple healthcare profession programs. However, overall enjoyment may be, universally, the lowest scoring measure in every program due to the nature of the pandemic. Ultimately, an open line of communication conveyed by the professors could increase the feeling of social support and interaction quality between students and professors.
Virtual learning impacts communication and teamwork (Harriott & McNulty, 2020)
Focused question: How is communication and teamwork affected by switching to an online learning platform?
Clinical bottom line: The findings of this study suggest that activities that were done as a group should remain in-person as much as possible to give the best experience with teamwork and communication.

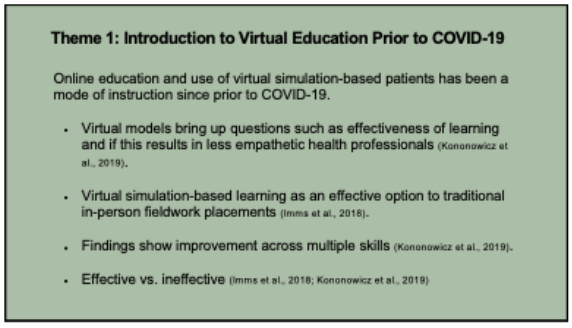
8


Critical Appraisal 4 and 5:
Simulated versus traditional occupational therapy placements: A randomised controlled trial (Imms et al., 2018)
Focused question: How has previous literature (pre-covid) related to online learning, guided the transition of the use of simulation-based learning (during and after covid) for fieldwork opportunities for occupational therapy students?
Clinical bottom line: The findings suggest that simulation-based placements supported the development of the occupational therapy students' skills and competencies and could be implemented into occupational therapy programs with good effect.
Virtual patient simulations in health professions education: Systematic review and meta-analysis by the digital health education collaboration (Kononowicz et al., 2019)
Focused question: How have effective virtual and technology-based learning activities influenced occupational therapy and other healthcare student's learning compared to traditional education?
Clinical bottom line: The author concluded from 51 trials explored that evidence suggested virtual patients can improve skills more than traditional education and at least equally improve knowledge. The skills this study examined were procedural and team skills and clinical reasoning skills.

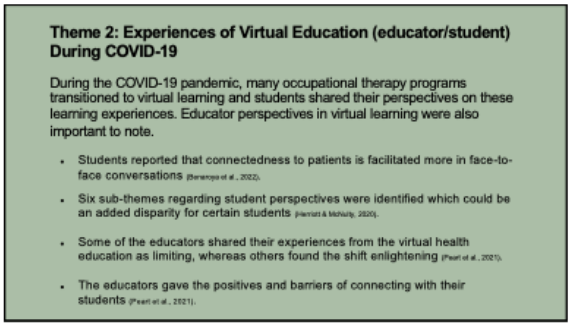
9


Critical Appraisal 6 and 7:
'It became quite a complex dynamic': The experiences of occupational therapy practice educators' move to digital platforms during the COVID-19 pandemic (Peart et al., 2021).
Focused question: How is the interaction with digital platforms for occupational therapy practice educators and students during COVID-19?
Clinical bottom line: Though there were many difficulties due to COVID-19, there were creative and innovative ways for learning online for clinical practice while integrating the relationships between educators and students.
Challenges in the online component of blended learning: A systematic review. (Rasheed et al., 2020).
Focused question: What challenges of online learning pre COVID-19 pose as implications for the effectiveness of online and virtual learning during the pandemic?
Clinical bottom line: Before the COVID-19 pandemic, challenges that students faced with on-line learning emerged in five inductive categories: self-regulation challenges, technological literacy and competency challenges, students' isolation challenges, technological sufficiency challenges and technological complexity challenges. Out of the five categories, self-regulation pose as the most impactful for the effectiveness of online learning for students.

10


Theme 1: Introduction to Virtual Education Prior to COVID-19
Online education and use of virtual simulation-based patients has been a mode of instruction since prior to COVID-19.
Virtual models bring up questions such as effectiveness of learning and if this results in less empathetic health professionals (Kononowicz et al., 2019).
Virtual simulation-based learning as an effective option to traditional in-person fieldwork placements (Imms et al., 2018).
Findings show improvement across multiple skills (Kononowicz et al., 2019).
Effective vs. ineffective (Imms et al., 2018; Kononowicz et al., 2019)

11


Theme 2: Experiences of Virtual Education (educator/student) During COVID-19
During the COVID-19 pandemic, many occupational therapy programs transitioned to virtual learning and students shared their perspectives on these learning experiences. Educator perspectives in virtual learning were also important to note.
Students reported that connectedness to patients is facilitated more in face-to-face conversations (Benaroya et al., 2022).
Six sub-themes regarding student perspectives were identified which could be an added disparity for certain students (Harriott & McNulty, 2020).
Some of the educators shared their experiences from the virtual health education as limiting, whereas others found the shift enlightening (Peart et al., 2021).
The educators gave the positives and barriers of connecting with their students (Peart et al., 2021).

