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Student Response to Varied Instructional Methods in Level I Fieldwork Experiences

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Student Response to Varied Instructional Methods in Level I Fieldwork Experiences

by
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Approval Page

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Statement of Original Work

I declare the following:
I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

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So much of my gratitude is for the current students and many graduates of the Belmont MSOT bridge program. Bridge students are the priceless unicorns of the occupational therapy education world! With their work experience as occupational therapy and physical therapy practitioners, they bring maturity, empathy, curiosity, and a hunger to learn that is, in my opinion, unmatched. I know I will never stop being blown away by the many hard things that you keep doing year after year. It has been and will continue to be my deep and sincere honor and pleasure to walk aside you through your academic journey. Keep on knocking it out of the park, MSOT cohorts!

Abstract

Student Response to Varied Instructional Methods in Level I Fieldwork Experiences. Camille Turner, 2023: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education and School of Criminal Justice. Keywords: Virtual Simulation, Level I Fieldwork, Competency, Fieldwork Shortage, Bridge Program, NBCOT first time pass rate

This applied dissertation was designed to investigate student responses to three different instructional strategies used to fulfill level I fieldwork requirements: traditional in-clinic rotation, a combination of virtual simulation and traditional in-clinic rotations, and virtual simulation. A multi-decade occupational therapy (OT) fieldwork shortage was exacerbated by the COVID-19 pandemic, in which OT education programs struggled to provide accreditation-required clinical education. Virtual simulation programs were utilized to fulfill some requirements, particularly more introductory-level fieldwork. Several cohorts of a Masters of Science in Occupational Therapy "bridge" program for licensed, practicing Certified Occupational Therapy Assistants and Physical Therapist Assistants were the subjects of this study. Very little research exists about this group of occupational therapy students.

Students who graduated prior to the pandemic fulfilled level I fieldwork requirements with brief (4-day) traditional in-clinic fieldwork rotations. Students in the program in 2020 completed two brief traditional in-clinic rotations and one virtual simulation rotation. Students in the program from 2020 on completed only virtual simulation to fulfill the level I fieldwork requirement. This study utilized National Board for Certification in Occupational Therapy (NBCOT) first time pass rate exam data and Fieldwork Performance Evaluation scores for each cohort between 2016-2022 as outcome measures.

Using a situated learning theoretical framework to design the study, the researcher hypothesized the null: there would be no statistically significant differences of the NBCOT exam score means or in the Fieldwork Performance Evaluation Form (FWPE) scores between groups that experienced the three instructional methods used to fulfill level I graduation requirements: Virtual Simulation, (very brief) traditional in-clinic fieldwork rotations, or a combination of both traditional in-clinic rotation and virtual simulation. This study also investigated potential associations between the amount of virtual simulation a student experienced and FWPE scores as well as NBCOT first-time pass rates. This study will provide more information about instructional methods for fulfilling level I requirements that may be especially supportive of "bridge" students' learning needs while taking into account their work experience and the additional life demands of this population of nontraditional adult learners.

Table of Contents

Page

Chapter 1: Introduction 1
- Statement of the Problem 1
- Setting of the Study 9
- Researcher's Role 9
- Purpose of the Study 10
- Definition of Terms 11

Chapter 2: Literature Review 17
- Theoretical Perspective: Situated Learning Theory 18
- Problem: Fieldwork Shortages Both Historical and Current 23
- Factors Contributing to Fieldwork Shortages 25
- Simulation: Potential Solution to Fieldwork Shortages 28
- Current Use of Simulation in Health Professions Education Programs 31
- Virtual Simulation 34
- Gaps in the Literature 38
- Conclusion 41
- Research Questions 41

Chapter 3: Methodology 43
- Participants 43
- Instruments 46
- Procedures 56

Chapter 4: Results 63
- Demographic Characteristics 63
- Data Analysis 66
- Summary 69

Chapter 5: Discussion 70
- Summary of Findings 70
- Interpretation of Findings 73
- Context of Findings 77
- Implications of Findings 79
- Limitations of the Study 81
- Future Research Directions 83

References 85

Tables
- 1 Sex and Race of Matriculants 2017-2022 64
- 2 Breakdown of Sex and Employment Credentials of Matriculants By Cohort 64
- 3 Self-Identified Sex and Race of Matriculants by Cohort 65

4 5 x 3 Chi-Square Test of NBCOT Mean Scores By FWI Instructional Method 67
5 Symmetric Measures for Chi-Square.....67
6 ANOVA of Z-Scores for Level II Fieldwork A and B By Instructional Method Used to Fulfill Level I Fieldwork Requirements 68

Chapter 1: Introduction

Statement of the Problem

An international shortage of traditional in-clinic, on-site opportunities for both level I and level II fieldwork in occupational therapy educational programs was reported in the United States and global professional literature as early as 1987 and has continued to be noted currently (AOTA, 2021; Avi-Itzhak & Kellner, 1994; Divens & Cruz, 2022; Evanson et al., 2015; Hirama, 1987; Mattila et al., 2020; Ozelie et al., 2015; Reed, 2016). In March of 2020, this shortage was predictably exacerbated by the global COVID-19 pandemic, wherein health profession educational programs were forced to adapt to a variety of global restrictions on in-person, on-site clinical education placements (British Medical Association, 2020; Hickland et al., 2020; Hutchings et al., 2022). In order to graduate, students in United States occupational therapy education programs must complete lower-level clinical education experiences, called level I fieldwork, and a minimum of 24 weeks of full-time clinical education, called Level II fieldwork (ACOTE, 2018, pp. 39-44). After the peak of the COVID-19 pandemic, the shortage of in-clinic, on-site fieldwork placements persists, requiring occupational therapy educational programs to design fieldwork programs thoughtfully and creatively.

The Research Problem

Given that shortages in fieldwork sites persist and given that available sites *should* be rationed for level II fieldwork, for which there is no leeway in the Accreditation Council for Occupational Therapy Education (ACOTE) standards, the issue of how to best meet the level I fieldwork requirements remains. In 2018, ACOTE published the latest edition of accreditation standards, allowing programs until July 31, 2020 to fully

incorporate the new standards (p. 1). Included in the ACOTE 2018 publication was Standard C.1.9, which stated five specific potential instructional methods that could be utilized independently or in combination to meet the requirement for level I fieldwork (p. 41). By specifying several approved instructional methods, the 2018 ACOTE standards essentially granted educational programs permission to diverge from the traditional on-site, in-clinic apprenticeship model of clinical education most programs had adhered to for years to fulfill level I fieldwork requirements. C.1.9 states that "simulated environments" is an educational strategy that would fulfill requirements, including those occurring and accessed virtually (AOTA, 2021, pp 16-17).

Flexibility with instructional methods that can be utilized to meet the ACOTE standards for level I fieldwork provided some relief from an already-overtaxed clinical education system, however, the problem of demonstrating the efficacy of the instructional methods came to the forefront. If, according to ACOTE (2018), the broad "goal of Level I fieldwork is to introduce students to fieldwork, apply knowledge to practice, and develop understanding of the needs of clients", what evidence exists to demonstrate the ability of the identified instructional methods to achieve the broad goal (p. 41)? Further, what evidence exists about the efficacy of the individual instructional methods, namely virtual simulation, as applied to clinical competence and preparation for level II fieldwork? Finally, what evidence exists about "bridge" students' opinions about the instructional methods they experienced in level I fieldwork? This study aims to address those specific gaps in the literature.

Background and Justification

Students pursuing entry-level Master's or Doctoral degrees in occupational therapy from United States Universities and who wish to be licensed to practice in the United States must complete educational programs that include lower-level clinical experiences known as *level I fieldwork.* According to the American Occupational Therapy Association (1999), Level I fieldwork should be designed by each academic institution to support didactic course instruction unique to each educational program's curriculum design. Level I fieldwork is required to meet standards established and evaluated by the Accreditation Council for Occupational Therapy Education (ACOTE, 2018). Inherent in the current level I fieldwork ACOTE standards is variability in the structure and delivery of level I fieldwork experiences.

Additionally, students are required to complete 24 full-time weeks of fieldwork education in a minimum of one setting if they are exposed to more than one area of practice, or a maximum of four settings (ACOTE, 2018, p. 42); the majority of United States occupational therapy educational programs require two twelve-week rotations to fulfill this standard. While occupational therapy educational programs have flexibility in designing and implementing level I fieldwork, the same flexibility does not extend to the level II fieldwork requirement. Students must complete the twenty-four full-time weeks not only to graduate but also to qualify for licensure in twenty-five states, which is required in all 50 states to practice legally (T. Brininger, S. Salvant, & N. Harvison, personal communication, March 16-18, 2020).

In 2020, the Coronavirus pandemic (COVID-19) disrupted clinical education worldwide and across disciplines (Hutchings et al., 2022; Hickland et al., 2020; Marchant, 2021; Lawton et al., 2021). In the United States, March 2020 marked the

beginning of restricted on-site traditional clinical placements in occupational therapy (OT) clinical education; over 8,000 fieldwork rotations were disrupted by mid-March 2020 (T. Brininger, S. Salvant, & N. Harvison, personal communication, March 16-18, 2020). ACOTE officials were sympathetic to the hardships these fieldwork disruptions posed to OT students, occupational therapy programs, academic fieldwork coordinators, and the healthcare systems that host these students. Yet, the accreditation standards remained in place, because in twenty-five states, the professional licensure application processes of health licensing boards reference the ACOTE standards *as written* for level II fieldwork rotations. In essence, no accommodations could be made without jeopardizing the potential for students in those twenty-five states to be licensed to practice in those states (T. Brininger, S. Salvant, & N. Harvison, personal communication, March 16-18, 2020). Thus, ACOTE required those disrupted fieldwork rotations to be completed, augmented, or replaced, further taxing America's already stressed healthcare system and a fieldwork education system already considered burdened before the pandemic.

With most available clinic spots assigned to level II OT students, slots previously reserved for level I students in pre-pandemic times, disappeared due to staffing or social distancing requirements or reassignment to level II fieldwork students. These disruptions created an urgent need to identify and utilize alternative means of fulfilling the ACOTE standards for level I fieldwork education that eliminated or reduced the need for students to physically be in a clinic. The use of high-fidelity virtual simulation was one solution for fulfilling level I fieldwork requirements and was supported by the accreditation standards.

Deficiencies in the Evidence

The use of simulation in occupational therapy educational programs is relatively new compared to the fields of nursing, medicine, and physical therapy (Bennett et al, 2017). As a result, there is much less simulation-focused literature specific to the field of OT. Further, much of the simulation-focused occupational therapy literature reports descriptive or prospective quasi- or non-experimental studies (Grant et al., 2021; Bennet et al., 2017), suggesting the need for a greater emphasis on randomized controlled trials or at least more robust research designs.

Student satisfaction with various simulation modalities has been widely reported in the occupational therapy literature (Andrzejewski et al., 2020; Mattila et al, 2020; Turesson & Falk, 2021; Divens & Cruz, 2022; DeIuliis et al., 2021; Ozelie et al., 2022; Coppola et al., 2019; Walls et al., 2018). Student satisfaction, attitudes, and perceptions constitute important parts of the literature because students certainly are directly impacted by instructional methods. However, student opinions are only one piece of the puzzle. Further, these opinions have been solicited from traditional graduate students, not nontraditional students in "bridge" programs.

The cost of simulation in relation to the effectiveness of simulation in terms of specific learning outcomes was noted as a topic ripe for robust research (Chu et al., 2019; Turreson & Falk, 2021; Gospodarevskaya et al., 2019; Bennett et al., 2017). Simulation modalities have a large range of potential costs from low-fidelity case studies, the cost of which can be measured in time and effort to generate them to computerized, life-sized manekins and virtual reality simulation equipment. Cost is certainly important,

particularly as questions about effectiveness in terms of learning outcomes, performance skills, and professional competency remain to be addressed.

A heightened focus of the healthcare professional education industry on interprofessional education (IPE) has encouraged studies investigating the impact of IPE simulations across healthcare profession disciplines. Recent research reported results including positive student perceptions of the IPE simulation experience, self-reports of increased understanding of interprofessional roles of healthcare team members, self-reports of heightened collaboration with other disciplines (Mills et al., 2020; Coppola et al., 2019; Washington et al., 2021). These same authors noted evidence deficiencies related to the timing of IPE simulation events in coursework across disciplines (Mills et al., 2020, p. 479), evaluating student perceptions of IPE simulations across gender (Washington et al., 2022, p. 280), and more rigorous research designs to measure effectiveness including studies at several universities simultaneously, across more disciplines, and with larger sample sizes (Nieuwoudt et al., 2021, p. 7; Coppola et al., 2019, p. 255). Finally, the need for more rigorously designed research specifically related to performance outcomes following IPE simulations was suggested by Coppola et al. (2019, p. 255) and Nieuwoudt et al. (2021, p. 7).

The most current scoping review of simulation in occupational therapy education, Grant et al. (2021), ultimately examined 32 international occupational therapy simulation studies between 2009 and 2020. Overarching results indicated positive responses from students (perceptions and attitudes), that occupational therapy programs are utilizing various simulation modalities in a variety of ways to meet learning objectives and accreditation standards, and that results suggest that simulation could serve as

replacements for traditional level I clinical placements if set up and managed according to best practices. The authors noted the "lack of studies" examining the effectiveness of simulation on performance outcomes as a significant gap in the research (Grant et al., 2021, p. 354). An older literature review of the use of simulation in occupational therapy education, Bennet et al. (2017), likewise noted the need for randomized controlled studies focusing on the *effectiveness* of simulation, in particular, effectiveness as applied to "students' behaviours (task performance), competence and client outcomes" (p. 324). The two related themes of effectiveness and simulation's potential for clinical placement replacement appeared in several studies.

Two studies indicating the positive impact of simulation on the development of narrowly defined clinical skills, including successfully transferring patients using safer body mechanics (Reichl et al., 2019) and the identification of hospital room safety hazards by interprofessional, interdisciplinary groups of students (Reime et al., 2022) suggest that this instructional method can be successful. However, both studies indicated the need for more robustly designed research studies that focus on performance rather than student self-reports. Additionally, both studies noted that knowledge transfer from the simulation to either the classroom or, ultimately, to professional practice needs to be investigated further.

