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Applying an ecological perspective to interprofessional education: Attitude changes in students of the tri-alliance

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Applying an ecological perspective to interprofessional education:

Attitude changes in students of the tri-alliance

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Submitted to the dissertation committee and the graduate faculty of

Dr. Pallivi Patel College of Health Care Sciences,

Department of Health Science at Nova Southeastern University

on April 7, 2021 in fulfillment of the requirements for the degree of

Doctor of Philosophy in Health Sciences

NSU Florida
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Doctor of Philosophy in Health Science

CERTIFICATION OF AUTHORSHIP OF DISSERTATION WORK

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Abstract

In spring 2020, three partnering academic programs of the "tri-alliance"—occupational therapy, physical therapy, and speech-language pathology—immediately transitioned from hybrid interprofessional education (IPE) to uniprofessional, online learning experiences due to the COVID-19 pandemic. This transition presented opportunity to compare attitude changes and understand student perceptions about interprofessional collaboration between two tri-alliance student groups: Case 2018, $N = 119$ and Case 2020, $N = 95$. By incorporating the Bioecological Theory of Human Development (BTHD) and the Ecology of Human Performance (EHP), a comparative mixed methods case study merged quantitative results from a natural experiment and qualitative findings from a case study to learn about ecological factors within IPE and their effects on student learning. A modified version of the Interprofessional Attitude Scale provided quantitative pre- and posttest results. Narrative responses to reflection questions provided insight into the students' perceptions. These results were analyzed separately and then merged together for both Cases. The outcomes between Cases diverged and provided evidence that attitude changes and perceptions from Case 2018 were significantly more positive than from Case 2020. Based on the BTHD, ecological factors related to multiple levels of context influenced student engagement in their full IPE-based experiences, which ultimately affected development. However, after sample size modifications, the outcomes were similar and appeared to be more influenced by the person factors than context, in alignment EHP constructs. These outcomes provided evidence that ecological factors affect student engagement in and learning from IPE, and more attention is needed about student factors and teaching/learning contexts.

Keywords: mixed methods, natural experiment, case study, tri-alliance, occupational therapy, physical therapy, speech-language pathology, interprofessional education, attitude

changes, ecology, context, COVID-19, Bioecological Theory of Human Development, Ecology

of Human Performance

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In the Time of Pandemic

Reprinted with permission from author, Kitty O'Meara.

And the people stayed home.

And they read books, and listened, and rested, and exercised, and made art, and played games, and learned new ways of being, and were still.

And they listened more deeply. Some meditated, some prayed, some danced. Some met their shadows. And the people began to think differently.

And the people healed.

And, in the absence of people living in ignorant, dangerous, mindless, and heartless ways, the earth began to heal.

And when the danger passed, and the people joined together again, they grieved their losses, and made new choices, and dreamed new images, and created new ways to live and heal the earth fully, as they had been healed.

O'Meara, K. (2020, March 16). *In the time of pandemic.* The Daily Round. Retrieved April 18, 2020, from https://the-daily-round.com/2020/03/16/in-the-time-of-pandemic/

Table of Contents

List of Tables

List of Figures

Applying an ecological perspective to interprofessional education:

Attitude changes in students of the tri-alliance

Chapter 1: Introduction

With the growing importance of preparing a collaboration-ready workforce of health and social care professionals, interprofessional education (IPE) is being included with greater intentionality in curricula of professional programs of study at academic institutions (Guraya & Barr, 2018; Lucas Molitor & Naber, 2020; Zorek & Raehl, 2013). National and international leaders and organizations have provided formal statements, guidelines, and calls to action about the importance of IPE (Institute of Medicine, 2015; Interprofessional Education Collaborative [IPEC], 2016; World Health Organization [WHO], 2010). As such, educators and researchers have implemented and studied a wide variety of IPE strategies, assessments, and outcomes, thus building a greater body of knowledge that the interprofessional community may utilize. Outcomes of IPE (i.e., preparing a collaboration-ready workforce) include achieving the goals of the Triple Aim in the United States: (a) improving the patient experience of care, (b) improving the health of populations, and (c) reducing the per capita cost of health care (Berwick et al., 2008, p. 760). Adding to the Triple Aim, a fourth goal has been identified—improving the work life of health care providers—which is commonly referred to as the Quadruple Aim (Brandt & Schmitz, 2017, p. 279; Khalili et al., 2019, p. 30).