12

Theme 3: Challenges of online learning before and during COVID-19

The challenges of online learning before COVID-19 were either addressed or exacerbated during the pandemic.

- Five inductive categories of challenges for students (Rasheed et al., 2020).
- The most prominent group of challenges for students prior to COVID-19 (Rasheed et al., 2020).
- A common challenge presented in research was the perception of digital supervisions (Peart et al., 2021).
- Extrinsic COVID-19 challenges (Barthea et al., 2014).

13

Theme 4: Best Practice for Online Health Profession Education

Research on online learning and students in the health profession education provided future direction for programs to support student learning.

- Autonomous learning capabilities versus facilitated independent skills (Brown et al., 2022).
- Open communication effectiveness (Brown et al., 2022).
- Continuation of curriculum activities in mode of instruction (Brown et al., 2022).
- Virtual simulation-based fieldwork placements vs. traditional placements (Imms et al., 2018).

14

Recommendations for OT and Interprofessional Programs

1. Create new education policies in order to maximize student learning.
2. Develop more learning opportunities through digital formats.
3. Sustain activities that were done as a group should remain in-person as much as possible.
4. Increase academic staff support and communication throughout class sessions.
5. Continue developing and enhancing virtual simulation-based fieldwork opportunities in a variety of practice areas.

15

Summary and Reflection

Alter education policies in various modes of instruction to maximize students' learning outcomes

Utilize available evidence-based research to modify academic programs and enhance student satisfaction

Proper skill acquisition

16

Summary and Reflection

More exploration is needed to explore learning outcomes of skills from virtual education methods by using a variety of different designs.

Future research should be conducted to increase the generalizability of the findings.

Online-only classrooms vs Blended classrooms

17

References

Benaroya, T. L., Swarbrick, M., Zechner, M., Murphy, A. A., & Cimmino, M. (2022). Faculty-led virtual level 1 community fieldwork during the COVID-19 pandemic. Journal of Occupational Therapy Education, 6(2), 1–20. https://doi.org/10.26681/jote.2022.060217

Bethea, D. P., Castillo, D. C., & Harvison, N. (2014). Use of simulation in occupational therapy education: Way of the future?. American Journal of Occupational Therapy, 68(Suppl_2), S32–S39. http://dx.doi.org/10.5014/ajot.2014.012716

Brown, T., Robinson, L., Gledhill, K., Yu, M. L., Isbel, S., Gruber, C., Parsons, D., & Etherington, J. (2022). 'Learning in and out of lockdown': A comparison of two groups of undergraduate occupational therapy students' engagement in online-only and blended education approaches during the COVID-19 pandemic. Australian Occupational Therapy Journal, 69(3), 301–315. https://doi.org/10.1111/1440-1630.12793

Harriott H. L., & McNulty M. A. (2022). Virtual learning impacts communication and teamwork. Clinical Teacher, 19(5):e13514. https://doi.org/10.1111/tct.13514

Imms, C., Froude, E., Chu, E. M. Y., Sheppard, L., Darzins, S., Gulnee, S., & Mathies, E. (2018). Simulated versus traditional occupational therapy placements: A randomised controlled trial. Australian Occupational Therapy Journal, 65(6), 559-564. http://dx.doi.org/10.1111/1440-1630.12513

18

References

Kononowicz, A. A., Woodham, L. A., Edelbring, S., Stathakarou, N., Davies, D., Saxena, N., & Zary, N. (2019). Virtual patient simulations in health professions education: Systematic review and meta-analysis by the digital health education collaboration. Journal of medical Internet research, 21(7), e14676. http://dx.doi.org/10.2196/14676

Peart, A., Wells, N., Yu, M. L., & Brown, T. (2021). 'It became quite a complex dynamic': The experiences of occupational therapy practice educators' move to digital platforms during the COVID-19 pandemic. Australian Occupational Therapy Journal, 68(1), 39-49. https://doi.org/10.1111/1440-1630.12767

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. Computers & Education, 144(1), 103701. https://doi.org/10.1016/j.compedu.2019.103701

Segbenya, M., Bervell, B., Minadzi, V. M., & Somuah, B. A. (2022). Modelling the perspectives of distance education students towards online learning during COVID-19 pandemic. Smart Learning Environments, 9(1). https://doi.org/10.1186/s40561-022-00193-y