ACOTE standard C.1.9. allowing the use of "simulated environments" and "virtual environments" to fulfill level I fieldwork requirements was adopted in 2018 for use by July 2020 (Accreditation Council for Occupational Therapy Education, 2018, pp.41-54). Because the standard is relatively new, limited research has been completed about this specific application of simulated environments and virtual environments

(Mattila et al.,2020). As noted by Mattila, no research to date has focused on potential effects the use of virtual simulations to fulfill the level I fieldwork requirements might have on clinical competence as measured by a recognized outcome measure in the field of occupational therapy. Two recent studies on the use of virtual simulation to fulfill level I fieldwork requirements identified two primary areas for future research: the impact of simulation on learning outcomes for level I fieldwork and on clinical competency (DeIuliis et al., 2021; Ozelie et al., 2022). Mattila et al. (2020) suggested that additional research is necessary to understand better the impact of virtual simulation on self-reported clinical competency versus competency as gauged by a known outcome measure (pp 8-9).

Finally, very little research has been published about the "bridge" students who were the subjects of this study. At the time of writing, 668 educational programs were accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) in the United States. Of those, 263 are at the occupational therapy assistant (OTA) level education programs, and 405 are at the entry-level occupational therapy level education programs. The entry-level occupational therapist (OT) degree has two points of entry into the profession: master's-level and doctoral-level. Of the 405 entry-level occupational therapy educational programs, 17 of those are classified by the American Occupational Therapy Association as "bridge" programs, whereby students with earned OTA degrees build on that existing assistant-level education and clinical practice experience to earn entry-level master's degrees. Approximately 4.2% of the entry-level OT educational programs accredited by ACOTE are "bridge" programs These "bridge" students are the student subjects of focus in this study. (ACOTE, 2022).

Audience

Results of this study would benefit occupational therapy educators, particularly program directors who oversee occupational therapy educational programs, and academic fieldwork coordinators, who are accountable for meeting the accreditation standards for fieldwork education in OT programs. Educators and clinicians who serve as on-site ACOTE accreditors would also benefit from the results of this study because they would understand how some universities are using virtual simulation to fulfill the standards related to level I fieldwork education. University administrators interested in revenue streams could utilize this information in order to plan for smart growth of cohort sizes or new programs. Finally, the results of this study might interest current and future OT students who are keen consumers of OT education. These stakeholders want to know that their tuition dollars pay for educational programs that will propel them toward graduation, board certification, state licensure, and professional practice.

Setting of the Study

The setting for this research study is a mid-sized private Christian university in a metropolitan area in the mid-south with four occupational therapy programs and three universities. The occupational therapy program of primary interest to this study is the Masters of Science in Occupational Therapy (MSOT) Degree “bridge” program.

Researcher’s Role

The researcher’s professional role at the institution where the research study will take place is faculty, who also has the ACOTE-recognized responsibilities of an Academic Fieldwork Coordinator for the MSOT “bridge” program.

Purpose of the Study

The overarching purpose of this study is to establish the efficacy of virtual simulation as an instructional method for fulfilling level I fieldwork requirements for MSOT "bridge" students as one means of mitigating the fieldwork shortage noted throughout occupational therapy literature. This hypothesis is based upon knowledge that "bridge" students matriculate with foundations of work experience and inculturation to the field, they have learning needs that differ significantly from traditional OT students, and they prefer more flexible educational delivery systems than traditional brick-and-mortar full-time educational programs offer (e.g., hybrid, asynchronous when possible). To do that, the investigator will analyze retrospective data from American Occupational Therapy Association (AOTA) Fieldwork Performance Evaluation (FWPE) final scores and National Board for Certification in Occupational Therapy (NBCOT) exam scores collected from 2016-2022 graduates of an MSOT "bridge" program to look for statistically significant differences based on the instructional method subjects experienced for level I. The investigator will also examine the same data for trends between the instructional methods to fulfill graduation requirements and the two outcome measures. Graduates from 2016-2022 fall into one of three groups based on the instructional methods used to fulfill their cohort's level I fieldwork requirements: virtual simulations, traditional in-clinic experiences, and a combination of traditional and virtual experiences. Does a relationship exist between exposure to virtual simulation and FWPE scores? Is there a relationship between exposure to virtual simulation and NBCOT first-time pass rates? These are two questions this research endeavors to answer.

Definition of Terms

Occupational Therapy

"The Therapeutic use of everyday life occupations with persons, groups, or populations (i.e., the client) for the purpose of enhancing or enabling participation." (American Occupational Therapy Association, 2020, p. 1)

Occupation

"Everyday personalized activities that people do as individuals, in families, and with communities to occupy time and bring meaning and purpose to life. Occupations can involve the execution of multiple activities for completion and can result in various outcomes. The broad range of occupations is categorized as activities of daily living, instrumental activities of daily living, health management, rest and sleep, education, work, play, leisure, and social participation" (American Occupational Therapy Association, 2020b, p. 70).

Allied Health Professions

"...those health professions that are distinct from medicine and nursing" (ASAHP, 2020, second paragraph).

Accreditation Council for Occupational Therapy Education (ACOTE)

"…the accrediting agency for occupational therapy education by both the United States Department of Education and the Council for Higher Education Accreditation" (Accreditation Council for Occupational Therapy Education, n.d., first paragraph).

Fieldwork Education

"…is a crucial part of professional preparation and is best integrated as a component of the curriculum design. The fieldwork experience is designed to promote

clinical reasoning and reflective practice, transmit the values and beliefs that enable ethical practice, and develop professionalism and competence in career responsibilities. Fieldwork experiences should be implemented and evaluated for their effectiveness by the educational institution. The experience should provide the student with the opportunity to carry out professional responsibilities under the supervision of qualified personnel serving as a role model" (ACOTE, 2018, p. 39).

Level I Fieldwork

ACOTE® (2018) states that "the goal of Level I fieldwork is to introduce students to fieldwork, apply knowledge to practice, and develop understanding of the needs of clients" (p. 41). Important to note is that the goal of level I fieldwork is not mastery, but rather exposure and enculturation to the profession.

Level II Fieldwork

ACOTE® reports that "the goal of Level II fieldwork is to develop competent, entry-level, generalist occupational therapists. Level II fieldwork must be integral to the program's curriculum design and must include an in-depth experience in delivering occupational therapy services to clients, focusing on the application of purposeful and meaningful occupation and research, administration, and management of occupational therapy services. It is recommended that the student be exposed to a variety of clients across the lifespan and to a variety of settings." (p. 42). Important to note is that the goal of level II fieldwork is entry-level competency or mastery of the skills of an entry-level practicing occupational therapist.

Fieldwork Educator

"An individual, typically a clinician, who works collaboratively with the program and is informed of the curriculum and fieldwork program design. This individual supports the fieldwork experience, serves as a role model, and holds the requisite qualifications to provide the student with the opportunity to carry out professional responsibilities during the experiential portion of their education" (ACOTE, 2018, p. 50).

Bridge Program

Occupational therapy educational programs accredited by ACOTE® in which applicants with occupational therapy assistant (OTA) degrees and credentials, either associates-level or bachelor's-level, can complete the requirements for a graduate degree, thus enabling them to sit for the national board exam for occupational therapists.

Competence

ACOTE (2018) states that to be competent means "to have the requisite abilities/qualities and capacity to function in a professional environment" (p. 48).

Community of Practice

Wenger et al., (2002) reported that communities of practice (CoP) are "groups of people who share an area of concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p. 4). Wenger (1998) asserted that CoP are mechanisms of social learning at the individual, community, and organizational level supporting knowledge transmission along a continuum of formality (from very causal and informal learning to more specifically targeted and regimented) (pp. 1-7).

Clinical Reasoning

According to ACOTE (2018), “clinical reasoning is complex multifaceted cognitive process used by practitioners to plan, direct, perform, and reflect on intervention” (p.48).

Fieldwork Performance Evaluation (FWPE)

The instrument created and validated by the American Occupational Therapy Association and utilized across occupational therapy programs in the United States to measure and document the performance of occupational therapy(OT) and occupational therapy assistant students in level II fieldwork placements. This study refers specifically to the FWPE for OT students.

Simulation

“A technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions” (Lioce et al., 2020, p. 44)

Simulated Clinical Experience

Experiences that are “based upon real-life clinical scenarios and utilize the simulated environment to provide a hands-on, safe clinical environment in which students have complete autonomy in providing patient care and decision-making. They are free to make mistakes, enabling them to see the real effects of any errors in interpretation of assessment findings” (Levine et al., 2014, p. 694).

Virtual Environments

“An environment in which communication occurs by means of airwaves and/or digital platforms in the absence of physical contact. The virtual context includes

simulated, augmented reality, or real-world environments, transmitted through information and communication technologies, in real-time, near-time, or store-and-forward/asynchronous methods" (ACOTE, p. 2018, p. 54).

Virtual Simulation

Simulation learning activities that occur in a virtual context.

Fidelity

"The degree to which the simulation replicates the real event and/or workplace; this includes the physical, psychological, and environmental elements" (Lioce et al., 2020, p. 18). *Fidelity* can be conceptualized on a continuum from low fidelity to high fidelity. Low-fidelity learning activities can include paper-based case studies; high-fidelity learning activities may include standardized patients, manikins (mechanized life-sized human replicas utilized for teaching and learning, especially in simulation situations) and some virtual simulation software programs.

Occupational Therapy Program

Educational programs accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) where upon admission, students complete degree requirements to earn a degree in the field. Completion of these educational programs is mandatory to be eligible to sit for the national certification board exam. Students pursuing Occupational Therapist credentials complete Masters- or entry-level Doctoral-level graduate degrees. Students pursuing Occupational Therapy Assistant credentials complete Associates- or Bachelor-level degrees.

Non-Technical Skills

Often referred to as professional behaviors in occupational therapy literature. These skills include a range of interpersonal, cognitive, and social *soft skills* that can support or inhibit the profession-specific technical skills that health professionals apply to their trade. No consensus exists about the specific skills belonging to this category, but their impact on patient care, safety, and professional success has been well-documented in the nursing and medicine literature. (Peddle et al. 2019 p. 72)

Chapter 2: Literature Review

In general terms, an overarching purpose of this study is to explore the suitability of the instructional method of virtual simulation to fulfill level I fieldwork requirements for MSOT "bridge" students. "Bridge" students constitute a small but growing percentage of the United States population of Occupational Therapy graduate students. Because they matriculate as licensed, currently practicing healthcare professionals with a variable number of years of practice, these "bridge" students have different learning needs than traditional occupational therapy graduate students. Exploring different ways to fulfill level I fieldwork requirements supports the ACOTE standards, individual educational program outcomes, and the learning needs of this body of students. Since little research exists about this specific population of "bridge" students, particularly as this student population relates to virtual simulation, this study fills a notable gap in the occupational therapy literature. One purpose of this study is to compare performance differences on an outcome measure of three groups of MSOT bridge students exist: students who completed all three level I fieldwork rotations traditionally in a clinic-based setting, students who completed a combination of two traditional clinic-based level 1 fieldwork rotations and one virtual rotation, and students who completed all three level I fieldwork rotations using virtual simulation. The second purpose of this study is to investigate whether differences in self-efficacy exist in the three groups of students who experienced different level I fieldwork instructional methods. The third purpose of this study is to investigate whether MSOT bridge students who have higher aggregate scores on the Professional Competence also have higher total scores on the NBCOT Practice Test.

Theoretical Perspective: Situated Learning Theory

Theories of situated *learning* provided a broad framework to compare the competency of MSOT students who fulfilled level I fieldwork requirements with one of three different instructional methods: high-fidelity virtual simulation, traditional clinic-based rotations, or a combination of the two. Situated learning theory was initially developed by Lave and Wenger (1991) and was primarily used to study professional education, such as health professional education, workplace learning, and communities of practice. The theory of situated learning indicates that situated learning is contextual, location-dependent, dependent upon practice, and necessary to enculturate professionals into their chosen profession. They posited that adult learners learn best when the learning environment requires contextual and meaningful problem-solving to address real-life, professionally-relevant problems. Lave & Wenger (1991) compared situated learning to the experience of an apprentice, learning alongside a master artisan; in the apprentice's entry into the profession, the activities s/he is allowed to engage in are low-risk but ones that embody buildable skills vital to both the culture and practice of that profession. Those early skills serve as a foundation for more complex skills and become a reservoir of profession-specific knowledge from which solutions to professional problems can be identified. Increasingly over the past two decades, health profession education has relied upon situated learning theory to explore and describe how health professional students across disciplines gain the necessary knowledge, skills, and attitudes to practice competently, safely, and ethically within their professions (Stalmeigher & Varpio, 2020; O'Brien & Battista, 2020; Kahlke et al., 2019)

Lave and Wenger's theory of situated learning (1991) and later, Wenger's ideas about Communities of Practice (1998) were heavily influenced in general by ideas about situated cognition, and in particular, by the idea of cognitive apprenticeships (Lave & Wenger, 1991, p.21). Brown, Collins, and Duguid (1989) examined the idea of "Cognitive Apprenticeships" within the situated cognition framework (p. 37). They used examples of teaching mathematics to illustrate the application of the cognitive apprenticeship. In this specific example, the students were learning how to apply math concepts but were also learning approaches to problem-solving employed by mathematicians, which was the goal of the situated-learning-framed lesson. To accomplish the lesson's objectives, the investigators utilized a mixture of the activity itself (solving math problems) and the "social interaction" piece of a mentor modeling professional reflection and problem-solving (the teacher talking casually aloud about the many ways to solve such a problem) (Brown et al., 1989, p. 37).

Wenger-Trayner and Wenger-Trayner (2015) defined Communities of Practice (CoP) as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (p. 2). The "bridge" students at the center of this study matriculate to the MSOT program with an average of just over four years of experience as licensed, practicing Certified Occupational Therapy Assistants (COTA) and Physical Therapist Assistants (PTA) (Lauzon, L., personal communication, 7/18/22). Those years of work experience within the same or similar contexts and locations as these individuals will practice in after graduating with MSOT degrees allows these students to benefit from the asynchronous situated learning affordances of virtual simulations in ways that traditional students without healthcare work experience might

not. In other words, the "bridge" students can leverage their healthcare work experience to contextualize asynchronous virtual simulation in order to add to their foundational skill sets.