However, what happens to a community, a nation, and the world during a global health crisis? What happens to higher education's duty to prepare a collaboration-ready workforce when everyday educational operations of a university change from on-campus activity to social distancing, isolation, and quarantining? On January 30, 2020, the WHO formally declared a "public health emergency of international concern" due to the outbreak of a novel coronavirus

disease that was said to have been originally detected in Wuhan, China in late 2019 (WHO, 2020). This new strain of coronavirus disease was later named COVID-19, and on March 11, 2020, the WHO identified COVID-19 as a pandemic (Centers for Disease Control and Prevention, 2020).

For higher education institutions in the United States, the immediate response to COVID-19 was to follow public health directives and government mandates quickly and closely by closing campuses, cancelling university events, and transitioning all education to alternative delivery formats in a matter of weeks. While health and social care professionals and many other essential workers continued working in the community during the COVID-19 pandemic, others, including students and educators, adapted to and functioned in their new environments and contexts to comply with social distancing and isolation requirements.

With these serious and abrupt changes to academic operations due to COVID-19, opportunity presented itself to study outcomes of modified IPE learning experiences that occurred during the time of compliance with public health mandates for reducing the spread of the virus (Cornwall, 2020). This dissertation study examined attitude changes about interprofessional collaborative practice (IPCP) in students from occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP) after engaging in two different IPE-based learning experiences—specifically, (a) hybrid, interprofessional learning experience with emphasis on the classroom-based workshop and (b) online, uniprofessional modules and videos about IPCP—that were influenced by differing environmental and contextual factors. By studying the ecology[1] of IPE—which, for this dissertation study, was defined as the

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[1] The dynamic relationships between students and multiple levels of the contexts and environmental factors create an ecology that affects learning outcomes. The environment-student reciprocal exchanges between typical and atypical curricular flow as described in this chapter were closely examined for this dissertation study.

interrelationships of and reciprocal exchanges between (a) students of health and social care programs and (b) learning environments and contexts for achieving IPE outcomes—knowledge was gained about the influences of context and environment on student attitudes about IPCP (See Appendix A for definitions of IPE and IPCP).

This chapter provides a background about the effects of pandemics on education, which includes relevant information about IPE. This chapter also describes background information about the collaborative IPE efforts of three health profession programs in Louisville, KY. These programs, their students, and pertinent ecological factors were the foci of this dissertation study. Ecological factors are referenced often in this chapter and are defined as factors that include the collective, reciprocal, and dynamic interrelationship between (a) the Person and their unique characteristics and (b) the Person's specific Contextual circumstances and levels that (c) affect Task selection, Performance of those Tasks, and the engagement in Proximal Processes (described later) over a period of or in Time. These constructs—identified as proper nouns when applied to this dissertation study—are from the Bioecological Theory of Human Development (BTHD) and the Ecology of Human Performance (EHP) and are discussed in the section "Theoretical and Conceptual Frameworks" within this chapter (see also Appendices C, D, F, and G; Bronfenbrenner & Morris, 2006; Dunn, 2017; Dunn et al., 1994).

This chapter also describes the theoretical and conceptual models introduced in the preceding paragraph, the study's purpose statement, and the research questions posed in this dissertation study. The following sections include an introduction to the details about mixed methods research and significance of this research. Finally, this chapter concludes with a summary, which prepares the reader for the formal literature review in the next chapter.

Background

To appreciate the complexities of pandemics and their influences on education, this brief history will provide insight into some of the challenges experienced by students and educators due to COVID-19. After understanding how pandemics have historically disrupted academic operations, a timeline of seminal and relevant IPE publications and an overview about the ecology of IPE (related to the health education programs within this dissertation study in Louisville, KY) provide foundational information for background.

Pandemics Affecting Education

Throughout the world's history of pandemics, society has benefitted from public health advancements and the expansion of epidemiological knowledge. In the mid-14th century, the Black Death (i.e., the Bubonic Plague) traveled from Asia to Europe, and the strain of bacteria that caused this pandemic, *Yersinia pestis*, had at least four other documented outbreaks from mid-6th century through mid-19th century (LePan, 2020). During one of its 17th-century outbreaks, specifically the Great Plague of London, Isaac Newton was a student at Trinity College in Cambridge and was sent home to avoid illness (Brockell, 2020). During this time, Isaac Newton continued his studies at home and developed what became known as early forms of calculus and theories on optics, gravity, and motion (Brockell, 2020).