19

Executive Summary

Introduction

This EBP project examined the evidence related to the question of types of characteristics that have contributed to effective virtual learning for healthcare students during COVID-19. Prior to starting the evidence-based research project, background learning was conducted to gain a better understanding of COVID-19, online education, virtual simulation-based learning, and fieldwork opportunities presented to occupational therapy and healthcare students. Four themes are used to summarize the findings from the research, including: virtual education prior to COVID-19, the experiences of virtual education among educators and students during COVID-19, the challenges of online learning before and during COVID-19, and the best practices for online health profession education. The research suggests some of the challenges students faced were technological literacy and sufficiency, feeling isolated, their ability to self-regulate, and developing clinical competencies. The studies recommend creating more virtual opportunities to increase student learning and competency level in a variety of practice areas. Throughout the literature review, it was noted that regardless of the mode of instruction, a curriculum in which students can apply their knowledge to real-life scenarios is crucial to enhancing their overall confidence.

Theme 1: Introduction to Virtual Education Prior to COVID-19

Prior to the COVID-19 pandemic, online learning and virtual simulation patients were increasingly used in health profession education. With the introduction of these new models, questions have been raised regarding learning effectiveness with virtual patients and whether this type of education results in less empathetic health professionals (Kononowicz et al., 2019). A

descriptive research study surveying the use of simulation and its challenges and benefits found increased critical reasoning, problem solving, decision making, and communication among students (Bethea et al., 2014). Furthermore, a randomized controlled trial conducted pre-COVID-19 consisting of 570 occupational therapy student participants examined the use of simulation-based learning as an effective option to traditional in-person learning opportunities and found it was a comparable alternative (Imms et al., 2018). Similarly, in a systematic review and meta-analysis examining research on virtual and traditional instruction methods in health profession education found virtual patients more effectively improved skills and just as effectively improved knowledge across 51 trials (Kononowicz et al., 2019). Importantly, findings show improvement across multiple skills including clinical reasoning, procedural, and team skills (Kononowicz et al., 2019). Additionally, skills improved equal to or more than traditional patients in research conducted in multiple high, low, and middle income countries (Kononowicz et al., 2019). In addition to the acquisition of skills from virtual patients, the review also examined students' attitudes and satisfaction, finding an overall positive outcome (Kononowicz et al., 2019).

Recommendations for future research suggest we need to understand the different modes of instruction. Despite some evidence suggesting that online learning can be an effective modality in healthcare profession students compared to the traditional model of education, research should be further explored to understand which mode of instruction is most impactful across healthcare professions (Imms et al., 2018; Kononowicz et al., 2019). For example, a qualitative retrospective study examined occupational therapy assistant students in a mental health fieldwork during the pandemic. It was overall positive for the students and the researchers suggested alternative models of fieldwork should be explored in order to optimize student

learning outcomes (Benaroya et al., 2022). Furthermore, a systematic review of the challenges in blended learning (N=30 studies) found that students, teachers, and educational institutions have problems related to technology that may limit effectiveness (Rasheed et al., 2020). It would be beneficial to explore virtual patients through different design variants for a more comprehensive understanding of effectiveness (Kononowicz et al., 2019).

Theme 2: Educator and Student Experiences During COVID-19

During the COVID-19 pandemic, many occupational therapy programs transitioned to virtual learning and students shared their perspectives on these learning experiences. In a retrospective qualitative study, four themes emerged from the surveys of occupational therapy assistant students (N=23) who had completed a faculty-led or virtual Level I fieldwork (Benaroya et al., 2022). At the end of this fieldwork experience, students felt they gained more skills, knowledge, structure, and positive attitudes towards mental health practices in the virtual realm of patient care (Benaroya et al., 2022). While the experiences were effective for most students, some students reported that connectedness to patients is facilitated more in face-to-face conversations (Benaroya et al., 2022). However, students felt that speaking to patients in a virtual format was less daunting than in-person conversation (Benaroya et al., 2022). A second study conducted by Brown, et al., focused on students' experiences (N=208) in an online-only or a blended format for in-class instruction. A self report measure was used to gather data from these occupational therapy students. Statistically significant differences were found between these two cohorts and their educational experiences in different academic modalities. Online-only students were found to develop time management skills, further independent learning skills, and increased focus. The students in the blended format classes perceived higher community support and a sense of belonging. Universally, satisfaction with learning quality was the lowest scoring

category in both cohorts due to the nature of the pandemic and its' restrictions (Brown, et al., 2022).

Student perspectives on the limitations of virtual learning during COVID-19 were examined across health profession education programs. An evaluation of a virtual case-based learning course was conducted using focus groups of students from occupational therapy, physical therapy, and physician assistants (Herriott & McNulty, 2020). Six sub themes regarding student perspectives were identified. These included unperceived non-verbal cues, difficulty building rapport, difficulty in completing collaborative work with all of the participants, and lastly unstable internet connections which could be an added disparity for certain students (Herriott & McNulty, 2020). The findings of this study suggest that activities that were done as a group should remain in-person as much as possible to give the best experience with teamwork and communication (Herriott & McNulty, 2020). Due to poor communication with other colleagues and patients that can cause medical error, it is essential to practice interpersonal skills such as communication and teamwork in health professions' curricula (Herriott & McNulty, 2020).