In traditional level I fieldwork placements, students spend a curriculum-specific amount of time at an assigned location, embodying Lave & Wenger's (1991) notion of professional learning within a context- and location-specific apprenticeship-type structure. Lower-level fieldwork placements provide opportunities for exposure to a site and population, professional norms within that specific context, and glimpses of operating within the occupational therapy profession in that specific setting. Mastery of any skill or behavior is not the goal of level I fieldwork, but enculturation to the profession could be considered part of the overall goal of these lower-level rotations (ACOTE, 2018, p. 41). Given that the subjects of this study are "bridge" students,

Situated Learning in Face-to-Face and Virtual Problem-Based Training

J. Higgs (2012) asserted that *practice-based education (PBE)* "…is grounded in the preparation of graduates for occupational practice" (p.3). She created an educational framework for practice-based education, and among the foundational tenets, she included the following: "…situated within practice-relevant contexts; occurs in many CoP; involves a process of socialization into professional/occupational worlds, roles, identities, and career paths" (p. 4). Higgs did not explicitly state nor imply that PBE must occur in-situ or face-to-face, only that it occurs within practice-relevant contexts. Virtual asynchronous simulations seem to uphold Higgs' tenets of PBE, particularly for level I fieldwork experiences.

Hutchings et al. (2022) noted that *practice-based learning*, traditionally taking the form of site-based clinical education across many health care disciplines, is rooted in the ideas of situated learning (p. 334). Taking place largely within Communities of Practice (CoP), expected outcomes of practice-based learning experiences include the development of a variety of critical skills including profession-specific clinical skills, professional behaviors, clinical reasoning and problem-solving, and ethical behaviors. Hutchings et al. (2022) asserts that situated, practice-based learning within a CoP can occur with variety learning strategies, including simulations, both face-to-face and virtual, and synchronous and asynchronous (p. 334).

Situated Learning in Virtual Reality

In a study designed to investigate the ability for situated learning to occur through engagement with virtual learning materials, Lin et al. (2022) reported that complex professional skill development occurred more strongly through virtual reality-based surgical simulations than with traditional instructional materials in flipped learning conditions. In this study, performance of two small groups of students in a lumbar puncture course was compared. The group that received flipped instruction using virtual reality-based instructional materials demonstrated significantly higher scores on lumbar puncture skills than the control group that received flipped instruction via traditional instructional materials. Neither group demonstrated significant differences in lumbar puncture *knowledge* (Lin et al., 2022, p.13). These authors assert that virtual reality simulations afford health profession students opportunities to safely practice and refine complex skills within the specific professional context and virtual environment in which they will eventually work, without harming human patients. In fact, a systematic review

and meta-analysis of adaptive e-learning environments (AEEs) by Fontaine et al. (2019) reiterated that AEEs may be better instructional strategies for teaching students at the skill rather than knowledge level. The benefits of knowledge and skill building coupled with aspects of professional enculturation can increase student confidence and ultimately performance.

When *context* and *location* are represented digitally, such as in virtual simulations, situated learning theory can still frame how the transfer of knowledge and skills may occur for adult learners. As students work through profession-specific problem-solving case study tasks, they are engaging in situated learning activities, supplemented with face-to-face debriefing or asynchronous reflection activities designed to support and encourage deeper learning. "Well-designed simulations and games provide immersive environments with appropriate tools, content, feedback, and scaffolds that are necessary for meaningful cognitive and metacognitive learning and transfer," as described in situated learning theory (Hajian, 2019, p. 103). Additionally, for "bridge" students, they may draw on their own contextual and professional culture experiences as licensed, practicing healthcare professionals to maximize the impact of these situated learning simulation opportunities. As noted by Nicolini et al (2016), virtual asynchronous CoPs have been noted to support professional socialization or enculturation of new employees and knowledge-sharing in more seasoned healthcare employees. The "bridge" students featured in this study, who matriculate with an average of over four years of work experience, might be considered to fall somewhere in between new and more seasoned health professionals.

Problem: Fieldwork Shortages Both Historical and Current

ACOTE

Fieldwork shortages have been reported in occupational therapy literature for at least 20 years (Schaefer-Clay, 2019, p.32) and continue to be an obstacle for occupational therapy programs today. To understand how fieldwork shortages developed and currently persist as obstacles, familiarity with the structure of occupational therapy educational programs is key foundational knowledge. Occupational therapy programs in the United States (US) are accredited by the Accreditation Council for Occupational Therapy Education (ACOTE), an agency recognized to fulfill this function by the United Stated Department of Education (USDE) and the Council for Higher Education Accreditation (CHEA). ACOTE is the only body empowered to accredit all occupational therapy education programs in the United States. Graduation from an accredited occupational therapy program in the United States ultimately results in the ability to meet the educational requirements of all fifty states, and thus apply for licensure for practice after successful completion of the national board exam. That exam is developed and administered by yet another agency, the National Board for Certification in Occupational Therapy (NBCOT). (Accreditation Council for Occupational Therapy Education (ACOTE), 2022a)

While all occupational therapy education programs are unique in terms of geographic location, higher educational institution affiliation, and mission, vision, and values, the one commonality among all United States occupational therapy educational programs is guidance from and adherence to the ACOTE standards. In order for individuals to be licensed to practice occupational therapy in the United States, applicants

must have passed the NBCOT registration (board) exam and must submit documentation of successful graduation from an ACOTE-accredited educational program. At the time of writing, there were 676 occupational therapy programs "in the accreditation process," including applicant and candidate/pre-accreditation programs (Accreditation Council for Occupational Therapy Education (ACOTE), December 2022). Approximately every five years, a committee of stakeholders appointed by ACOTE, including occupational therapy educators, practitioners at both the therapist and assistant level, and community members or service recipients, reviews the ACOTE standards and makes revisions based on practitioner feedback, broad market trends, ACOTE's strategic plan, and other factors. Once standards have been adopted and published, occupational therapy programs must demonstrate compliance with the updated standards within an allotted time frame, generally between 12 and 24 months. (Schultz-Khron, 2019)

ACOTE, having observed the hardships occupational therapy programs experienced with fieldwork placements during the accreditation process, officially broadened the profession's understanding of how level I fieldwork standards could be fulfilled by explicitly stating alternatives to shadowing professionals in traditional clinical practice. The 2018 publication of ACOTE standards included a new level I fieldwork standard, C.1.9, which, in addition to the traditional in-clinic 1:1 shadowing of an occupational therapy practitioner, offered four additional alternative ways the level 1 fieldwork standard could be met. Those four alternatives to traditional in-clinic placements were "simulated environments, standardized patients, faculty practice, and faculty-led site visits" and the standard can be met with one or a combination of any of

these five instructional methods as long as “all level 1 fieldwork [is] comparable in rigor” (Accreditation Council for Occupational Therapy Education (ACOTE), 2018. P. 41).

Factors Contributing to Fieldwork Shortages

Educational Trends

Trends in occupational therapy education have contributed to fieldwork shortages noted in current literature (Mack, 2019; Montgomery, 2022; Ozelie et al., 2022) and since the 1980’s. The American Occupational Therapy Association (AOTA) compiles data reported by all educational programs annually into the Annual Data Report. The most recent report (Harvison, 2022) analyzing data from the 2020-21 academic year indicated that enrollment numbers reported by masters- and doctoral- entry-level occupational therapy programs represent 23,436 students at some point in their educational programs (p. 7). ACOTE standards requires each of those students to complete at least 24 weeks of level II fieldwork and on average, three level I fieldwork rotations apiece, requiring approximately 46,872 separate level II placements and 70,308 individual level I placements (for programs that include three level I fieldwork rotations). Climbing enrollment is one contributing trend, while another is the profession’s shift from entry-level master’s to doctoral degrees.

Ozelie et al. (2020) analyzed data from six cohorts to determine if an educational program’s transition from Master’s-level to a Doctoral entry-level degree (ELOTD) impacted diversity in their program, enrollment, and number of fieldwork reservations. To distinguish master's and Doctoral-level entry-level degrees, ACOTE standard D.1.0 (2018, p. 44) requires a doctoral capstone experience of an additional fourteen weeks of independent study, often at facilities local to the degree seekers’ universities, including

healthcare sites. This study did not indicate a statistically significant difference between master's and doctoral entry-level numbers but did note a slight decline in fieldwork reservations during this time. More research is needed to understand how the shift from master's to Doctoral entry-level degrees impacts current educational infrastructure including fieldwork placements.

Fieldwork Educator Factors

Limited time resources were noted repeatedly as a barrier to supervising fieldwork students (Ozelie et al., 2016; Ryan et al., 2018; Schaefer-Clay, 2019). Aware of the continuing challenges related to fieldwork placements, Schaefer-Clay (2019) surveyed current OT and OTA practitioners regarding their perceived barriers to supervising fieldwork students. Understanding perceived barriers to supervising fieldwork students would allow educational programs to address those challenges systematically to encourage practitioner participation. Related identified barriers Schaefer-Clay (2019) reported were practitioners' current caseload demands, which can reflect the site productivity requirements of each practitioner, and "flexibility of placement schedule" (p. 49), indicating practitioners would like some say in when the fieldwork rotation begins and ends. Ryan et al. (2018) indicated similar findings, noting that the *lack of time* theme "garnered the most emotional responses" because practitioners noted a perceived inability to provide excellent student supervision while maintaining their required caseload per site productivity standards (p. 8). Ozelie et al. (2016) reported that, on average, practitioners who supervise students spend slightly less than an additional half-hour at work than those who do not supervise students (p. 68). Limited time was not the only barrier to supervision noted by fieldwork educators.

In an effort to combat fieldwork shortages related to supervisors who do not feel prepared to supervise students, Chycinski (2020) examined the impact on reported readiness of completing a learning module developed for OT practitioners who plan to supervise students. Although limited participation limits generalizability of results, this exploratory study paved the way for researchers to further examine perceived fieldwork educator readiness and the potential supports that could increase feelings of readiness. Not unrelatedly, Schaefer-Clay (2019) noted that 39.3% of respondents reported that they had *not* been asked by educational programs to supervise students in fieldwork education (p. 41). Practitioners without experience in student supervision might be likely to report a lack of perceived readiness in supervision skills, but that assertion would require additional research to make with confidence.

Fieldwork Shortages Exacerbated By COVID-19 Pandemic

The worldwide COVID-19 pandemic's March 2020 impact on clinical education across all healthcare professional education in the United States was swift and thorough. Mandatory quarantine periods exempting only those individuals with jobs considered essential resulted in many health professions students being unable to complete fieldwork rotations already in progress or to initiate new rotations until the federal and state governments generated more guidelines. Health Professional Educational programs adapted quickly and made use of technology to deliver educational content to students learning remotely (Patel et al., 2022, Zhang et al., 2021). Studies noting pandemic-related fieldwork barriers including shortages also describe creative pivots allowing OT programs to fulfill ACOTE standards while preparing students for level II fieldwork and ultimately, for practice (Branch, 2022, Montgomery et al, 2022, Ozelie et al., 2022).

Simulation: Potential Solution to Fieldwork Shortages

Fieldwork shortages have required occupational therapy educational programs to generate creative solutions to fieldwork shortages, and the 2018 ACOTE standards introduced four instructional strategies in addition to traditional on-site clinical placements to fulfill level I fieldwork requirements, including "simulated environments" (ACOTE, 2018, p. 41). Simulation is an accepted, beneficial instructional strategy in many HEP. Simulation has a rich history in the medical and health profession education fields and growing traction in occupational therapy educational programs.

The History of Simulation as Instructional Strategy in Health Professional Education

The use of simulation in health profession education, while inconsistent in depth and breadth of application in current times, has been noted at several points in history, beginning with the use of clay livers in ancient Babylonia as early as 1900 BCE (Bienstock & Heuer, 2022; Heuer et al., 2022). The Healthcare Simulation Dictionary (2nd ed., 2020) defines *simulation* as "a technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions" (p. 44). Artifacts, including sculpted models from antiquity and artist-rendered anatomical drawings, have been described as early simulations meant to guide those in healing professions to promote accuracy and safety. Applications of simulation in health professional education before the 1960s were sporadic and often short-lived due to the instability of materials used to craft simulations and/or, often, to laws and regulations, religious doctrine, or social mores, which may have limited or prohibited access to those learning tools (Bienstock & Heuer, 2022).

Military use of simulation was well in place by the time medical and health professional education formally adopted a more widespread use for student learning in the 1960s with the release of *Resusci Anne* (Bienstock & Heuer, 2022). Since the 1960s, the research and development of health professional education simulation technology and instructional methods have increased commensurately with developing technology. Currently, health professional education programs that embrace simulation utilize a variety of simulation modalities. Simulation modalities may include any or all of the following: paper- or computer-based case studies, trained standardized patients, mechanized manikins, virtual reality surgical simulators with haptic augmentation, and dynamic web-based environments such as Second Life™ (Bienstock & Heuer, 2022). Simulation design and development continues apace with developing technology.

Several factors converged to support the increased utilization of simulation in health profession education (HPE). A dwindling number of available clinical hours necessary for degree requirements for most HPE students, initiated by overtaxed clinical resources and in some cases, stakeholder mandates for limits, made simulation modalities necessary for learning required clinical skills (Bogossian, et al, 2019; Hewat et al., 2020; Jeffries et al., 2019; Roberts et al, 2019). Of note, HPE struggled to provide students with dependable hands-on clinical opportunities to experience and resolve high-risk, high-acuity patient scenarios in which time-pressured clinical reasoning was required. Using simulation, HPE students were provided with opportunities for repeated practice to strengthen and hone these skills without the risk of harming real patients meant fewer safety risks and perceptions of greater preparedness and confidence when students proceed to clinical experiences involving live patients and ultimately post-graduation

employment (Ataei et al., 2020; Hough et al., 2019; Oman et al, 2022; Sheen & Goffman, 2019). As a result, HPE programs embraced simulation opportunities to provide students with realistic, holistic, low-risk, controllable, dependable learning environments and problem-solving challenges that would encourage and develop higher-order clinical reasoning skills, confidence, and competence necessary for post-graduate work.