More recently in the 20th and 21st centuries, pandemics have continued to deeply affect society and disrupt academic operations. In 1918 and 1919, the H1N1 influenza virus known as the Spanish Flu resulted in approximately 40 to 50 million deaths globally; however, timely academic institution closures and cancellations of public gatherings were associated with reduced mortality rates of this strain of influenza (Chen et al., 2011, p. 200; LePan, 2020; Rosenweld, 2020). Nearly a century later in 2009 and 2010, the H1N1 influenza virus resurfaced

becoming known as the Swine Flu, which resulted in approximately 200,000 deaths worldwide, and, like the Spanish Flu, many academic institutions across the United States closed—mostly primary and secondary schools—to help control the spread of the virus (LePan, 2020; Navarro et al., 2016; Rosenweld, 2020). While these historical events are interesting and pertinent, the Bubonic Plague is still considered the deadliest pandemic in history with some sources reporting up to 200 million deaths worldwide (LePan, 2020; Rosenweld, 2020).

Many similarities with the implementation of nonpharmaceutical interventions (NPI) and their effects on the economy and society—to include academic operations—are present between the pandemic, COVID-19, and the historical H1N1 influenza virus outbreaks. According to Van et al. (2010), as with other institutions, universities are affected by natural and human created disasters, and when faced with pandemics, they "must maintain a balance between academic continuity, with infection control [while] minimizing morbidity" (p. 2). NPI strategies utilized for all three pandemics included school and university closures and cancelled school-related events; all of which have been credited for helping to slow the rate of infection within affected communities (Chavez et al., 2020; Chen et al., 2011; Navarro et al., 2016). Unfortunately, with the rapid spread of COVID-19 and what some consider a delayed response to the pandemic in the United States, educators were faced with quickly transitioning classroom education to online and asynchronous education, which resulted in significant changes to and cancellations of previously planned, in-person learning experiences (Epstein & Sheth, 2020; Harvard Health Publishing, 2020; J. Cason, personal communication, April 11, 2020; Kaiser Family Foundation, 2020).

A Timeline of Important Publications Shaping IPE

The evolution of IPE has also led to significant changes in higher education. Early in the 20th century, just before the Spanish Flu outbreak in 1918, Abraham Flexner, a research scholar and Louisville, KY native, wrote a report that identified significant flaws in medical education (Gilbert, 2008; Institute for Advanced Study, n.d.). This report was pivotal in the evolution of medical education and has been considered one of the earliest catalysts of IPE due to how the report affected education of all health professionals (Gilbert, 2008).

A few decades later, another report was published by Dr. John McCreary, a physician and educator, in the mid-1960s about the challenges of medical education in Canada, which also included one of the earliest introductions of the IPE concept. According to McCreary (1964), services provided by teams consisting of multiple health professions were necessary for providing care to populations. He continued by stating:

> All of these diverse members of the health team should be brought together
>
> during their undergraduate training years, taught by the same teachers, in the same
>
> classrooms and on the same patients. Under these circumstances, with students
>
> studying together, working together, reading together, eating together, it should be
>
> possible for the various disciplines to be welded into a true health team such that
>
> each can contribute, with full respect for what the other has to offer, his share of
>
> the health services" (McCreary, 1964, p. 1220).

Interestingly, McCreary provided insight in this statement about changing *from* "siloed" learning contexts in which students of health and social care professions were being educated *to* interprofessional learning contexts that positioned these students to learn together. Some of these early concepts written by McCreary are reflected in the most current definition of IPE, written by

the Centre for the Advancement of Interprofessional Education (CAIPE): "IPE enables

[members or students of] two or more professions to learn with, from and about each other to

improve collaborative practice and quality of care [and services]" (Barr et al., 2017, p. 4; Khalili

et al., 2019).

Although IPE is thought to have become energized in the 1980s after a WHO meeting in

Geneva and subsequent reports, the need for IPE appeared to become more urgent after the

publication of *To Err is Human: Building a Safer Health System* (Barr, 2015, pp. 4; Fransworth

et al., 2015; Kohn et al., 2000). This publication described the significance of medical errors in

the United States health care system through the reporting of patients' lives lost, persons harmed,

and near-miss events that could have caused harm to patients—all due to medical errors.

According to Kohn et al. (2000), premiums being placed on medical autonomy and the lack of

interprofessional cooperation were two of many reasons for minimal attention to safety in

hospitals and other institutions (p. 165). The authors also identified that "traditional clinical

boundaries and a culture of blame must be broken" (Kohn et al., 2000, p. ix).

Since its publication in 2000, more reports and guidelines have been written to document

the importance of IPE and the importance of developing or enhancing learning experiences that

promote IPCP. After the Triple Aim was introduced in the United States in 2008, the WHO

published its seminal document in 2010, *The Framework for Action on Interprofessional*

Education and Collaborative Practice (a.k.a. *Framework for Action;* WHO, 2010). The

Framework for Action included strategies and ideas for health policy makers, educators,

clinicians, community members, and others about interprofessional education and collaborative

practice to address the global health workforce crisis (WHO, 2010, pp. 9-11). Of importance,

concepts included in the *Framework for Action* were for users to recognize their contexts of

health service provision to implement strategies for achieving effective IPE and IPCP to meet

their populations' needs (WHO, 2010, p. 11).