Though the students' experiences have been important during the pandemic, educator perspectives on virtual learning during COVID-19 are also important to note. A qualitative study researched occupational therapy educators in focus groups and individual interviews to identify their experiences on adjusting to teaching students digitally during COVID-19. Three main themes emerged from these experiences. These themes focused on lost and created opportunities, the relationship between educators and students, and the students' abilities to practice in certain clinical settings. Some of the educators stated that the shift to virtual health education provided limited opportunities, whereas others stated the move caused innovative learning opportunities

and skills, such as adaptability and lateral thinking. The educators also gave perspectives on the strengths and barriers of digital service delivery. Some positives were forming strategies such as informal check-ins and feedback to connect or support their students' well being. Certain barriers during the pandemic showed how limiting learning opportunities and lack of social interaction were difficult for educators to assess students' competency level in class and practice (Peart et al., 2021).

Theme 3: Challenges of Online Learning Before and During COVID-19

Instructional technology has inherent challenges for students, educators, and institutions. A systematic review of research on blended learning pre-COVID-19 found that both students and teachers reported difficulties with technology (Rasheed et al., 2020). Self-regulation and using the technology itself were identified as key factors for students in navigating virtual education (Rasheed et al., 2020). In other words, students must have the ability and the skillset to organize their own online learning (Rasheed et al., 2020). Without face-to-face instruction, responsibility falls on the student for meeting learning objectives (Rasheed et al., 2020). For teachers, the use of the technology was problematic as well. Difficulties associated with online learning for teachers included issues with uploading and dispersing video lectures as well as the teachers own views on the use of virtual education as an instructional tool (Rasheed et al., 2020). On an institutional level, the training required for virtual education was also identified as a challenge. This was primarily due to whether the training provided by the institution was considered effective and supporting the teacher's learning in using technology as an instructional aid (Rasheed et al., 2020). Furthermore, time and cost were found to be of relevance to educators and educational institutions (Berthea et al., 2014). Specifically, the financial challenges of

receiving funds to develop the technology as well as the time it took for faculty to acquire technological competency (Berthea et al., 2014).

Learning in a virtual environment also challenges students' organization and mental health. The five inductive categories of challenges for students that emerged from a systematic review were: self-regulation, technological literacy and competency, students' isolation, technological sufficiency and technological complexity challenges (Rasheed et al., 2020). On an individual level, these challenges reflected the emotional and physical toll when practicing education was impacted due to an increase in restrictions (Peart et al., 2021). Another common challenge presented in research was the perception of digital supervisions as a loss of opportunities for informal learning, professional development both socially and within a multidisciplinary team, as well as the loss of incidental moments during informal supervision (Peart et al., 2021).

Students' professional skills were challenged during the pandemic. Communication and teamwork are important skills in any health profession. Thus, a focus group of students in an anatomy class surveyed data that analyzed teamwork and communication (Herriott & McNulty, 2020). The evidence suggests that communication and teamwork were perceived as less effective during COVID-19 when education was transitioned to online learning (Herriott & McNulty, 2020). Further sub themes were also identified as impacting students' ability to get the skills necessary to enter the professional field. The sub themes identified by the researchers were the feeling of missing out on in-person experiences, less engagement and accountability than in-person experiences, lack of bonding and teamwork, feeling uncomfortable online, and difficulty overall regarding conversing (Herriott & McNulty, 2020).

Theme 4: Best Practice for Online Health Profession Education

Research on online learning and virtual students in health profession education provided direction for programs to support student learning. Research done by Brown et al. (2022) provided outcomes that occupational therapy instructors now have evidence-based results to incorporate into future education processes in multimodal classrooms. For example, implementing online discussion groups or daily announcements may strengthen student-faculty communication, ultimately enhancing students' perceived social support. Combining students' experiences throughout the COVID-19 pandemic into the future education courses will maximize their overall learning experiences in healthcare programs. This research focused on multiple factors that affected students' experiences, in blended or online-only format, in the occupational therapy program throughout the pandemic. Support provided by academic staff seemed to heavily influence students' perceptions of education quality in both blended and online-only formats. In order to improve students' perceived social support and enhance student-instructor interaction, open communication must be consistently practiced with faculty instructors throughout educational courses (Brown et al., 2022).