Fidelity

Simulation in HPE falls along a continuum of *fidelity*. Low fidelity simulation (LFS) is intentionally far-removed from reality, such as a paper case study. High fidelity simulation (HFS) involves higher degrees of realism in patients, environments, and contexts, and often requires students to make professional decisions based on higher-level clinical reasoning in time frames that mimic more life-like demands (Becker & Hermosura, 2019; Hanshaw & Dickerson, 2020). Examples of high-fidelity simulation instructional strategies include the use of trained standardized patients acting out a scenario, mechanized life-like *manikins* that can be programmed to display specific behaviors (i.e., sounds, bodily fluid emission, cardiac arrest, etc.), and virtual simulation programs that require step-by-step decision-making from the student to proceed. A key part of the simulation experience is direct feedback from experts or mentors to the HPE student about clinical decision-making, ethics, professionalism, and communication behaviors demonstrated throughout a simulation. The form of that feedback varies with the simulation platform, instructors, and other affordances including delivery method of the simulation, available time resources, and number of students to debrief. (Hallinger & Wang, 2020)

Current Use of Simulation in Health Professions Education Programs

General Benefits of Simulation as a Learning Strategy in HPE

Several benefits of simulation as a learning strategy have been noted, including but not limited to the adaptability of this instructional strategy to many different fields of HPE (Bienstock & Heuer, 2022; Brazil et al., 2023; Heuer et al., 2022), the ability for educators to design and implement supported, dependable clinical experiences and student assessments for individuals and/or groups (Brown et al, 2021; Goodwin et al, 2021, Reed et al, 2021), exposure to less common diagnoses and patient presentations (Layne et al, 2021; So et al., 2019), interprofessional skill development applications (Bienstock & Heuer, 2022; Langton et al., 2021; Reime et al., 2022; van Wyk, 2020; Washington et al., 2022), opportunities to develop professional behaviors and skills (Brown et al, 2021; Randal et al., 2018; Reed et al., 2021), improve safety outcomes (Frasier et al, 2022; Reime et al., 2022; Seaton et al., 2019), and dependable platform for developing student confidence in clinical skills and decision-making (Andre et al, 2021). Thibault (2020) noted that the use of technology in health professions education can free up time to address content that simulation cannot adequately teach (p. 692). Sullivan et al. (2021) posited that virtual simulation can provide dependable, affordable opportunities for student training in critical skills related to populations most students won't be able to access in level II fieldwork placements. The most simplistic explanation for its enduring and growing use in health professions education is that as an educational strategy, *simulation works*. As noted by Eppich and Reedy (2022), current research has evolved from asking *whether* simulation works to investigating *in which contexts and for what purposes* is simulation most impactful for students.

Barriers to the Use of Simulation in Health Professions Education Programs

Barriers to adopting and implementing simulation in allied healthcare education include financial cost to institutions for the initial investment in high-tech simulation equipment and lab spaces, simulation training for faculty and support staff, and work-load adjustments for faculty release time (Nye et al., 2019; Stockert et al. (2022). Ongoing costs include the time and cost of paying actors (Kourgiantakis et al., 2020), and increased costs to students for simulation resources (Nye et al., 2019). So et al. (2019) noted less easily quantifiable costs including the increased training costs of teaching small group sizes, which is often associated with simulation best practices, and the need for faculty or clinical staff release time to train or implement simulations. In an Australian occupational therapy educational program, Gospodarevskaya et al. (2019) found the costs of a simulated clinical program to be comparable to their traditional on-site clinical placements but noted that students and program administration placed a higher value on TCP than simulated experiences. Mack (2019) reported that funding was a primary barrier to institutions' adoption of simulation. Because simulation use has not been as deep or broad in allied health professions education as it has been in medicine or nursing, research about the barriers to implementation is sparse.

Placement Replacement

Does simulation work? Given the challenges of securing quality clinical and fieldwork experiences for healthcare professions education students coupled with increasing research reports of the benefits of using simulation as an instructional strategy, Nye et al. (2019), Roberts et al. (2019) and Hill et al. (2021) recommended using simulation to replace some unspecified portion of the number of hours students are

required to accrue to graduate and sit for board exams in speech-language pathology and nursing. After surveying health professions educators, Bridge et al. (2022) reported that between 11%-30% of required clinical hours could be replaced with simulation and still result in HPE graduates with strong practice skills and competencies (p. 46). When compared to results obtained from five years of students' scores on the Level I Fieldwork Competency Evaluation for OT and OTA Students upon completion of traditional in-clinic fieldwork placements, Montgomery (2022) found no significant difference in the scores on that same evaluation tool of a group of students who completed only virtual simulations. Conversely, Blackford et al. (2020) reported that clinical educators did not observe improved clinical competency in students who experienced one week of intensive simulation before participating in traditional in-clinic clinical experiences and felt rushed to help those students reach required benchmarks. Branch (2022) recommended utilizing commercially available web-based simulation platforms alongside traditional on-site face-to-face clinical experiences to fill gaps in less pedagogically dependable but still valuable in-person rotations. While still limited, research indicates a slowly growing interest in increasing the use of simulation in many formats in allied health professions education, balancing both the need for alternatives to traditional placements and the benefits of this instructional strategy to students and, ultimately, healthcare outcomes. More research is needed to flesh out the full benefits and barriers to adopting and implementing simulation-based experiences across allied health professions education. More recent research has focused on the use of a variety of virtual simulation modalities and platforms utilized heavily during the worldwide COVID-19

pandemic, but with an eye toward its continued utility as an instructional strategy in health professions education programs.

Virtual Simulation

As noted earlier, the COVID-19 pandemic exacerbated the existing fieldwork shortage, requiring health professions education programs to transition immediately to remote learning instructional strategies for all didactic and clinical education requirements. With student placements at many traditional in-clinic sites being canceled altogether, rationed for level II fieldwork placements, or altered by variable staffing requirements (Fogg et al., 2020a), occupational therapy programs, sanctioned by ACOTE's 2018 standards, broadened their views of level I clinical education to incorporate more simulation-based learning opportunities (Robinson et al., 2021). The Coronavirus pandemic paved the way for HPE programs to use computer-based or virtual simulation in HPE, with the bulk of these decisions being made without time to fully investigate potential outcomes, costs, and benefits. Since the beginning of the pandemic, studies have emerged describing aspects of simulation-based learning, some of which might prove useful to continue with in the post-pandemic period of HEP. Numerous studies (DeIuliis et al., 2021; Fogg et al., 2020a; Hickland et al., 2020; Lawton et al., 2021; Marchant, 2021; Mattila et al., 2020, Ozelie et al., 2022) describe emergency pivots from traditional face-to-face clinical placements to virtual placements spurred by necessity during the pandemic. Many of these pandemic-borne studies report outcomes related to various aspects of efficacy of virtual simulation as a learning strategy. Both non-pandemic-based and pandemic-based studies about virtual simulation contributed to

the current understanding of the potential utility and applicability of these types of digital learning strategies beyond their emergency application.

Virtual Simulation vs. Face-to-Face Instructional Methods: Is This the Right Question?

Simulation might prove to be among the best alternatives to face-to-face training when such training is not affordable, accessible, or advisable for a variety of reasons and may, in fact, be equally effective at teaching skills (Kononowicz et al., 2019; McKinney, 2020; Rumbach et al., 2021). The enduring Richard E. Clark (1983) quote, "[t]he best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" suggests that virtual simulation, when serving as the vessel for well-designed instruction, is a dependable instructional strategy for imparting a variety of HPE skills (p. 446). Lee et al. (2019) explained Clark's assertions in a medical education setting: "Elaborate technology alone cannot guarantee effective learning, but evidence-based instructional interventions can facilitate its optimal use and bring about better learning outcomes" (p. 786). Chu et al. (2019) echoed Clark's sentiments by asserting that simulation could likely replace part of the Australian clinical hour requirement if the simulations in question were well-designed to replicate aspects of clinical practice. Additionally, Chu et al. (2019) dispels the notion that simulation can be a quick, cheap alternative to traditional face-to-face placements. According to these authors, the iterative nature of the development, design, implementation, and evaluation of comprehensive simulation experiences are people-, time-, and financial resource-intensive endeavors if the "...primary focus is [authentic] 'participation in practice'" (Chu et al, 2019, p. 10). It

seems then, that the question to ask is not ‘is virtual simulation better than any other learning strategy,’ but rather, ‘is it *as effective* at meeting stated learning objectives?’

In a related vein, Massoth et al. (2019) found that students randomly assigned to a “high-fidelity” simulation group reported higher levels of confidence regarding their performance on the simulation outcomes both before and after the simulation as compared to the similarly matched “low-fidelity” simulation group. Interestingly, the “low fidelity” simulation group outperformed the “high-fidelity” group on several outcome measure subscales, leading the investigators to opine that the participants’ interpretation of "high-fidelity" translated to a perception of a higher quality or better educational experience for both groups of students. If both the “high-fidelity” and “low-fidelity” group simulations were well-designed and pedagogically sound, then, according to Clark (1983), one would expect similar performance from both groups on an outcome measure. Results from Massoth et al. (2019) suggest that student self-report measures used as outcomes for simulation research may be inadvertently measuring much more than the impact of the actual *learning strategy* of simulation, or at least something different than the intended variable.

Bracq et al. (2019) reported an increase in studies investigating the use of virtual reality simulations to teach *nontechnical skills*, often referred to as *professional behaviors* in occupational therapy literature (Howard & Barton, 2019). Peddle et al. (2019) investigated undergraduate nursing students’ ability to learn nontechnical skills through interaction with virtual patients in a commercially-available, web-based simulation resource; students self-reported perceptions suggested that interaction with virtual patients could promote the development of the “knowledge, skills, attitudes, and practice”

of nontechnical skills including communication, team interaction skills, clinical decision-making, empathy, and social awareness of situations (p. 73). Simulation could provide the support students need for those who require additional training or remediation of *nontechnical skills* to be successful on clinical rotations without taxing healthcare providers. Sullivan et al. (2021) asserted that computer-based role-play simulation was successful in training occupational therapy students in motivational interviewing techniques, which impacted their self-reported confidence scores in screening and intervening with individuals exhibiting substance abuse behaviors. Relatedly, the authors indicated that because very few mental health level II occupational therapy fieldwork opportunities exist nationwide, the computer-based role-play simulation filled a wide gap. Rather than attempting to cycle many students through very few existing slots in clinics, thus overwhelming the few available face-to-face resources, all students could complete computer-based simulation training programs to meet minimum accreditation standards. If virtual simulation is as effective as other instructional strategies, its application could be highly valuable such as in cases where students' direct interaction with vulnerable populations would be unlikely, or when the presentation of content could be challenging to dependably replicate in the field, such as workplace interpersonal conflicts. The ability to target specific learning outcomes by using virtual simulations as a learning strategy coupled with the ability to reduce the demand on traditional clinical sites by utilizing virtual patients or virtual simulation to fulfill some percentage of fieldwork requirements supports continued use beyond the pandemic.

Simulation Outcomes

As the application of simulation as an instructional strategy across allied health professions' educational programs has increased, so has the body of allied health professions' simulation-focused literature (Tudor-Car et al., 2022). A common theme noted in the growing body of allied HEP literature is the need for more rigorously designed and executed studies examining simulation (Bogossian, et al., 2019; Grant et al. 2021; Heuer et al., 2022; Kononowicz et al. 2019). A common type of outcome measure noted in allied HEP simulation literature was subject/student self-reports of the impact of simulation on their attitudes, beliefs, or perceptions (Booker, 2020; Coppola, et al, 2029; Mattila et al, 2020; Reichl et al, 2019; Walls et al., 2019). While understanding learners' perceptions of instructional experiences is valuable to HEP programs and certainly to students' educational experiences, further research focusing on outcome measures reflecting profession-specific facets of competence is necessary to fill a current gap in the literature.

Gaps in the Literature

Simulation in Health Professions Education and Occupational Therapy

The use of simulation in Occupational Therapy education has been growing, although the reporting of its use across all allied health professions has been inconsistent, and thus leads to difficulty with gauging accurate levels and formats of simulation utilization (Heuer et al., 2022). Squires et al. (2022) mapped the use of simulation-based experiences in allied healthcare education programs, reporting that the majority of studies were lower-level, focusing on student reactions or the impact of simulation of aspects of learning. Far fewer of the mapped studies focused on the impact of simulation-based experiences in clinical contexts or, even fewer, on how simulation-based experiences

impacted an organization. Similarly, Grant et al. (2021) found that simulation's efficacy in occupational therapy education has "been poorly evidenced" and cited a specific need for more randomized controlled trials to explore its pedagogical value (p. 354). Relatedly, other researchers (Bogossian et al., 2019; Heuer et al., 2022) described as a research gap the presence of very few RCTs in educational research, particularly those investigating the efficacy of various types of simulation utilized in allied health professions practice and educational programs. Langton et al. (2021) identified the need for more research designed to measure long-term outcomes with use of IPE simulation in HEP.

DeIuliis et al. (2021) recommend further research on the potential impact of simulation use on student learning outcomes and occupational therapy fieldwork performance. Ozelie et al. (2022) recommended future studies evaluate "actual clinical performance skills as evaluated by fieldwork educators" (p. 13). Mattila et al. (2020) similarly recommended that simulation efficacy be measured using performance on a recognized outcome measure. Montgomery (2022) urged occupational therapy educators to prioritize the study of student learning outcomes of various formats of simulation to make research-based pedagogical decisions in occupational therapy curricula. In a similar vein, DiZazzo-Miller et al. (2021) recommended a granular approach to investigating the pedagogical application of human patient simulators; they suggest that researchers study the impact of various acute diseases and clinical environments on measurable student performance outcomes. The use of simulation as a predictor of level II fieldwork performance is also a frequently noted gap in the occupational therapy literature (DiZazzo-Miller, 2021; Montgomery, 2022)

Conversely, Eppich & Reedy (2022) assert that more RCTs is *not* what HPE research should focus on currently. Rather, they suggest that HPE research about the use of simulation no longer needs to focus on *justifying* the use of simulation, because that work has already been done in a number of ways. Eppich and Reedy state that *clarification* of the ways simulation supports theoretically founded curricula and learning activities should be the goal of HEP research.

Bridge Students

Since 2019, only one study has focused on the specific population of *bridge students* in master's-level occupational therapy educational programs. In her dissertation, Showers (2022) examined the relationship between the students' first-time pass rates of the National Board for Certification of Occupational Therapy (NBCOT) registration exam, the amount of time between completing degrees for either associate degrees for occupational therapy assistants or bachelor's degrees, the students' majors of their bachelor's degrees, and the diploma-granting institution of the associate degrees. No statistically significant correlation was identified, but this study did contribute to the profession's understanding of admissions criteria for this underrepresented population of occupational therapy students. Specifically of value to this study is that Showers (2022) noted no current research about bridge programs or students in the body of occupational therapy literature, exposing a significant gap in the profession's scholarship of teaching and learning research.