A Brief Note about IPE Learning Outcomes

During the development and progression of these IPE and IPCP publications, Barr,

Koppel, Reeves, Hammick, and Freeth (2005) formed the Joint Evaluation Team (JET) and were

the original co-authors of the modified Kirkpatrick typology of educational outcomes. (Each

author was specifically listed to acknowledge equal contribution for their collaborative work [H.

Barr, personal communication, May 13, 2020].) According to these five co-authors, the

modified learning outcomes were named the JET classification of interprofessional education

outcomes, which consisted of the following six levels: Level 1: reaction; Level 2a: modification

of attitudes/perceptions; Level 2b: acquisition of knowledge/skills; Level 3: behavioral change;

Level 4a: change in organizational practice; and Level 4b: benefits to patients/client (Barr et al.,

2005, p. 43). Since its original publication in 2005, the JET classification of IPE outcomes has

been utilized as guiding competencies for pre- and post-qualification IPE learning experiences

through application and research.

The specific IPE outcome of interest for this dissertation study per the JET classification

is Level 2a: modification of attitudes. According to the JET classification of IPE outcomes,

achieving the Level 2a outcome occurs because of "changes in reciprocal attitudes or perceptions

between participant groups [or] changes in perception or attitude towards the value and/or use of

team approaches to caring for a specific client group" (Barr et al., 2005, p. 43). Attitude changes

have been well researched in IPE (Reeves et al., 2017). Although research about attitude changes

has established an extensive body of literature, it has become clear that there is also a strong need

to study the influence of environments and contexts on any level of IPE outcome (Reeves et al.,

2016; Olson & Bialocerkowski, 2014).

Environments, Contexts, and the Ecology of IPE

Environmental and Contextual Factors and Their Applications to IPE

To address the need for including environmental and contextual factors in IPE research,

this dissertation study offered definitions from several expert sources that provided the

foundation from which it was developed. According to the fourth edition of the *Occupational*

Therapy Practice Framework: Domain and Process (OTPF-4), environments and contexts are

often used interchangeably, but their interchangeable use may cause confusion when describing

the situations in which engagement in occupations occur (American Occupational Therapy

Association [AOTA], 2020a, p. 9). As such, the OTPF-4 uses the term "context" as a broad

construct that encompasses environmental factors (i.e., things that are external to the person,

such as natural environments, technology, relationships, and societal attitudes) and personal

factors (i.e., things that are internal [within or about] the person, such as age, cultural

background, and professional identity), which align with the *International Classification of*

Functioning, Disability, and Health (AOTA, 2020a; WHO, 2013).

According to Kitto et al. (2013), the concepts of "space, place, and learning" in IPE are

important in consideration of effective academic resource utilization to promote IPCP, as well as

understanding the presence and intersection of space, place, and learning in educational activities

and clinical practice (p. 7). Linking space, place, learning, and OTPF-4 constructs with the

ecology of IPE, student engagement and participation in IPE occur within contexts influenced by

environmental and personal factors that may facilitate or inhibit learning as measured by the JET

classification of IPE outcomes. For instance, environmental factors related to IPE may include

the natural environment or built environments such as university campuses, libraries, classrooms, or simulated labs; homes, clinics, hospitals, or community agencies; infrastructure for mobility and transportation; and time within the academic year or until graduation. A recently relevant environmental factor within context includes products and technology, such as Wi-Fi capable devices, synchronous or asynchronous online delivery of IPE, online gaming, or video conferencing (AOTA, 2020a, pp. 37).

Environmental factors related to social support and relationships may include family and friends; faculty and peers; preceptors or clinical supervisors; organization or association members and leaders; and patients, clients, or caregivers. Other environmental factors include attitudes, such as family values, that are placed on education or the overarching customs or behavioral standards of practice between different professional programs. Additionally, the interprofessional or uniprofessional mix of students and educators are included in these environmental factors. Understanding the mix of students and educators in conjunction with the learning outcomes is important for selecting appropriate IPE learning opportunities (Thistlethwaite, 2012).

Personal factors, the second contextual factor per the OTPF-4 and related to IPE, include components that are a part of the person's background and consist of unique features of the person (AOTA, 2020a, p. 40). These factors include elements such as the range of students' ages in a cohort, being male in a predominantly female profession, or financial ability to pay for school. They also include previous work or life experiences, the stage or point of progression through a program, or study routines and habits. Each of these context-related examples, environmental and personal, could be a component of any student's daily life, and an ecological

disruption of any size or type could affect a student's ability to engage in their studies, including IPE.