Open communication fostered a sense of community and decreased anxiety when technical difficulties arose via virtual platforms. Along with these findings on the importance of communication in both modalities, another factor of applicability to real-life situations was found to be critical in optimizing student experience throughout pandemic learning (Brown et al., 2022). A universal finding showed that no matter the mode of instruction, curriculum activities in which students are able to apply their studies into real-life situations is critically important to maximize their learning outcomes (Brown et al., 2022).

A real-life situation that assesses students' capabilities outside the classroom are fieldwork experiences for occupational therapy and occupational therapy assistants. In order to

maximize learning outcomes for fieldwork students, non-traditional methods of fieldwork opportunities should continue to be explored (Benaroya et al., 2022).

Another learning option for students that has been studied are simulation-based learning opportunities. These experiences can be provided through a wide variety of different methods such as the "use of actors, video cases, high- or low-fidelity mannequins, and other computerized equipment" (Bethea et al., 2014, p. 38). A randomized controlled trial examining the effectiveness of simulation-based learning practices suggested that these fieldwork placements can also provide comparable learning outcomes to those in traditional in-person placements (Imms et al., 2018). Further research is needed to determine the effectiveness of each approach and the scenarios that provide the best learning outcomes**.** This will allow for a better understanding of the development of clinical competencies and if this is a possible option to incorporate into fieldwork experiences (Bethea et al., 2014). With the rapid shift to the use of online-learning, it was paramount to continue evaluating the effectiveness of alternative approaches to learning to ensure health profession students receive a well-rounded education.

Summary and Implications for Practice

Online practical education has been a prominent tool implemented before COVID-19. Throughout COVID-19, educators and students were impacted by restrictions. This resulted in online education to prevail as the essential method of learning. The shift to online learning with virtual simulation-based patients has been an increasingly popular mode of instruction since the advent of the COVID-19 pandemic. There have been stipulations about this type of learning and whether it provides proper skill acquisition. Research shows that use of virtual patients may improve skills just as much or more than traditional education methods. Prior to the pandemic, evidence was published exploring online education methods and the positive outcomes which led the transition to virtual learning for students and educators alike. Studies prior to COVID-19 examined extensive online education on the use of simulation based virtual experiences which set the stage for when COVID-19 hit.

During COVID-19, the transition to virtual platforms used by educators highlighted the strengths and limitations on teaching and connecting with students. Virtual patients and e-learning in the general education classroom have shown simultaneously favorable outcomes and challenges. With research conducted during the COVID-19 pandemic, future academic staff may alter education policies in various modes of instruction to maximize students' learning outcomes.

The three main stakeholders impacted by online education are students, educators, and educational institutions. The challenges that each group faces are not mutually exclusive and cross boundaries, making it difficult to identify specific solutions to each respective group. In order to make relevant recommendations for future research, it is important to narrow the scope of the studies and reviews to reflect a specific population. Future research is needed to study the adaptability and effectiveness of different technological modes for practice education.

Communication and teamwork were affected by online learning. The difficulties of obtaining these skills were due to less engagement and accountability, lack of bonding, having difficulty talking, and facilitating inclusivity. The interpersonal skills of communication and teamwork are important to incorporate into learning because they are essential for the workplace and connecting to other health professionals. In the field of occupational therapy, it is important to be able to foster relationships with others on the client's professional team. Implications for communication and teamwork are pertinent so an interdisciplinary team can provide the best possible service. Some occupational therapy recommendations consider insight of educator experiences towards students' competencies, the developing opportunities through digital formats, and relational support for students that focus on the adjustment of maintaining wellbeing throughout the shift of traditional methods to online learning.

Multiple studies with varying designs were explored consisting of two systematic reviews, a randomized controlled trial, three descriptive survey research studies, a cross-sectional quantitative non-randomized cohort study, and a retrospective qualitative study. Current evidence comparing traditional in-person learning methods to virtual simulation-based learning shows that virtual methods have contributed to positive learning outcomes. One of the limitations include the size of the scope of the reviews and studies, whether it was too narrow; solely focusing on a certain component of online learning, or too broad - considering all of the populations affected by virtual learning. A second limitation was found in several studies with their sample collections. The use of convenience sampling ultimately compromised the generalizability of various studies and negatively impacts the transferability of the findings to other situations. Convenience sampling in research does not truly reflect the targeted population in these studies. The poor transferability of the findings jeopardized the overall trustworthiness of the studies.

Additionally, self-report measures were used in multiple studies. Participants could either be under reporting or over reporting when filling out the self-report questionnaires, causing report bias.

Studies that focus on occupational therapy programs have yielded strong results concerning students' experiences with learning in differing educational environments during the COVID-19 pandemic. Recorded lectures for online-only classes proved to be advantageous to students by providing flexibility and ability to rewatch the lectures, whereas blended classrooms perceived greater community support and a sense of belonging due to in-person interactions. Both modes of instruction had restrictions on their environment due to the COVID-19 pandemic severely impacting their application of theoretical knowledge in clinical settings (Brown et al, 2022).