The need for research about bridge program students is evident in that very little currently exists. Similarly, the literature highlights a need for research about the impact of simulation utilizing recognized outcome measures related to competency. This study

examines the impact of three different learning strategies utilized for level I fieldwork on NBCOT practice test scores of cohorts of bridge students. If virtual simulation not only fulfills the ACOTE standards but also indicates a higher level of competence as measured by a recognized outcome measure, then HEP can commit to some level of virtual simulation to satisfy graduation requirements, thus reducing the demand on valuable community site resources and alleviating fieldwork shortages.

Conclusion

This literature review examined the history and current use of simulation in health professional education in general and occupational therapy education specifically. Researchers have examined the cost of simulation programs compared to traditional clinical placements. Studies described the emergency implementation of simulation programs in the Coronavirus pandemic, allowing their students to continue to progress through their HPE programs. Some investigators focused solely on self-reported perceptions of subjects who participated in virtual simulations, while others attempted to introduce outcome measures that may shed light on the efficacy of virtual simulation as a means of teaching skills directly related to clinical competence HPE need to demonstrate on clinical rotations and after graduation. Many gaps in the literature remain; this study aims to focus on two specific gaps. The first goal is to broaden the understanding of this population of bridge students. The second goal relates to the impact of different learning strategies on student competency in the field of occupational therapy.

Research Questions

The following questions will support this research study’s stated purpose.

1) Are there statistically significant differences between the mean exam scores on the National Board for Occupational Therapy Certification (NBCOT) exam of three groups of MSOT "bridge" students who experienced different instructional methods to meet the level I fieldwork requirement (all clinic-based, all virtual simulation, or part clinic-based and part virtual simulation)?
2) For MSOT "bridge" program graduates, is there a significant difference between the FWPE mean scores based upon the instructional method utilized to fulfill level I fieldwork requirements?
3) For MSOT "bridge" graduates, is there a significant difference between the FWPE means scores based upon the amount of virtual simulation experienced to fulfill level I fieldwork requirements?

Chapter 3: Methodology

Because a fieldwork shortage persists across the United States and internationally, examining alternatives to traditional in-clinic fieldwork placements is not only prudent but necessary in order to preserve limited in-clinic fieldwork sites for level II fieldwork rotations. As noted previously, ACOTE standards allow very little flexibility related to level II fieldwork, and because licensure laws in twenty-five states specifically reference in their statutes the ACOTE standards for level II, traditional in-clinic placements are almost mandatory for OT students. Those limited placements should be reserved for level II OT students who need them to graduate; the ACOTE standards for level I fieldwork, however, allows OT educational programs significantly more flexibility with level I rotations in order to support the curriculum design of individual OT educational programs. With the expanded list of ACOTE sanctioned instructional methods outlined in the standards, OT programs now have more options to fill these requirements, which could reduce the demand on limited in-clinic traditional placements. One alternative to traditional level I placements is virtual simulation. Therefore, the purpose of this research study was to explore the potential impact of virtual simulation as an instructional method for fulfilling level I fieldwork requirements for MSOT "bridge" students to mitigate the fieldwork shortage noted throughout occupational therapy literature.

Participants

This quantitative nonexperimental retrospective correlational study utilized a convenience sample composed of 2016-2022 graduates of an MSOT bridge program at a mid-sized private Christian university in the mid-south. The target population for this study was individuals who will attend, currently attend, or have graduated from an

MSOT bridge program in which licensed, practicing Certified Occupational Therapy Assistants (COTA) and Physical Therapist Assistants (PTA) earn a Master's of Science in Occupational Therapy (MSOT) degree. The inclusion criterion for this study was graduation from the study site's MSOT bridge program between 2016 and 2022.

Demographic data about the population included graduates aged 24-60 years of age, a maximum of 16% identifying as male with the remainder identifying as female, primarily Caucasian, but with representation from many racial and ethnic backgrounds, including Black, Asian and Pacific Island, Asian, Hispanic, and Native American. The admission criteria for the MSOT bridge program was one year of documented work experience as a licensed, credentialed occupational therapy assistant (OTA) or a physical therapist assistant (PTA) coupled with "a minimum of 90 semester equivalent credits from a regionally accredited college or university, or a school accredited by ACOTE [the Accreditation Council for Occupational Therapy Education]" (Belmont University, n.d.). The population to which results may be generalized with caution was the very small portion of the occupational therapy educational "bridge" programs specifically designed to award earned Masters of Science in Occupational Therapy degrees to licensed, practicing COTAs and PTAs upon fulfilling graduation requirements. At the time of writing, thirty-one educational programs self-identified as "bridge" programs, but many of these programs had features that significantly distinguished them from the population of interest in this study, including but not limited to requiring Bachelors' degrees and submission of Graduate Record Examination scores to apply and educational content delivery

formats different than the hybrid model used at the study site (ACOTE, 2023). Out of a total of 248 Occupational Therapist-level educational programs, both at the Entry-Level Doctoral and Master's levels, 166 were at the Master's level, and of those, 31 identified as "bridge" programs (ACOTE, 2023).

This study utilized a convenience sample composed of graduates from the study site who experienced one of three possible instructional methods to fulfill level I fieldwork requirements. Convenience sampling occurs when the study's subjects are available to investigators (Edmonds & Kennedy, 2017). The first question asked if statistically significant differences in NBCOT exam score means per cohort were observed based on the type of instructional method utilized to fulfill level I fieldwork requirements. Those seven graduated cohorts fulfilled level I fieldwork requirements using one of three instructional methods: three very brief traditional in-clinic fieldwork placements, two very brief traditional in-clinic fieldwork placements and one virtual simulation, or three placements built completely of virtual simulations. Because every occupational therapy educational program's curriculum, including the precise structure and function of level I fieldwork, is different, comparing outcomes between graduates of other programs would likely be less impactful in terms of generalizability and might limit the internal validity.

This study utilized convenience sampling, a nonprobability technique, meaning that the investigator did not take steps to ensure that the subjects are selected to represent characteristics that may occur in the broader population. The primary advantage was that the subjects, and in the case of this study, the subjects' aggregated and individual archival data, were easily accessible to the investigator. The

disadvantages included significantly limited representation of the population as opposed to probability sampling, potential response bias, and very limited generalizability (Waterfield, 2018). Despite the potential disadvantages, as Cresswell and Guetterman (2019) noted, educational research often does not support probability sampling for a variety of reasons including ethics and access to the population (p. 143). In this study's case, the study site, a mid-sized Christian university offering a specific type of health professions degree, a MSOT "bridge" degree for licensed, practicing COTAs and PTAs, utilized three instructional methods to fulfill level I fieldwork requirements between 2016-2022, but within a given year, the entire cohort experienced the same instructional method. The overall curriculum design for the MSOT program was essentially the same for the years 2016-2022. All MSOT graduates who graduated and took the NBCOT exam between 2016 and 2022 served as subjects for this study. Each cohort had between thirty-six and forty total students, generating a possible total of 272 subjects.

Instruments

Simucase®

The virtual simulation platform utilized in this study was Simucase®, which is a commercially-available web-based simulation platform designed for educational use in occupational therapy, physical therapy, audiology, radiography, social work, and speech-language pathology programs. The platform offers four primary types of "learning models": assessments, interventions, part-task training, and screening, all of which require students to interact with the platform to indicate knowledge acquisition, competency, and clinical reasoning skills. (Ondo et al. 2022, p. 6). These simulations

focus on a variety of populations, age groups, diagnoses, and specific areas of practice. In this study, a variety of simulations were assigned throughout the semesters to complement the existing developmentally-based curriculum design: Pediatrics, early adult/adult, and older adult. Students completed simulations asynchronously in Learning Mode, which is one of two available modes; Learning Mode provided the learner with immediate feedback about their clinical decision-making, whereas Assessment Mode provided a final score upon completion. Students were required to achieve a minimum score of 90%, a score indicating a "competency measure [of] *Mastering*" (Ondo et al., 2022, p. 6). In this study, students either completed zero virtual simulations, a maximum of seven simulations, or a minimum of nine and a maximum of twenty-seven simulations to fulfill level I fieldwork requirements. Students who completed zero or very few virtual simulations did so because they utilized only or mostly traditional, in-clinic fieldwork placements to fulfill level I fieldwork requirements.

The COVID-19 pandemic exacerbated the fieldwork shortage in occupational therapy education (British Medical Association, 2020; Hickland et al., 2020; Hutchings et al., 2022). Simucase® provided occupational therapy education programs a way to fulfill level I fieldwork ACOTE standards, which meant that many programs were able to continue educating students without delaying their progress toward graduation. DeIuliis et al. (2021) published a "pedagogical blueprint" for incorporating Simucase® into the fieldwork portion of an occupational therapy curriculum (p.2). That team's instructional design utilized Simucase® to replace the traditional in-clinic placements disrupted by the pandemic. Additional clinical tasks guided by faculty (rather than supervising fieldwork educators as would occur in the field), including chart reviews, goal writing, intervention

designing, and documentation. Mattila et al., (2020) utilized Simucase® during COVID-19 and collected self-reports on "students' perceived levels of knowledge, confidence, and clinical reasoning" as well as student general perceptions about virtual simulation as a learning strategy. Results included student self-report of increased clinical reasoning ability, confidence, and general preparedness for level II fieldwork rotations (Mattila et al, 2020, Sections 4.3 and 4.4). Ozelie et al., (2022) reported similar findings with a comparison of Occupational therapy doctoral students who completed either a traditional in-clinic placement or Simucase® virtual simulations to fulfill level I fieldwork requirements during the pandemic. Students self-reported "knowledge, confidence, and attitude," upon completion of their level I experience. No statistically significant difference was noted in perceived knowledge and confidence between the traditional placement and simulation fieldwork groups (p. 11). The authors noted that the Simucase group demonstrated a "significant increase in perceived confidence after completing Level I fieldwork," although they clarified that with no significant difference between the two groups in "change of confidence scores", they concluded that the two instructional methods were comparable in their perceived benefit to students (p. 11). Eppich & Reedy (2022) noted rather than attempting to justify the use of simulation, research should focus instead on the circumstances in which simulation is most efficacious. This research study served in that capacity.

NBCOT Exam Retrospective Data

To answer questions about the NBCOT exam first-time pass rate, this study examined retrospective NBCOT exam data from seven cohorts of MSOT graduates. The National Board for Certification in Occupational Therapy (NBCOT) is the non-profit

body responsible for credentialing United States occupational therapy practitioners, both occupational therapists (OT) and certified occupational therapy assistants (COTA). This body is dually accredited by the International Accreditation Service (IAS) and the National Commission for Certifying Agencies (NCAA). Governed by a board of eighteen directors, the board performs fiduciary oversight and strategic visioning functions. (NBCOT, 2023a)

To practice occupational therapy (OT) in the United States, an OT practitioner must be initially credentialed by the NBCOT. Occupational therapy practitioners become credentialed after meeting a series of eligibility requirements outlined in the NBCOT Exam Handbook. These requirements include but are not limited to the provision of official transcripts documenting graduation from an occupational therapy education program accredited by the Accreditation Council for Occupational Therapy Education (ACOTE); the completion of a *character review* in which candidates must report felony convictions or charges; and an agreement to abide by the NBCOT Code of Conduct and Practice Standards (NBCOT, 2023c, p. 7). All fifty states, the District of Columbia, and Guam and Puerto Rico require *initial certification* of occupational therapy practitioners as a requirement for licensure to practice (NBCOT, 2023c, p.4). Initial certification, which requires fulfillment of all requirements outlined in the Handbook, culminates with the successful completion of the NBCOT certification exam. It is retrospective data from that exam that will be examined in order to answer the first research question.

According to the NBCOT, “the primary purpose of the NBCOT certification exams is to protect the public interest by certifying only those candidates who have the necessary knowledge of occupational therapy to practice” (NBCOT, 2023c, p.4). The

NBCOT conducts “an entry-level practice analysis every five years to ensure that the knowledge assessed by our certification programs is representative of current practice” (NBCOT, 2023d, p. 3). As of this writing, the most current practice analysis was published in 2022. A *practice analysis* is a formal process by which assessment professionals “identify and prioritize the important tasks of a job or profession and the essential knowledge or skills required to perform the essential job functions satisfactorily” (NBCOT, 2023d, p. 4). Standards of the National Commission for Certifying Agencies (NCCA) dictate that “content assessed on a certification exam is based on a current practice analysis” (NBCOT, 2023d, p. 4). Incidentally, ensuring that the certification exams reflect current practice as detailed in a practice analysis creates the foundation, the “validity of the inferences drawn on the basis of the certification exam scores” for those instruments (NBCOT, 2023d, p.4). The practice analysis is one of the ways the NBCOT ensures the certification exams are measuring what they are supposed to be measuring.

The overarching goal of the NBCOT practice analysis process is to result in validity data for the certification exams. The NBCOT practice analysis is a dynamic, multipronged process. The NBCOT board of directors and staff first conducted an internal review of the exam content and format. The internal review resulted in several items for a volunteer panel of occupational therapy practitioners and educators selected to represent the current demographic makeup of the broad NBCOT certificant population to weigh and debate. That panel produced a revised exam content outline that was utilized as the basis for a national validation survey provided to practitioners who had been certified for 36 months or less. That sample of newly certified occupational therapy

practitioners would be able to speak to the work tasks, required knowledge, and demands they experienced as new entry-level practitioners and the degree to which the NBCOT exams' new content outline represented current practice. (NBCOT, 2023d, pp.4-5) NBCOT certifies both OT and COTA-level practitioners with separate exams, both of which undergo the practice analysis process. The results discussed from this point focus solely on the OTR (Occupational Therapist Registered®) because it was the OTR certification exam data that was utilized in this study.

NBCOT analyzed a total of 2,137 valid responses to the survey. Demographic data provided an updated snapshot of the profession: OTRs are mostly women, white, the majority of whom practice with a variety of pediatric populations: early intervention, school system, out-patient clinics; followed by skilled nursing facilities and acute care (NBCOT, 2023d, pp. 6-7). The resulting content outline contained four domains, or broad categories of occupational-therapy skills (i.e., evaluation, analysis/interpretation/planning, interventions, management) related to current practice, and sixty-two knowledge statements, or specific skills occupational therapists must be able to apply in order to be competent (NBCOT, 2023d, appendix).