With an appreciation for context, Olson and Bialocerkowski (2014) identified that "student factors, such as their social, economic and cultural backgrounds, as well as the stereotypes, expectations and attitudes that [students] bring to higher education, vary considerably between institutions even within one health profession course, and will probably influence IPE experiences and learning" (p. 237). As such, the ecological factors between students and their educational context are unique to the individual and are important to consider. By understanding and appreciating contextual factors, educators and researchers may thoughtfully examine how IPE leads to improved long-term outcomes in differing circumstances (Olson & Bialocerkowski, 2014).

A Historical Account of IPE and its Ecological Factors in Louisville, KY

According to Dunn et al. (1994), "ecology, or the interaction between person and the environment, affects human behavior and performance, and that performance cannot be understood outside of context" (p. 598). Appreciating the interconnectedness between a student and their context, educators are positioned to consider the ecology of IPE and create learning experiences that are relevant to current health and social care professions.

Recent History of Tri-Alliance IPE in Louisville, Kentucky. Students and professionals of OT, PT, and SLP are commonly referred to as rehabilitation professionals and occasionally referred to as the "tri-alliance," which is a collective term that describes interprofessional collaborative actions among these rehabilitation professions (Eidson et al., 2018). Through tri-alliance opportunities, students of these rehabilitation professions participate in learning experiences within new contexts, thus beginning to develop their own tri-alliance

professional culture. Tri-alliance collaboration commonly occurs during state- and federal-level advocacy initiatives (American Physical Therapy Association, 2018). However, tri-alliance is a term being applied to other endeavors, such as IPE, and even more recently became applicable to COVID-19 responses (AOTA, 2020b; Eidson et al., 2018; Library of Congress, 2000).

Beginning in September 2016, a multi-institutional IPE learning initiative began in Louisville, KY, which brought together three of the city's graduate-level, tri-alliance professional programs. These programs created a hybrid, three-part IPE learning experience that began with (a) individual and group online and in-person preparatory activities one week before the workshop, (b) a 4-hour, classroom-based workshop with teambuilding and case-based learning experiences, and (c) brief individual narrative reflections on a web-based platform after the event concluded. This IPE experience was created to address the Interprofessional Education Collaborative's (IPEC) 2016 competencies and to meet each professional program's unique IPE-related accreditation standards (see Appendix B for IPEC 2016 competencies). Based on student and faculty reports, the IPE workshop met its intended goals.

The Effects of COVID-19 on the Tri-Alliance IPE Workshop. Since September 2016, this hybrid IPE learning experience has occurred in the same way—with modest revisions—twice a year until spring 2020. The hybrid IPE learning experience that was scheduled for spring 2020 was severely affected by COVID-19 and the resultant public health and government responses to the pandemic. In mid-March 2020, most higher education institutions required all in-person and on-campus education events to either transition to online course work or cancel altogether, with these directives and evolving iterations lasting through the end of 2020 and into 2021. Faculty had approximately one week to make these transitions before campuses closed.

After cancelling the hybrid IPE learning experience, specifically the classroom-based workshop, but still attempting to meet accreditation standards, each program elected to utilize existing uniprofessional online modules or virtual simulations about IPE and IPCP, which afforded faculty the ability to manage all co-occurring curricular changes that were also affected by closures due to the pandemic. Understanding that IPE learning experiences are time and resource intensive, the online, uniprofessional IPE-based learning experience met accreditation standards at a basic level. Unfortunately, the purpose behind IPE to have "students of two or more professions to learn with, from, and about each other" was lost due to abrupt changes to the normal ecology of higher education.

Theoretical and Conceptual Frameworks

The background information about pandemics, higher education, IPE, and the tri-alliance exhibits many contextual complexities. Conducting research about IPE during the COVID-19 pandemic required strategic and intentional thought about these contextual factors for crafting a cohesive and informative study. This task was accomplished by employing philosophical and theoretical models that guided the research methodology and provided opportunity to test theories as they applied to IPE, while maintaining focus on the ecology of IPE.

Inquiry Worldview

Committing to a philosophical paradigm about research or an overall worldview is challenging for novice researchers. A research paradigm, also called a worldview, defines a researcher's philosophical orientation or beliefs that inform the meaning or interpretation of research data and has implications for every decision made within the research process (Kivunja & Kuyini, 2017, p. 26). Research experts appear to agree that there are four or five common worldviews: (a) positivism/postpositivism, (b) constructivism/interpretivism, (c) critical, (d)

transformative/participatory, and (e) pragmatism/pluralism (Creswell & Plano Clark, 2018; DeCuir-Gunby & Schutz, 2018a; Kivunja & Kuyini, 2017).