Concentrating solely on occupational therapy programs, academic staff now have evidence-based research to convert academic program structures to meet the needs of students and have them accomplish their academic goals. Academic staff may implement new policies with online-only, blended, and in-person classes to optimize students' experiences throughout the program. Research demonstrated that some important next steps for communication and teamwork is to include as many in-person activities as possible. It is suggested that future research should explore the learning outcomes and improvements of skills from virtual education methods through a variety of different designs. Non-traditional modes of education for fieldwork experience should be utilized as this type of experience is shown to greatly impact learning outcomes and can provide more opportunities for students. Typically, they are also a requirement of higher education programs. Additionally, more research is needed to determine the efficacy of virtual learning opportunities and strategies in acquiring clinical skills and competency.

Since the majority of these studies focused on occupational therapy programs, these findings are not universal to all healthcare programs. Future research should include other healthcare programs such as dental, physician assistant, medical, and other programs to increase the generalizability of the findings. Larger sample sizes are also recommended in future research to more closely approximate to the general population of healthcare students.

References

Benaroya, T. L., Swarbrick, M., Zechner, M., Murphy, A. A., & Cimmino, M. (2022). Faculty-led virtual level 1 community fieldwork during the COVID-19 pandemic. *Journal of Occupational Therapy Education, 6*(2), 1-20. https://doi.org/10.26681/jote.2022.060217

Bethea, D. P., Castillo, D. C., & Harvison, N. (2014). Use of simulation in occupational therapy education: Way of the future?. *American Journal of Occupational Therapy*, *68*(Suppl_2), S32-S39. http://dx.doi.org/10.5014/ajot.2014.012716

Brown, T., Robinson, L., Gledhill, K., Yu, M. L., Isbel, S., Greber, C., Parsons, D., & Etherington, J. (2022). 'Learning in and out of lockdown': A comparison of two groups of undergraduate occupational therapy students' engagement in online-only and blended education approaches during the COVID-19 pandemic. *Australian Occupational Therapy Journal*, *69*(3), 301–315. https://doi.org/10.1111/1440-1630.12793

Herriott H. L., & McNulty M. A. (2022). Virtual learning impacts communication and teamwork. *Clinical Teacher, 19*(5):e13514. https://doi.org/10.1111/tct.13514

Imms, C., Froude, E., Chu, E. M. Y., Sheppard, L., Darzins, S., Guinea, S., & Mathieu, E. (2018). Simulated versus traditional occupational therapy placements: A randomised controlled trial. *Australian Occupational Therapy Journal*, *65*(6), 556-564. http://dx.doi.org/10.1111/1440-1630.12513

Kononowicz, A. A., Woodham, L. A., Edelbring, S., Stathakarou, N., Davies, D., Saxena, N., & Zary, N. (2019). Virtual patient simulations in health professions education: Systematic review and meta-analysis by the digital health education collaboration. *Journal of medical Internet research*, *21*(7), e14676. http://dx.doi.org/10.2196/14676

Peart, A., Wells, N., Yu, M. L., & Brown, T. (2021). ‘It became quite a complex dynamic’: The

experiences of occupational therapy practice educators' move to digital platforms during the COVID-19 pandemic. *Australian Occupational Therapy Journal*, *69*(1), 38-49. https://doi.org/10.1111/1440-1630.12767

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144*(1), 103701. https://doi.org/10.1016/j.compedu.2019.103701

Appendix A. Initial Appraisals

Abbott-Gaffney, C. R., Gafni-Lachter, L., Cason, J., Sheaffer, K., Harasink, R., Donehower, K., & Jacobs, K. (2022). Toward successful future use of telehealth in occupational therapy practice: What the COVID-19 rapid shift revealed. *Work (Reading, Mass.)*, 71(2), 385–394. https://doi.org/10.3233/WOR-210789

Alanazi, A. A., Nicholson, N., & Thomas, S. (2017). The use of simulation training to improve knowledge, skills, and confidence among healthcare students: A systematic review. *Internet Journal of Allied Health Sciences and Practice*, 15(3), 2. http://dx.doi.org/10.46743/1540-580X/2017.1666

Bay, U., Maghidman, M., Waugh, J., & Shlonsky, A. (2021). Guidelines for using simulation for online teaching and learning of clinical social work practice in the time of COVID. *Clinical Social Work Journal,* 49(2), 128–135. https://doi.org/10.1007/s10615-021-00807-x

Bethea, D. P., Castillo, D. C., & Harvison, N. (2014). Use of simulation in occupational therapy education: Way of the future. *American Journal of Occupational Therapy*, 68(Suppl_2), S32-S39. http://dx.doi.org/10.5014/ajot.2014.012716