Upon graduation, applicants provide all required documentation, pay the fee, schedule and sit for the exam. NBCOT maintains a database of applicant performance because all US OT educational programs use this data for program outcome analyses, curriculum design, and marketing. The Accreditation Council for Occupational Therapy Education (ACOTE) standard A.4.2. requires all OT educational programs to post on their official web homepages a direct link to NBCOT program data (ACOTE, 2018, pp.15-16). All program directors, a formally recognized and required ACOTE faculty

designation within all occupational therapy educational programs, have access to their programs' NBCOT exam data, aggregated by year. It is this data that was analyzed to answer research questions one.

American Occupational Therapy Association Fieldwork Performance Evaluation

The American Occupational Therapy Association (AOTA) Fieldwork Performance Evaluation (FWPE) instrument is the tool most occupational therapy educational programs use to document student performance on level II fieldwork rotations, which are required parts of all OT educational programs. The Accreditation Council for Occupational Therapy Education (ACOTE, 2018) standard C.1.15. requires that OT programs "Document mechanisms for requiring formal evaluation for student performance on Level II fieldwork (e.g., the *AOTA Fieldwork Performance Evaluation for the Occupational Therapy Student* or equivalent) (p. 44). This instrument has been formatted on a digitized platform that results in readily downloadable data; users must pay an annual fee to utilize the instrument. Both the fee structure and the digitized platform are in keeping with the clinical rotation evaluation system used by Physical Therapy educational programs, the Physical Therapist Clinical Performance Instrument (PT CPI) tool (APTA, 2019). Final scores on 2016-2022 MSOT "bridge" graduates FWPE were be analyzed to answer research questions two and three.

According to Preissner et al. (2020), prior to 2020, the content of the FWPE had not been "updated in more than two decades" (p.1). In 2015, a series of groups appointed by the American Occupational Therapy Association (AOTA) began a revision process resulting in the instrument that replaced the initial FWPE version implemented in 2002 (Preissner et al., 2020). In the first step, the 2002 version was carefully reviewed in light

of collected feedback about the instrument, “known issues” with the tool, trends in practice at that time, and ACOTE standards, and revisions were recommended (Preissner et al., 2020, p. 2). Next, the appointed groups completed two phases of research on the revised instrument geared to result in a psychometrically sound tool representative of current educational outcomes and professional practice. According to Preissner et al. (2020), the first phase was qualitative in nature and utilized a technique called “cognitive interviewing” to support the content validation process of the FWPE (p. 2). Cognitive interviewing utilizes an iterative process to prompt, collect, clarify, and further probe members, (primarily academic fieldwork coordinators and fieldwork educators) of multiple focus groups with semi-structured interviews about the topic of interest. Preissner at al. (2020) noted that a goal of the cognitive interviewing was to result in a “stronger baseline content validity” that would then be tested more broadly in later and larger validation studies (p. 2).

Using an epistemological-ontological approach to the content validity research, several recommendations for revisions to the instrument were made based on input from the eighteen-person purposive sample for instrument validation. Narrative data from the cognitive interviews was compiled and themes identified. Several revisions were proposed based upon the results of this process. For example, the categorical rating scale was adjusted during the quantitative phase of the validation study to include four criterion-referenced designations: “exemplary, proficient, emerging, and unsatisfactory”; these designations are operationally defined on the FWPE instrument itself (Preissner et al., 2020, p. 3). Additional revisions included the elimination of FWPE criteria deemed redundant and the rewording of lengthy and/or confusing criteria with more simplistic

and clear language (Preissner et al., 2020, p. 6). This qualitative content validation process was undertaken as the first phase of research on the revised AOTA FWPE instrument. No quantitative research about the revised FWPE has been published by the AOTA as of this writing.

When schools adopt the Fieldwork Performance Evaluation (FWPE) for use to evaluate student performance on clinical rotations, the instrument is utilized at both the mid- and end- point of every Level II fieldwork rotation. Fieldwork educators, the term AOTA uses to designate occupational therapists who supervise level II OT fieldwork students, score student performance on thirty-seven observable behavioral criteria using a four-point criterion-referenced scale. The thirty-seven criteria fall into one of six categories of broad practice competencies: fundamentals of practice, basic tenets, screening and evaluation, intervention, management of occupational therapy services, and communication and professional behaviors (AOTA, 2020a, pp.1-4). At the time of writing, no midterm cutoff score for failure had been established. At the final evaluation point, a passing score is comprised of the following four elements: a) all items have been scored on the evaluation with b) a minimum total score of 111 (with a maximum of 148), c) no items receiving a score of 1, and d) no scores lower than 3 on items number 1-3, which relate to ethics and safety (AOTA, 2020b, pp.1-2). According to Harvison (2022), of the 14,815 Master's-level occupational therapy students placed in level II fieldwork rotations in the 2020-21 academic year, 98% passed, 145 failed, and 141 were withdrawn. That data was noted in the AOTA annual report because *level II fieldwork pass rates* are a standard outcome measurement for occupational therapy programs (Jensen et al, 2021).

The FWPE was an appropriate measure for investigating any potential impact the three instructional methods may have had on MSOT bridge students between 2016 and 2022 for several reasons. First, as "bridge" students, these individuals entered the OT program with a minimum of one year of work experience post-state licensure. According to one Director of Admissions at the study site, MSOT students matriculate to the program with an average of 4.5 years of healthcare practice as COTAs or PTAs, and most continue to work anywhere from part-time to full-time while completing their studies (B. Nichols, personal communication, February 2020). The level II fieldwork experiences were the final two graduation requirements for the MSOT degree at the study site; the students completed the two final 12-week, full-time rotations after successful completion of all didactic coursework. The investigator chose that instrument to explore any potential statistically significant differences in the final FWPE scores of students based upon the type of instructional method a student experienced to fulfill level I fieldwork requirements. The NBCOT exam must be completed before graduates are able to practice as occupational therapists, which means the FWPE and the NBCOT exam are the final two objective outcome measures that can capture the impact of any aspect of an educational program before the results become potentially contaminated with professional practice. Finally, these two instruments were suitable for the research questions because they were both considered objective outcome measures in the occupational therapy profession (Jensen et al., 2021). A resounding theme in current and past occupational therapy literature has been the need to assess the efficacy of instructional methods, specifically as related to those used to fulfill level I fieldwork requirements, using recognized, meaningful outcome measures. This study filled at least

some of that gap in the literature. This study also bolstered the occupational therapy field's understanding of level I instructional methods that may be especially useful and efficacious for MSOT bridge students who, due to their work experience as licensed, practicing health care practitioners, present with different learning needs and goals.

Procedures

Design

This quantitative, nonexperimental research design used a descriptive approach. Rooney and Evans (2019) noted that nonexperimental designs are appropriate when investigators cannot manipulate independent variables for various reasons or when the research questions do not seek causal relationships between variables (p. 217). The events under investigation in this study had already occurred, so no manipulation of variables occurred; the investigator was left with observation and analysis of that retrospective data resulting from the past events. Edmonds and Kennedy (2017) wrote that by using a explanatory design, "…investigators attempt to explain the degree of association between two (or more) variables (sometimes referred to as relational research)" (p. 126). In this study, the independent variable was the instructional method used to fulfill level I fieldwork requirements, and the dependent variables (examined separately) were the AOTA FWPE final scores for FWIIA and FWIIB and the NBCOT exam score means by cohort. The first question asked if statistically significant differences were observed between the mean exam scores on the National Board for Occupational Therapy Certification (NBCOT) exam of three groups of MSOT "bridge" students who experienced different instructional methods to meet the level I fieldwork requirement (all clinic-based, all virtual simulation, or part clinic-based and part virtual simulation)? The

second question asked if there are statistically significant differences in the means of MSOT "bridge" students' final scores on the AOTA FWPE tool for both fieldwork level II rotations, based on the type of instructional method a cohort experienced to fulfill level I fieldwork requirements. The third question investigated whether the amount of virtual simulation a cohort experienced to fulfill level I fieldwork requirements was associated with FWPE scores for the first and second level II fieldwork rotations.

Data Collection Procedures

Upon Nova Southeastern Institutional Review Board approval, the investigator retrieved FWPE data for 2016-2022 MSOT "bridge" graduates from the shared drive utilized by the School of Occupational Therapy (SOT) at the study site. Similarly, upon IRB approval, the researcher obtained the NBCOT exam data from the same group of graduates from the MSOT Program Director who has direct access to that data through the NBCOT portal for educators (https://sites.nbcot.org/pdportal). That data was downloaded into excel spreadsheets and stored on the Microsoft Office 365 One Drive SOT folder. Finally, after an IRB application amendment granted approval, the investigator retrieved demographic data from 2017-2022 "bridge" program matriculants from the Director of Graduate Health Sciences Admissions and stored the data in the same method use to securely store all data analyzed in this study. The folder was protected in several ways. First, individuals with invitations to accessed the folder with approved two-step credential sign-in from the study site's institutional system. Second, that folder was a locked folder within the SOT server and only individuals given express permission by the SOT administrator had access to it. Data remained in that protected cloud environment when not in SPSS being analyzed. The NBCOT exam data is not raw

data; at the Program Director Portal, NBCOT allows Program Directors to access "program data, candidate passing reports, [and] customized score reports" (NBCOT, 2023e).

Students who utilized virtual simulation to fulfill level I fieldwork requirements completed different total numbers of simulations, depending upon their cohort. For example, one cohort in the study used a combination of both traditional in-clinic placements and virtual simulations to fulfill level I fieldwork requirements due to the pandemic and subsequent lockdowns and stringent regulations on face-to-face clinical education. This cohort completed a maximum of fewer than seven virtual simulations to fulfill level I fieldwork requirements. Graduates from the two cohorts immediately following that one completed more than a minimum of nine and a maximum of twenty-seven virtual simulations and no in-clinic traditional placements to fulfill level I fieldwork requirements. That data is part of course documentation for previous courses.

Data Analysis Procedures

The investigator utilized IBM SPSS Statistics (version 28.0.1.1 (14)) to analyze all data. After cleaning the data, the investigator ran descriptive statistics, primarily frequencies, to describe the sample. Descriptive statistics highlighted some core distinctions between "bridge" MSOT students and OT students attending more traditional programs, including age, race, and gender. Because very little literature exists about "bridge" students, this descriptive data will help to fill the gap in the field's understanding of these students.

In this study, the independent variable was the type of instructional method utilized to fulfill level I fieldwork requirements. Three instructional methods were

utilized to fulfill the level I fieldwork requirements between 2016-2022, meaning three groups or conditions were compared along that independent variable. As a nonexperimental study, no independent variable was purposefully manipulated, so the only method of control available to an investigator in this case was statistical analysis (Edmonds & Kennedy, 2017). The independent variable had three conditions, resulting in categorical, nonmetric data. The two dependent variables in this study were the NBCOT exam mean per cohort, treated as categorical, non-metric data, and Fieldwork Performance Evaluation score data for each MSOT graduate between 2016-2022, treated as continuous numerical data.

During the time of data collection, the Fieldwork Performance Evaluation (FWPE) tool was revised by the American Occupational Therapy Association AOTA), as discussed in the *Instrument* section of Chapter 3. The revised instrument continued to fulfill the same purpose as the previous iteration, that is, serving as a widely-recognized and used outcome measure of student performance on level II occupational therapy fieldwork rotations. The 2020 revision resulted in fewer questions, 37 versus 42, and a lower total score, 148 versus 168. In order to be able to meaningfully compare FWPE data across cohorts between 2016 and 2022, the researcher used SPSS to convert the raw FWPE scores into sets of z-scores for cohorts between 2016-2020, using the previous FWPE raw score data, and for cohorts 2021 and 2022, using the revised FWPE raw score data. Following the conversions, the z-score data were combined into a single set of 2016-2022 FWIIA and FWIIB z-scores for statistical analyses.

Andrade (2021) suggested converting raw scores obtained from multiple instruments to z-scores in order to be able to compare them along the same metric,

particularly if the instruments test the same constructs. The revised FWPE fulfills the exact same purpose in the field of occupational therapy. Using the z-scores allowed the researcher to compare means across the independent variable of three different instructional methods utilized between 2016 and 2022 to fulfill level I fieldwork requirements.

The first research question focused on determining if any differences in the mean scores of the NBCOT exam of three groups of graduates, based upon the type of instructional method used to fulfill their level I fieldwork requirement, existed. NBCOT exam score mean data was treated as categorical nonmetric data. The NBCOT provides all occupational therapy educational programs with a report of each year's test data including the cohort's mean, percentage passing, percentage failing, and, except for 2017, the median score. Because program directors receive only the actual mean number per cohort, and not a range of scores, the mean score data points were treated as categorical data and analyzed across the three independent variable conditions with the non-parametric test, Chi-Square.

The Chi-Square test is a nonparametric inferential statistical test used to analyze categorical, non-metric data. An *independent-sample Chi-Square test* was used to examine the frequencies of the NBCOT mean scores of MSOT "bridge" students across the three conditions of the independent variable, instructional method used to fulfill level I fieldwork requirements. Huck (2012) notes that Chi-Square is an appropriate statistical analysis to use in four specific situations, including "…more than two samples compared on a response variable that has three or more categories" (pp. 413-14). The h_0 for this type of Chi-Square is that the study's independent samples would have "the same

distribution of attributions across the categories of" type of instructional method used to fulfill level I fieldwork (Huck, 2012, p. 416-17). The Chi-Square nonparametric inferential statistical analysis has been used to describe the strength of associations between nonmetric categorical variables (Huck, 2012, p. 418).

To answer the second research question, the investigator used ANOVA to compare the z-scores of FWPE final scores by the three conditions of the independent variable. According to Huck (2012), one-way ANOVA has been utilized to determine statistically significant differences in means of three or more groups (p. 235). One-way ANOVA has been recommended for studies with a one independent variable and independent samples to compare along conditions of that independent variable (Huck, 2012, p. 237). Edwards and Kennedy (2015) support the use of ANOVA for observational designs.

To answer the third research question, the research used the ANOVA from the second research question. The three conditions of instructional method utilized to fulfill level I fieldwork requirements differ inherently in the amount of virtual simulation students were exposed to: zero virtual simulation, very little virtual simulation (fewer than seven virtual simulations), and only virtual simulations (a minimum of 9 and a maximum of 27 virtual simulations). The ANOVA used to analyze the FWPE final score z-scores was used to answer the third question because of the inherently different amounts of virtual simulation in each condition of the independent variable.

Anticipated Outcomes

Question 1: H_0: There is no statistically significant association between the categorical non-metric variables analyzed in this study.