Although argument has been made for conducting IPE research through the lens of a critical realist, this dissertation was written from a pragmatic worldview (Lutfiyya et al., 2016). Pragmatism's ontology is of a non-singular reality and acknowledges there are multiple "realities" that are based on individual interpretation, which also includes a single reality (DeCuir-Gunby & Schutz, 2018a; Kivunja & Kuyini, 2017, p. 35). Additionally, pragmatism's epistemology acknowledges there are basic "truths" to be known; however, those truths and human processes are influenced by contexts, which are used for problem solving (DeCuir-Gunby & Schutz, 2018a, p. 4). The axiology (i.e., the nature of ethics and ethical behavior) of pragmatism is value-laden, which means research is conducted in a way that benefits people (Kivunja & Kuyini, 2017, p. 35).

Pragmatism is a common worldview for mixed methods researchers because it emphasizes use of a variety of methodologies for finding the truth about a phenomenon in a practical way (Kivunja & Kuyini, 2017, p. 35). Pragmatism became a worldview in the 1870s through the formation of the "Metaphysical Club" by a group of students from Cambridge, Massachusetts; two of these students were Charles Peirce and William James (Biesenthal, 2014). Peirce and James were credited for pioneering pragmatism through the club's discussions and debates about philosophy, knowledge, and truth. Not long after, both men published essays and articles that described their individual views of pragmatism, and both inspired other early leaders of this worldview, to include John Dewey and George Mead. Dewey applied pragmatism to social sciences, and Mead became a founder of social psychology (Biesenthal, 2014).

More recently, neo-pragmatism was introduced by Richard Rorty and further developed by Hilary Putnam and Susan Haack (Biesenthal, 2014). Neo-pragmatism was another term to describe linguistic pragmatism, which was concerned with the importance of conversations in the process of scientific inquiry about one's reality. Since its beginning, pragmatism has become an interprofessional worldview; however, pragmatism is not a precise worldview due to how it accommodates and conflicts with many theoretical viewpoints. Despite its imprecision, pragmatism remains a practical worldview that aims to solve problems through scientific inquiry, thus making it a suitable worldview for mixed methods research (Biesenthal, 2014).

According to DeCuir-Gunby and Schutz (2018a) and Kivunja and Kuyini (2017), pragmatism is a worldview that ascribes to

- rejection of locating a study in either a postpositivist paradigm or a constructivist paradigm (i.e., the pragmatic worldview is pluralistic),

- use of the best suited approaches that help with knowledge discovery,

- search for useful points of connection within the research project that facilitate understanding of the situation, and

- use of research designs and methodologies that are best suited to the purpose of the study.

Acknowledging that other paradigms are well suited for IPE research, the beliefs and characteristics of the pragmatic paradigm aligned with the worldview of this novice researcher (i.e., the investigator). Studying a topic in the most efficient and effective way, using carefully selected methodology to fulfill the purpose, answer the guiding questions, and benefit the most people, was perceived by this investigator to be the best approach to research. As such, the pragmatic paradigm was the selected worldview to inform this dissertation study.

Subjectivity Statement

The subjectivity statement is a personal explanation of how the investigator is connected to the research topic and is part of the theoretical framework (DeCuir-Gunby & Schutz, 2018a, p. 7). The investigator for this dissertation is an associate professor for an OT program who also co-facilitates IPE learning experiences with the faculty from a neighboring PT program and an SLP program. Like the students of the tri-alliance, this investigator was affected by the administrative and regulatory directives related to the COVID-19 pandemic. Although this dissertation study focused only on the students of the tri-alliance, faculty who were co-facilitators of IPE learning experiences represented some of the ecological factors experienced by these students.

Substantive Content Theories

Two primary models are the substantive content theories informing this dissertation study: Urie Bronfenbrenner's Bioecological Theory of Human Development (BTHD) and Winnie Dunn and colleague's Ecology of Human Performance (EHP). The Person and their Contexts are central to both theories. The reciprocal and dynamic interactions the Person has in their Contexts and the Contexts on the Person influence human Development through the life span, per the BTHD, and the Performance of meaningful Tasks, per the EHP[2] (Bronfenbrenner & Morris, 2006; Dunn, 2017). Because the BTHD and EHP both place importance on the Person-Context interrelatedness, these two theoretical models were selected to effectively interpret, support, and expand the applications of this dissertation study (Bronfenbrenner, 1979, p. 3; Bronfenbrenner & Morris, 2006; Tudge et al., 2009, p. 199; Dunn et al., 1994; Dunn, 2017).