Bridgman, K., Erickson, S., Furlong, L., & Bird, A. (2022). Allied health student engagement in telehealth clinical placements: A rapid review. *Internet Journal of Allied Health Sciences & Practice*, 20(2), 1–12. https://nsuworks.nova.edu/ijahsp/vol20/iss2/1/

Brown, T., Robinson, L., Gledhill, K., Yu, M. L., Isbel, S., Greber, C., Parsons, D., & Etherington, J. (2022). 'Learning in and out of lockdown': A comparison of two groups of undergraduate occupational therapy students' engagement in online-only and blended

education approaches during the COVID-19 pandemic. *Australian occupational therapy journal*, 69(3), 301–315. https://doi.org/10.1111/1440-1630.12793

Car, L. T., Kyaw, B. M., Dunleavy, G., Smart, N. A., Semwal, M., Rotgans, J. I., Low-Beer, N., & Campbell, J. (2019). Digital problem based learning in health professions: Systematic review and meta-analysis by the digital health education collaboration. *Journal of Medical Internet Research*, 21(2), 1-12. https://doi.org/10.2196/12945

Chu, E. M. Y., Sheppard, L., Guinea, S., & Imms, C. (2019). Placement replacement: A conceptual framework for designing simulated clinical placement in occupational therapy. *Nursing and Health Sciences,* 21(1), 4– 13. https://doi.org/10.1111/nhs.12551

Dhar, P., Rocks, T., Samarasinghe, R. M., Stephenson, G., & Smith, C. (2021). Augmented reality in medical education: Students' experiences and learning outcomes. *Medical Education Online*, 26(1). https://doi.org/10.1080/10872981.2021.1953953

Geyer, L., & Cooper, K. (2022). The transition to telehealth occupational therapy practice: Lessons learned. *Occupational Therapy in Health Care*, 36(1), 101–108. https://doi.org/10.1080/07380577.2021.1972382

Giles, A. K., Carson, N. E., Breland, H. L., Coker-Bolt, P., & Bowman, P. J. (2014). Use of simulated patients and reflective video analysis to assess occupational therapy students' preparedness for fieldwork. *American Journal of Occupational Therapy*, 68(Supplement_2), S57-S66. http://dx.doi.org/10.5014/ajot.2014.685S03

Grant, T., Thomas, Y., Gossman, P., & Berragan, L. (2021). The use of simulation in occupational therapy education: A scoping review. *Australian Occupational Therapy Journal*, 68(4), 345-356. http://dx.doi.org/10.1111/1440-1630.12726

Gupta, M. M., Jankie, S., Pancholi, S. S., Talukdar, D., Sahu, P. K., & Sa, B. (2020). Asynchronous environment assessment: A pertinent option for medical and allied health profession education during the COVID-19 pandemic. *Education Sciences*, 10(12), 1-14. https://doi.org/10.3390/educsci10120352

Herriott H. L., & McNulty M. A. (2022). Virtual learning impacts communication and teamwork. *Clinical Teacher.* 19(5):e13514. https://doi.org/10.1111/tct.13514

Imms, C., Froude, E., Chu, E. M. Y., Sheppard, L., Darzins, S., Guinea, S., & Mathieu, E. (2018). Simulated versus traditional occupational therapy placements: A randomised controlled trial. *Australian Occupational Therapy Journal*, 65(6), 556-564. http://dx.doi.org/10.1111/1440-1630.12513

Khalili, H. (2020). Online interprofessional education during and post the COVID-19 pandemic: A commentary. *Journal of Interprofessional Care.* 34(5), 687-690. https://doi.org/10.1080/13561820.2020.1792424

Kim, H., & Xie, B. (2017). Health literacy in the eHealth era: A systematic review of the literature. *Patient Education and Counseling*. 100(6), 1073-1082. https://doi.org/10.1016/j.pec.2017.01.015

Kononowicz, A. A., Woodham, L. A., Edelbring, S., Stathakarou, N., Davies, D., Saxena, N., & Zary, N. (2019). Virtual patient simulations in health professions education: Systematic review and meta-analysis by the digital health education collaboration. *Journal of medical Internet research*, 21(7), e14676. http://dx.doi.org/10.2196/14676

Korkmaz, G., & Toraman, C. (2020). Are we ready for the post-COVID-19 educational practice?