Question 2: H_0: There is no statistically significant difference in the means of FWPE final score z-scores based upon the different instructional methods used to fulfill level I fieldwork requirements.

Question 3: H_0: Exposure to varying levels of virtual simulation according to the type of instructional method used to fulfill level I fieldwork requirements leads to no statistically significant difference in the means of FWPE z-scores.

Chapter 4: Results

The purpose of this study was to investigate the potential impact of different instructional methods utilized to fulfill level I fieldwork requirements in an MSOT "bridge" program at a mid-sized Christian college in the Southeastern United States on outcome measures widely-recognized in the field of Occupational Therapy profession. This section relays results of statistical analyses run to investigate each research question.

Demographic Characteristics

Demographic data including sex, United States citizenship, age, employment credential, and race, from 2017-2022 matriculants was analyzed using SPSS. From a total of 230 matriculants, 87% (n=200) were female and 13% (n=30) were male (See Table 1). The mean age of applicants was 29.1 and the mode age was 23, with a range in age from 21 to 55 years. 91.7% (n=211) were Certified Occupational Therapy Assistants (COTA) and 8.3% (n=19) were PTAs (Physical Therapist Assistant) (See Table 2). 80.4% of the sample identified as White (n=185), 6.5% as Black (n=15), 2.6% as Asian (n=6), 0.9% as Hispanic (n=2), 0.4% as Pacific Islander, 6.1% self-selected more than one race indicator (n=14), and 3.0% (n=7) did not respond (See Table 3). 98.3% of the sample identified as United States citizens (n=226), 1.3% indicated Permanent U.S. Resident status, and 0.4% (n=1) indicated Non-Resident status. 98.3% (n=226) marked their country of citizenship as the United States, with 0.4% (n=1) of matriculants indicating citizenship in each of the following countries: India, Mexico, Nepal, and the Philippines.

Table 1

Sex and Race of Matriculants 2017-2022

Sex	Hispanic	Asian	Black	Pacific Islander	White	Multiracial	Did Not Indicate
Female	1	5	12	1	164	12	5
Male	1	1	3	0	21	2	2
Total	2	6	15	1	185	14	7

Table 2

Breakdown of Sex and Employment Credentials of Matriculants by Cohort[a]

		Sex		
Employment Credentials	Matriculation Year-Cohort	Female	Male	Total
COTA	2017	26	6	32
	2018	28	5	33
	2019	35	2	37
	2020	30	4	34
	2021	33	6	39
	2022	33	3	36
	Total	185	26	211
PTA	2017	4	0	4
	2018	3	2	5
	2019	0	1	1
	2020	4	0	4
	2021	1	0	1
	2022	3	1	4
	Total	15	4	19

Note. [a]Sex and Employment data for 2016 cohort was not available.

Table 3

Self-Identified Sex and Race of Matriculants by Cohort[a]

Race	Matriculation Year - Cohort	Year	Sex		
			Female	Male	Total
Hispanic	Matriculation Year-Cohort	2017	0	1	1
		2022	1	0	1
	Total		1	1	2
Asian	Matriculation Year-Cohort	2018	1	0	1
		2019	1	0	1
		2020	2	0	2
		2021	0	1	1
		2022	1	0	1
	Total		5	1	6
Black	Matriculation Year-Cohort	2017	2	0	2
		2019	0	1	1
		2020	1	0	1
		2021	5	1	6
		2022	4	1	5
	Total		12	3	15
Pacific Islander	Matriculation Year-Cohort	2019	1	0	1
	Total		1	0	1
White	Matriculation Year-Cohort	2017	25	4	29
		2018	27	7	34
		2019	32	1	33
		2020	30	3	33
		2021	28	3	31
		2022	22	3	25
	Total		164	21	185
Multiracial	Matriculation Year-Cohort	2017	1	1	2
		2018	3	0	3
		2020	1	0	1
		2021	1	1	2
		2022	6	0	6
	Total		12	2	14
Did not Indicate Race	Matriculation Year-Cohort	2017	2	0	2
		2019	1	1	2
		2020	0	1	1
		2022	2	0	2
	Total		5	2	7

Note. [a] Self-identified Racial and Sex data was not available for the 2016 matriculants

Data Analysis

All data was analyzed with IBM SPSS Statistics (Version 28.0.1.0 (14)).

Research Question 1

Are there statistically significant differences between the mean exam scores on the National Board for Occupational Therapy Certification (NBCOT) exam of three groups of MSOT "bridge" students who experienced different instructional methods to meet the level I fieldwork requirement (all clinic-based, all virtual simulation, or part clinic-based and part virtual simulation ("hybrid"))? A 5x3 Pearson independent-samples Chi-Square test indicated a statistically significant association between NBCOT Exam score mean by cohort and instructional method used to fulfill level I fieldwork requirements, χ^2 (8, N=246) =403.131, p<.001, V=.905. This significant result rejected the null hypothesis, meaning that some relationship does exist between categorical variables in this study's population; in other words, this distribution did not likely occur from chance (See Table 4). Cramer's measure of association, the Cramer's V result, indicated a strong effect size, suggesting a strong association (See Table 5). The Chi-Square was an appropriate statistical analysis for categorical, nonmetric variables.

Table 4

5 x 3 Chi-Square Test of NBCOT Mean Scores by FWI Instructional Method

Statistical Analyses	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	403.131	8	<.001
Likelihood Ratio	384.645	8	<.001
Linear-by-Linear Association	98.913	1	<.001
N of Valid cases	246		

Table 5

Symmetric Measures for Chi-Square

Statistical Analyses	Symmetrical Measures	Value	Approximate Significance
Nominal by Nominal	Phi	1.280	<.001
	Cramer's V	.905	<.001
N of Valid Cases		246	

Research Questions 2 and 3

Are there statistically significant differences in the means of MSOT "bridge" students' final scores on the American Occupational Therapy Association (AOTA) Fieldwork Performance Evaluation (FWPE) tool based on the type of instructional method a cohort experienced to fulfill level I fieldwork requirements? Because the three conditions used to analyze FWPE scores in this ANOVA corresponded with the amount of virtual simulation a student was exposed to throughout the program, this ANOVA also answered the third research question: For MSOT "bridge" graduates, are there statistically significant differences in the means of FWPE scores based upon the amount of virtual simulation experienced to fulfill the level I fieldwork requirements?

An ANOVA was conducted with both sets of FWPE z-scores (FWIIA and FWIIB raw scores converted to z-scores) on the Fieldwork Performance Evaluation (FWPE) for students in each of the three conditions of the independent variable. No influence of the three conditions of the independent variable was observed on the dependent variables, the FWPE z-scores for FWIIA, $F(2,243)=.002$, $p=.998$, $\eta^2=.000$, or the FWPE z-scores for FWIIB, $F(2,243)=.444$, $p=.642$, $\eta^2=.004$ (See Table 6). This result supported the null hypothesis for question two, meaning that the three conditions of the independent variable had no impact on the dependent variable of the FWPE score means between groups.

Table 6

ANOVA of Z-Scores for Level II Fieldwork A and B by Instructional Method Used to Fulfill Level I Fieldwork Requirements

Fieldwork Rotation	Traditional		Hybrid		Virtual Sim.		F(2, 243)	η^2	*p*
	M	SD	M	SD	M	SD			
FWIIA	.0027	.9630	-.0099	1.1381	.0000	1.000	.002	.000	.998
FWIIB	-.0378	1.038	.1371	.8464	.0000	1.000	.444	.004	.642

The results of the same ANOVA for FWIIA, $F(2,243)=.002$, $p=.998$, $\eta^2=.000$, and FWIIB, $F(2,243)=.444$, $p=.642$, $\eta^2=.004$ also answered the third research question, which asked if a statistically significant difference in FWPE mean scores exist based upon the amount of virtual simulation graduates experienced as part of the level I fieldwork instructional method utilized to fulfill level I fieldwork requirements. These results supported the null hypothesis for the third question, which stated that no statistically significant difference in FWPE means score existed, based upon the three

conditions of the independent variable. Because the three conditions of instructional methods inherently represented different amounts of virtual simulation experienced by a cohort (Traditional=three traditional, in-clinic placements and zero virtual simulations; hybrid = a combination of two traditional, in-clinic placements and a maximum seven virtual simulations; and all virtual sim.= only virtual simulations, i.e., a minimum nine and a maximum of twenty-seven), these same ANOVAs were an appropriate statistical analyses to hypothesis test this research question.

Summary

This section presented the results of the statistical analyses run to hypothesis test the three research questions that guided this study. Descriptive statistics of the sample's unique demographic data were presented, providing a picture of some of the characteristics that differentiate the population of "bridge" students from their peers in traditionally-formatted programs. Results from the statistical analyses run to hypothesis test research questions one, two, and three were also presented in verbal and table formats. What follows is a discussion of these results.

Chapter 5: Discussion

This final chapter provides a summary of this ex-post facto study's data analyses, interpretations of those analyses, contextual considerations of the findings related to other studies, limitations of the study, and implications for future research. This study was conducted to investigate the potential impact of three distinct instructional methods utilized to fulfill level I fieldwork requirements in a hybrid Masters of Occupational Therapy (MSOT) "bridge" program: brief, traditional in-clinic fieldwork placements, hybrid placements with both traditional placements and very limited virtual simulations, and only virtual simulations. The outcome measures examined in this study were both the American Occupational Therapy Association (AOTA) Fieldwork Performance Evaluation (FWPE) tool and the National Board for Certification in Occupational Therapy (NBCOT) registration exam; both measures are widely used as outcome measures in most occupational therapy education programs in the United States. In health education programs, shortages of clinical or fieldwork placement sites have been noted consistently for decades both in the United States and globally (AOTA, 2021; Avi-Itzhak & Kellner, 1994; Divens & Cruz, 2022; Evanson et al., 2015; Hirama, 1987; Mattila et al., 2020; Ozelie et al., 2015; Reed, 2016). Identifying alternative instructional methods to fulfill level I fieldwork requirements might provide relief to the already-stressed clinical education placement infrastructure in the United States and, potentially, internationally.

Summary of Findings

The demographic data in this study reflected data aggregated in the latest nationwide annual report on occupational therapy education available to the investigator

at the time of writing. Nationally for Master's programs in the 2020-21 academic year, 74% of students self-identified as White, 5% as Black, 8% as Asian, and <1% as American Indian, Alaska Native, or Native Hawaiian or other Pacific Islander. Nationally, 89% of students identified as female, 10% as male, and 1% as other (Harvison, 2022). In this study's sample, 87% identified as female and 13% as male. No age data was available on the Annual Report, so there are no formal means of comparison, although the matriculant age range of 21 – 55, with a mode of 23 and a mean age of 29, almost certainly reflects a more non-traditional student population than occupational therapy programs with more traditional admissions requirements of a bachelor's degree and traditional program format (in-person on campus during week days). Finally, as licensed, credentialed, and practicing Certified Occupational Therapy Assistants (COTA) and Physical Therapist Assistants (PTA), the students in the hybrid MSOT "bridge" program that serves as the sample for this study applied to the program with a minimum of one year of practice experience past licensure, which is an application requirement that distinguished these students from peers in more traditionally-formatted programs.

Research question one asked if there were statistically significant differences between the mean exam scores on the National Board for Occupational Therapy Certification (NBCOT) exam of three groups of MSOT "bridge" students who experienced different instructional methods to meet the level I fieldwork requirement (all clinic-based, all virtual simulation, or part clinic-based and part virtual simulation ("hybrid"))?A Pearson 3x5 Chi Square was used to analyze NBCOT exam means data according to the type of instructional method graduates experienced to fulfill level I

fieldwork requirements. The finding was statistically significant ($p<.001$) with a strong effect size ($V=.9$), meaning that the distribution of dependent variables along the independent variable conditions was not expected and would not likely occur by chance. These results indicate a strong statistically significant association between the two nonmetric categorical variables. In other words, the NBCOT mean scores do not seem to have resulted by chance. This finding may suggest that for bridge students, virtual simulation might be a key to higher mean NBCOT scores when compared to traditional level I fieldwork rotations.

To test the second and third research questions, an ANOVA was used to examine potential differences in the means of Fieldwork Performance Evaluation (FWPE) scores between groups constructed according to the instructional method used to fulfill level I fieldwork requirements. The results from this ANOVA was used to test research question three, also, because students in each of the independent variable conditions experienced specific amounts of virtual simulation to fulfill level I fieldwork. One group experienced zero virtual simulations and only traditional placements, one group experienced a maximum of seven virtual simulations but mostly traditional placements, and the third group experienced a minimum of nine and a maximum of twenty seven virtual simulations and no traditional placements. Therefore, the same ANOVA tested two different hypotheses. The ANOVA results supported the nulls of both research questions two and three: the means of the FWPE scores compared between the three groups of independent variable conditions were not different in a statistically significant way and therefore could therefore be the product of chance. This result also indicated that the

amount of virtual simulation to which students are exposed to fulfill level I fieldwork requirements has no statistically significant bearing on mean scores of the FWPE.

Interpretation of Findings

This section will discuss this investigator's interpretation of the research findings.

Demographic Data Analyses

Demographic data was available from all matriculants between 2017-2022. Two circumstances prevented this data from 2016 being made available to the researcher, including a change in the director of admissions of graduate health sciences programs personnel and the university's adoption of the occupational therapy common application system (OTCAS) platform before the 2017 application period began. The data analyzed in this study was made available by the current director of admissions of graduate health sciences programs, who harvested the data from the OTCAS platform for the requested years. The 2016 data was not available to that individual due to a personnel change and subsequent shift in how applicant data is collected and stored. Additionally, because this tranche of de-identified demographic data included all matriculants to the MSOT bridge program, data from students who withdrew from the program at any point before graduation for any reason would have been included. Those individuals may not be reflected in the FWPE or NBCOT data presented later in the study because they may have left the program before completing level II Fieldwork or graduating.

Two data points specifically support the assertion that MSOT "bridge" students are nontraditional students: age and professional experience. The mode age of matriculants was noted as 23, which is not different from the national averages Harvison (2022) noted in the AOTA's annual report. However, given that applicants to the MSOT

"bridge" program have a minimum of one year of professional experience in the field (COTA or PTA) after licensure, the lived experiences of these students may be assumed to be different than those of their peers in more traditionally-formatted programs. Second, the range of ages was noted to be 21-55 years of age at the time of application. Given that matriculants entered the program with an average of 4.5 years of practice experience (B. Nichols, personal communication, February 2020), sustained work experience might be considered another distinguishing factor. Finally, racial and ethnic diversity, while not radically different from the national averages noted by Harvison (2022), do appear representative of the field as a whole (Ozelie et al., 2020, p. 7).