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[2] Concepts and constructs related to the BTHD and EHP were written as proper nouns when applied to this dissertation study.

Bioecological Theory of Human Development

The BTHD was developed by Bronfenbrenner beginning in late 1970s as the Ecology of

Human Development and evolved into its current, mature model, the BTHD. The BTHD is

described as "an evolving theoretical system for the scientific study of human development over

time" (Bronfenbrenner & Morris, 2006, p. 793). According to the BTHD, human development

occurs through synergistic interconnections among four key elements: Proximal Processes,

Person, Context, and Time (Bronfenbrenner, 2001; Tudge, et al., 2016, p. 428). These four

elements are essential to the application of the BTHD to research and are further explained later

in this section.

This BTHD model was designed from the perspective of human development and with an

"interdisciplinary and integrative focus on the age periods of childhood and adolescence"

(Bronfenbrenner & Morris, 2006, p. 794). Although it began with an emphasis on childhood

development, it quickly grew to encompass development across the life span. The previous and

current versions of the BTHD have consistently emphasized the significance of Context in

human Development. However, many scholars have overlooked how this model also equally

emphasizes the reciprocal influences that Context has with the Person over the duration of or a

moment in Time making the construct, Proximal Processes, central to the current version of the

BTHD (Bronfenbrenner & Morris, 2006; Tudge et al., 2016). Simply stated, Proximal Processes

are what Bronfenbrenner considered the "engines of development" due to how the collective,

reciprocal interactions between Person, Context, and Time in the immediate environment

facilitate human Development (Bronfenbrenner & Morris, 2006, p. 798).

Understanding the importance of Proximal Processes, the Person, the Person's Contexts,

and the Time in which the Person's Development occurs, Bronfenbrenner provided the Process-

Person-Context-Time (PPCT) model for operationalizing the BTHD theory when applied to practice and research (Bronfenbrenner & Morris, 2006). The conceptualization of the PPCT model is different from the schema commonly used to illustrate Bronfenbrenner's early and some current versions of the BTHD. Bronfenbrenner's theory has been commonly depicted with nested circles that emphasize the micro-, meso-, exo-, and macrosystem levels of Context, as well as an additional layer of time, which has been commonly referred to as the chronosystem. Many scholars continue to use this schema even though Bronfenbrenner consistently emphasized other important constructs of the BTHD (Tudge et al., 2009; Tudge et al., 2016).

To this end, this dissertation study used the BTHD schema introduced by Tudge (2008) in Figure 1, which captures the Proximal Processes that occur between the Person and elements within the Microsystem and the reciprocal influences occurring between and within other levels of Context over a period of Time (p. 69). This schema differs from the traditional nested circle structure typically used to illustrate Bronfenbrenner's theory and is reported to provide a more accurate representation of what the BTHD truly describes in its model (Tudge, 2008, p. 68). Refer to Appendix C for specific definitions of the PPCT model and its application to IPE. Refer to Appendix D for a schema that applies Tudge's interpretation of the PPCT model (Figure 1) to IPE.

Figure 1

U. Bronfenbrenner's Process-Person-Context-Time Model Interpreted by J. Tudge
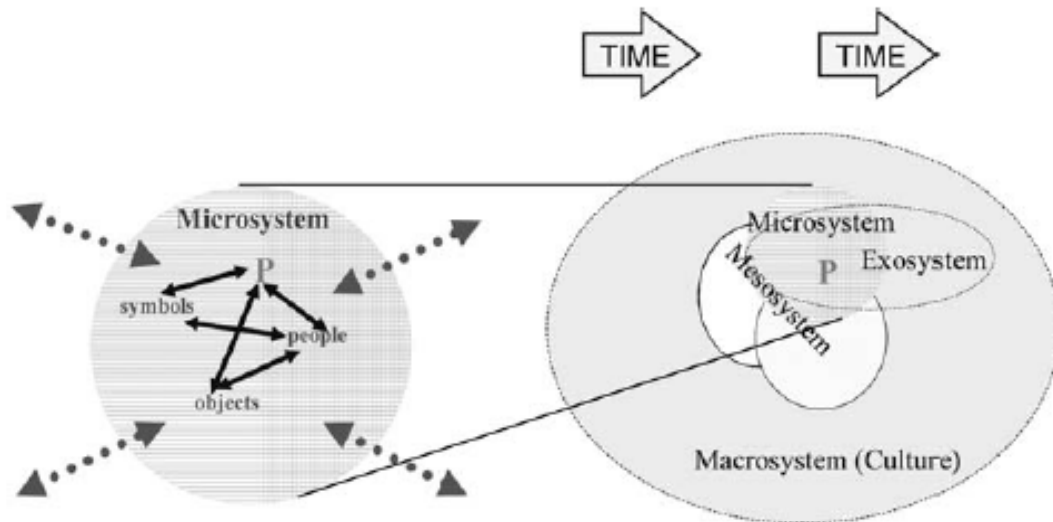
Note. From *The Everyday Lives of Young Children: Culture, Class, and Child Rearing in Diverse Societies* (p. 69), by J. Tudge, 2008, Cambridge University Press. Copyright 2008 by Cambridge University Press. Reprinted with permission (See Appendix E).