An investigation into what educators think as to online learning. *International Journal of Technology in Education and Science*, 4(4), 293-309. https://doi.org/10.46328/ijtes.v4i4.110

Krahe, M. A., Conway, M., Howells, S., Roffey, K., & Reilly, S. (2021). Rapid transition of an allied health clinic to telehealth during the COVID-19 pandemic: Satisfaction and experience of health professionals, student practitioners, and patients. *Internet Journal of Allied Health Sciences & Practice*, 19(3), 1–13. http://dx.doi.org/10.46743/1540-580X/2021.2041

Malhorta, A. & Kumar, A. (2021). Breaking the COVID-19 barriers to health professional team training with online simulation. *Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare*, 16(1), 80-81. https://doi.org/10.1097/sih.0000000000000518

McGill, M., & Dennard, Q. (2021). Graduate students' perspectives toward telepractice at the COVID-19 global pandemic onset. *Perspectives of the ASHA Special Interest Groups*, 6(4), 841–854. https://doi.org/10.1044/2021_PERSP-20-00231

Perone, A. K. (2021). Surviving the semester during COVID-19: Evolving concerns, innovations, and recommendations. *Journal of Social Work Education*, 57(sup1), 194-208. https://doi.org/10.1080/10437797.2021.1934210

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education,* 144, 103701. https://doi.org/10.1016/j.compedu.2019.103701

Romli, M. H., Cheema, M. S., Mahet, M. Z., Hashim, N. F., Hamid, H. A. (2020). Exploring the

effectiveness of technology-based learning on the educational outcomes of undergraduate healthcare students: An overview of systematic reviews protocol. *BMJ Open.* 10(11), 1-10. http://dx.doi.org/10.1136/bmjopen-2020-041153

Romli, M. H., Yunus, F. W., Cheema, M. S., Hamid, H. A., Mehat, M. Z., Hashim, N. F., Foong, C. C., Hong, W., Jaafar, M. H. (2022). A meta-synthesis on technology-based learning among healthcare students in southeast asia. *Medical Science Educator.* 32(3), 657-677. https://doi.org/10.1007/s40670-022-01564-3

Sánchez-Guarnido, A. J., Domínguez-Macías, E., Garrido-Cervera, J. A., González-Casares, R., Marí-Boned, S., Represa-Martínez, G., & Herruzo, C. (2021). Occupational therapy in mental health via telehealth during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(13), 7138. https://doi.org/10.3390/ijerph18137138

Schulz, T., Long, K., Kanhutu, K., Bayrak, I., Johnson, D., & Fazio, T. (2022). Telehealth during the coronavirus disease 2019 pandemic: Rapid expansion of telehealth outpatient use during a pandemic is possible if the programme is previously established. *Journal of Telemedicine and Telecare,* 28(6), 445–451. https://doi.org/10.1177/1357633X20942045

Sibrian, J., Hutapea, K., Dunbar, G. B., & Kawar, L. N. (2022). A virtual world: New graduate education in the era of COVID-19. *The Journal of Continuing Education in Nursing*, 53(7), 307–311. https://doi.org/10.3928/00220124-20220603-06

Stamm, M., Francetic, K., Reilly, R., Tharp, A., Thompson, N., & Weidenhamer, R. (2021).

Kinesthetic learners during the COVID-19 pandemic: Occupational therapy students' perspective on E-learning. *Journal of Occupational Therapy Education*, 5(2), 3. http://dx.doi.org/10.26681/jote.2021.050203

Tabatabai, S. (2020). COVID-19 impact and virtual medical education. *Journal of Advances in Medical Education & Professionalism,* 8(3), 140-143. http://dx.doi.org/10.30476/jamp.2020.86070.1213

Triemstra, J. D., Haas, M., Bhavsar-Burke, I., Gottlieb-Smith, R., Wolff, M., Shelgikar, A. V., Samala, R. V., Ruff, A. L., Kuo, K., Tam, M., Gupta, A., Stojan, J., Gruppen, L., & Ellinas, H. (2021). Impact of the COVID-19 pandemic on the clinical learning environment: Addressing identified gaps and seizing opportunities. *Academic medicine: journal of the Association of American Medical Colleges*, 96(9), 1276–1281. https://doi.org/10.1097/ACM.0000000000004013

Wald, H. S., Monteverde, S. (2021). COVID-19 era healthcare ethics education: Cultivating educational and moral resilience. *Nursing Ethics*. 28(1), 58- 65. https://doi.org/10.1177/0969733020976188

Wilcha, R. J. (2020). Effectiveness of virtual medical teaching during the COVID-19 crisis: Systematic review. *JMIR medical education*, 6(2), e20963. http://dx.doi.org/10.2196/20963

Wittmeier, K., Hammond, E., Tymko, K., Burnham, K., Janssen, T., Pablo, A. J., Russell, K., Pierce, S., Costello, C., & Protudjer, J. (2022). "Another tool in your toolkit": Pediatric occupational and physical therapists' perspectives of initiating telehealth during the

COVID-19 pandemic. *Physical & Occupational Therapy in Pediatrics*, 42(5), 465–481. https://doi.org/10.1080/01942638.2022.2065898