Research Question 1

The significant association between type of level I fieldwork instructional strategy and NBCOT exam mean scores was an interesting outcome. Because the primary difference between the three instructional methods used to fulfill level I fieldwork requirements between 2016 and 2022 was the amount of virtual simulation students experienced to fulfill level I fieldwork requirements (zero, a maximum of seven virtual simulations, a minimum of nine and a maximum of twenty-seven virtual simulations), one cautious interpretation of this result might be that the instructional strategy of virtual simulation might contribute to higher mean NBCOT scores when compared to cohorts who experienced little or no virtual simulation to fulfill level I fieldwork requirements. As an ex-post facto study using archival data, this finding by no means suggests causality, however, it is worth considering that the primary difference between the three conditions is that in one condition, the students fulfilled level I fieldwork requirements using only virtual simulations, sometimes as many as nine simulations in three out of the

four semesters of didactic coursework. Perhaps the asynchronous online format supported the time management challenges of these hybrid distance students, many of whom work at least part time. Further, the individual virtual simulations may have provided exposure to areas of practice, populations, diagnoses and conditions, assessments, and interventions the students had not and would not have been otherwise exposed to. One graduate reported that prior to her level II fieldwork placement where she had to demonstrate competency with this tool, her only exposure to a standardized assessment used in specialty practice areas had been an assigned virtual simulation during the pediatric semester of coursework. This graduate expressed that she had approached her first in-clinic administration of the assessment with an increased level of confidence based on the previous virtual, simulated exposure to the instrument. (W. Pogue-Nixon, personal communication, January 2022) Those opportunities to fill knowledge gaps alone could have increased their mean NBCOT scores. On the other hand, the difference could have been related to any number of other factors, including the students in each cohort and their individual abilities related to NBCOT performance.

The MSOT "bridge" students do not have the same needs for level I fieldwork as their more traditional peers. First, these students are licensed, practicing health professionals with a minimum of one year of practice experience when they matriculate to the program, as required by the MSOT "bridge" program admissions requirements. These students do not need to gain *exposure* to patient care, clinic environments, documentation systems, or professional enculturation because their paid employment provides constant exposure to all of those factors. Because of the demands of their busy lives, into which they try to make the pursuit of a graduate degree fit, and the

unpredictability of traditional in-clinic level I fieldwork experiences, those brief, traditional in-clinic rotations are often perceived as a waste of the "bridge" students' time. Alternatively, while the virtual simulations may lack the challenge of unpredictability present in many face-to-face placements, virtual simulations provide a dependable breadth and depth of experience to professional practice across many aspects of the field that these seasoned professional students crave and positively respond to.

Research Questions 2 and 3

Hypothesis testing for research questions two and three harkened back to a classic debate in the field of instructional technology: is virtual/asynchronous/distance learning better or worse than traditional face-to-face/synchronous/on-campus learning? The results of the ANOVA used to test the hypotheses of research questions two and three support the outcomes of many years of similar research (Jowsey et al., 2020; Nguyen, 2015; Paul & Jefferson, 2019; Phipps & Merisotis, 1999; Summers & Waigandt, 2005): there were no statistically significant differences in the means of Fieldwork Performance Evaluation (FWPE) scores between the three conditions of the independent variable. The level II fieldwork performance, as measured by the FWPE, of students who completed only traditional in-clinic fieldwork placements to fulfill their level I fieldwork requirements was not significantly different from the performance of students who utilized only virtual simulations or that of students who completed a minimum of one traditional in-clinic placement and a maximum of seven virtual simulations to fulfill level I fieldwork requirements.

This single ANOVA was able to hypothesis test both research questions two and three because the type of instructional method used to fulfill level I fieldwork

requirements inherently differed in the amount of virtual simulation utilized to meet its goal. The students who only experienced traditional level I in-clinic fieldwork placements had no exposure to virtual simulations and the group of students in the virtual simulation condition had no exposure to traditional in-clinic level I placements. The hybrid condition was comprised of students who completed a minimum of one traditional in-clinic placement and a maximum of seven virtual simulations, which was a direct result of the COVID-19-related pandemic quarantines imposed nationally.

This finding suggested that in this study, differences in level II fieldwork performance as measured by the FWPE could not be attributed in a statistically significant way to the type of instructional method used to fulfill level I fieldwork. Rather than a limitation, that finding could be perceived as an opportunity within occupational therapy educational programs.

Context of Findings

This study's finding of the significant association between NBCOT mean scores and the instructional method used to fulfill level I fieldwork requirements aligns with several current studies investigating various facets of the efficacy of virtual simulations. Several studies noted positive qualities of virtual simulations that supported its use in health professions education. The adaptability of virtual simulations as an instructional strategy to multiple educational formats was noted by Bienstock & Heuer (2022) and Brazil et al. (2023). The dependability of simulated learning environments versus the unpredictability of clinical placements was frequently noted as a positive characteristic (Brown et al, 2021; Goodwin et al, 2021, Reed et al, 2021), especially when coupled with the potential for students to interact with rare or infrequently seen diagnoses,

environments, or populations (Layne et al, 2021; So et al., 2019; Sullivan et al., 2021). The opportunity for students to engage with clinical situations in a safe, controlled virtual environment has been noted frequently in current literature (Frasier et al., 2022; Reime et al., 2022; Seaton et al., 2019). Simulations offer students the opportunity to transfer learning from didactic course to real-world applications (Grant et al., 2021; Linn et al., 2022). In addition to clinical skill development, virtual simulation has also been noted for its ability to impact *nontechnical skills* or *professional behaviors* (Brown et al, 2021; Randal et al., 2018; Reed et al., 2021; Walshe et al., 2019). Montgomery (2022) opined that commercial virtual simulation creators could partner with the occupational therapy accrediting body, ACOTE, and educational programs to design and implement high-fidelity, evidence-based, virtual simulations that mirror current practice across the lifespan, various populations, and areas of practice.

The ANOVA findings answering research questions two and three are supported by current studies. Ozelie et al. (2023) specifically examined the potential impact of virtual simulation on level II fieldwork performance and found no significant differences between the Fieldwork Performance Evaluation performance of students who had completed traditional level I rotations and students who fulfilled level I requirements with the same commercially-available virtual simulation platform utilized in this study. These authors concluded that virtual simulation was a "…comparable alternative to the traditional fieldwork model" (Ozelie et al., 2023, p. 1). The subjects in Ozelie et al.'s study (2023) were not "bridge" students, and so the results must be generalized with caution, but it is another study supporting alternatives to traditional in-clinic fieldwork. Lucas-Molitor and Nissen (2020) found that simulations supported performance in

didactic coursework, which in turn, appeared to have a small level of predictive value in fieldwork performance as measured by the FWPE, at least in some rotations (p. 10).

Fieldwork shortages persist nationwide at the time of this writing (Mattila et al, 2020; Montgomery, 2022; Ozelie et al, 2023). The accreditation standards for level II occupational therapy fieldwork require supervised, synchronous site-based fieldwork rotations for degree fulfillment, while the current standards for level I allow for "simulated environments" as one of five instructional methods to fulfill level I requirements (ACOTE, 2020, p. 41). That standard provides flexibility for occupational therapy educational programs to design and implement level I fieldwork programs to support the specific learning needs of their students. Additionally, the convenience of the asynchronous, virtual, web-based simulation platform makes this option ideal for nontraditional, distance, or hybrid students who struggle to balance home, work, and school.

Implications of Findings

The significant association between the NBCOT mean score and amount of virtual simulation students experienced to fulfill level I fieldwork should be further investigated to fully understand its potential for occupational therapy education in "bridge" programs. The nontraditional students who matriculated to the "bridge" program started didactic coursework with a minimum of one year of professional work experience past licensure, and a reported average of 4.5 years of clinical practice (B. Nichols, personal communication, February 2020). When these students started coursework, their work histories had already provided at least a broad understanding of what occupational therapy is, a broad understanding of how the evaluative process works, how to design an

intervention based on client plans of care, general trajectory of the continuum of care, how healthcare work environments function in a broad sense, and how professional behaviors enhance or inhibit work performance and patient care. They learned some of this knowledge and skill in their COTA or PTA educational programs, but they also learned on the job as licensed, practicing healthcare professionals.

Situated learning theory provides a framework for why virtual simulation as an instructional strategy serves as a valuable alternative to traditional, in-clinic level I fieldwork rotations. Students participated in didactic coursework in a hybrid format: they participated in active learning on campus twenty two full weekends over the course of four didactic semesters. Most students were working full time, part-time, or per diem throughout the didactic coursework, so they were able to immediately apply knowledge and practice skills they learned in their courses. The same process described their interaction with virtual simulations. As working healthcare professionals, these "bridge" students had the professional context in which to work through the virtual simulation context they encountered in the individual assigned simulations. They could compare professional conversations heard on the virtual simulations to real work-place conversations occurring in their places of employment. Because of the "bridge" students' strong foundation of situated learning, the virtual simulations may have been perceived as higher fidelity or more authentic and thus impactful than for traditional students without a real-life basis for comparison.

Based on the impact of the virtual simulations on a widely recognized outcome measure in addition to other beneficial affordances of the instructional strategy including but not limited to, accessibility, efficiency, consistent experience across all students,

dependable platform, mobile-friendly, asynchronous, and flexibility across a variety of curricula, occupational therapy "bridge" programs are encouraged to evaluate virtual simulations as potential replacements for traditional level I fieldwork placements. Occupational therapy prides itself as a profession for taking the *whole person* into consideration when assessing, creating treatment plans of care, and implementing interventions. Given the unique set of challenges facing "bridge" students, specially-designed curricula that not only meet the ACOTE standards but also scaffold from the "bridge" students' often extensive professional histories and current work roles would be welcome. Virtual simulation could play a valuable role in such curricula.

Now more than ever, there are many sanctioned ways to meet the minimum ACOTE standard for level I fieldwork. Perhaps the benefit in this finding is to encourage ACOTE to continue to allow virtual simulations to fulfill the level I fieldwork requirements rather than requiring MSOT "bridge" students to expend valuable time on a performative "learning" experience that does not meet their needs as nontraditional adult learners. ACOTE could interpret this finding as another support for maintaining the current level of flexibility of instructional methods to fulfill level I fieldwork based on programs' student learning needs and curriculum designs.

Limitations of the Study

Paul E Spector (1981) opined that "the *ex post facto* design is a patchwork procedure intended to make a pseudo-experimental design out of a nonexperimental one" (p. 48). That the events under observation and analysis in this study had already occurred was a major limitation to any results gleaned from data analysis. The investigator's inability to generalize results beyond the study sample related directly to the convenience

sample and the investigator's inability to manipulate any variables whatsoever beyond statistical analyses, which itself was limited by the type of data available. Teasing out the impact of the identified independent variable from that of happenstance was impossible to do with certainty. To that end, asserting any sort of causal relationship on the basis of retrospective, non-experimental research was ill-advised.

Generalizability of this study's results is very limited for several reasons. First, the subjects of this study were a convenience sample of a small subset of the occupational therapy student population. While a small number of programs label themselves "bridge" programs in the United States, few of them share important characteristics of the program that served as this study's site. First, many programs require a bachelor's degree for admission. In addition, some require graduate school testing, although it was difficult to get an accurate number since many schools have paused that requirement since the pandemic's start. Both the bachelor's-level education prerequisite and the graduate school testing requirement are not admissions requirements of the "bridge" program in this study, which differentiates it from other "bridge" programs and further limits any potential for this study's results to be generalized beyond the study sample.

Due to both a change in personnel and the admission team's 2017 decision to adopt the use of the Occupational Therapy Centralized Application System (OTCAS) some data was not available to the researcher, including the demographic data from the 2016 cohort.

The AOTA Fieldwork Performance Evaluation (FWPE) is the most widely-used outcome measure of United States occupational therapy student entry-level practice performance on level II Occupational Therapy fieldwork rotations (Dudzinski et al.,

2022; Ozelie et al., 2023; Preissner et al., 2020). Despite its adoption across most ACOTE accredited occupational therapy educational programs, the tool is not without limitations. As Ozelie et al. (2023) noted, this instrument "allows for a degree of rater subjectivity and potential bias" (p. 14), which does limit its utility in research. The tool was validity tested and the current iteration (2020) was digitized, to support more efficient dispersal, submissions, and data capture and reporting. The tool's weaknesses include a possible level of subjectivity related to the individual completing the evaluation (Dudzinski et al., 2022; Lucas-Molitor & Nissen, 2020; Ozelie et al., 2023). No easily accessible, affordable, or standardized training program or reliability training process currently exists to increase reliability among occupational therapy practitioners who serve as fieldwork educators for level II students. Due to this subjectivity, using the FWPE as an outcome measure, despite its recognized utility in the field of occupational therapy education, is a limitation.

The NBCOT test data provided to program directors of occupational therapy education programs were provided as deidentified and aggregated by cohort, meaning that the data did not include a full range of raw scores to analyze. Because the NBCOT exam score mean data was a single data point, the types of statistical analyses appropriate to use was very small. The mean scores were treated as nonmetric, categorical data, which limited the types of analyses to nonparametric statistics. "Because statistical techniques are the only form of control to be applied to the observational approach," the results of this study must be considered in context and generalized conservatively (Edwards & Kennedy, 2017, p. 125).

Future Research Directions

This study was one of very few focusing on “bridge” students in the field of occupational therapy. Harvison (2022) noted in his annual report that accessibility to occupational therapists in rural areas across the entire middle of the United States is a significant current challenge not only to the profession, but for the health and welfare of US citizens who require the specialized care of occupational therapists. MSOT “bridge” programs offer COTAs (and PTAs) the opportunity for career advancement while also filling notable disturbing gaps in healthcare access. Studying this population further to identify the best educational practices to promote “bridge” students’ transitions from assistant-level to therapist-level practitioners may lead to more affordable, efficient, and effective educational programs specifically designed to support the myriad challenges of nontraditional students.

Virtual simulation, especially with this population of “bridge” students, for whom virtual simulation appears to be a good fit, should be studied in earnest with random-controlled trials, larger-scale studies spanning the nation, and meaningful outcome measures. Replicating this study with NBCOT raw scores would be advisable.

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