Although the BTHD consists of many complementary elements used to guide this research, several limitations to accurately utilize and test this theory were recognized. According to Tudge et al. (2009), Bronfenbrenner heavily relied on the work of other researchers, as opposed to his own, to describe and operationalize the BTHD and PPCT model; therefore, the limited clarity or guidance has resulted in this theory not being fully or accurately tested according to its mature version despite its multiple citations (p. 207). Additionally, Bronfenbrenner himself continued to use nested circles to describe Contexts, which has perpetuated the conceptual elements of the mature BTHD with an antiquated visual representation and, therefore, inaccurate applications of the BTHD (Xia et al., 2020).

In addition, the BTHD is a developmental theory which thoroughly captures how humans develop throughout a lifetime, but the BTHD is not reflective of what could be considered the ultimate purpose of Proximal Processes in a Microsystem. In consideration of this limitation as applied to this dissertation study, theoretically, how is it known that interactions will facilitate Development without knowing if the interaction is or is not meaningful or purposeful? The developmental outcomes of interest in the BTHD are the results of the synergies within the elements of the PPCT model; however, these developmental outcomes could be better understood when a Person engages in culturally relevant, purposeful, or meaningful behaviors or tasks. Motivated engagement in Tasks encountered in Proximal Processes may encourage more diligence or desire to participate, which may facilitate greater Development (Dunn, 2017, p. 218; Xia et al., 2020). Conversely, the synergies within the PPCT model could also produce maladaptive development or negative outcomes (i.e., "inverse proximal processes"), which is a perspective missed in the BTHD altogether (Merçon-Vargas et al., 2020). Despite these limitations, the BTHD served as the primary theory that guided this research and was supported by the EHP for strength in the BTHD's areas of limitation.

Ecology of Human Performance

Influenced by Bronfenbrenner and other theorists, the EHP framework was first introduced in 1994 by a team of occupational therapy educators from University of Kansas Medical Center to provide structure for its academic curricula and research (Dunn et al., 1994; Dunn, 2017). Although the EHP framework was conceptualized and operationalized by OTs and heavily influenced earlier versions of the OTPF, the EHP framework was intentionally created to be an interprofessional tool that represents the interconnectedness between the Person, the Person's Contexts, the Tasks available within those Contexts, and the person's Performance of

those Tasks (Dunn et al., 1994; Dunn, 2017). Formally, the purpose of the EHP is "to provide a

framework that emphasizes both the essential role of Context in participation and the critical

nature of the relationships among Person, Context, and Task to our understanding of

Performance" (Dunn, 2017, p. 210).

The fullest utility of the EHP is to (a) assess each element of the person according to this

framework's constructs, (b) identify where challenges exist within the elements that influence

the Person's Performance, and (c) create an action plan according to different intervention

strategies for enhancing the Person's Performance Range of tasks in their Contexts. Additionally,

the EHP framework offers insightful guidance for research by providing structure to components

specific to the unique elements of interest or examination. By virtue of this theoretical model's

interprofessional aim and holistic perspective, the EHP is a framework that many scholars and

educators from varying professional backgrounds may employ for representing the complex

interrelations of the Person and their Context.

In Figure 2, a schema illustrates how the Person is embedded in their Context (the circle)

with multiple Tasks ("Ts") from which to choose for Performance. The Person views the Tasks

through their Contextual lens for selecting which Tasks to perform; additionally, a Person's roles

are included in the Task and its selection for Performance (Dunn, 2017). The Performance Range

(megaphone-shaped structure) illustrates Tasks that are selected to perform within a range based

on the unique abilities of or challenges experienced by the Person, as well as the supports and

barriers of the Context (Dunn et al., 1994; Dunn, 2017). An important detail about this schema

concerns how the Person and Context are a composite, which represents how these to constructs

are inseparable (Dunn, 2017, p. 212). Refer to Appendix F for specific definitions of the EHP

framework and its applications to IPE. Refer to Appendix G for a schema that applies the EHP to

IPE as depicted in Figure 2.

Figure 2

A Schema of the Ecology of Human Performance
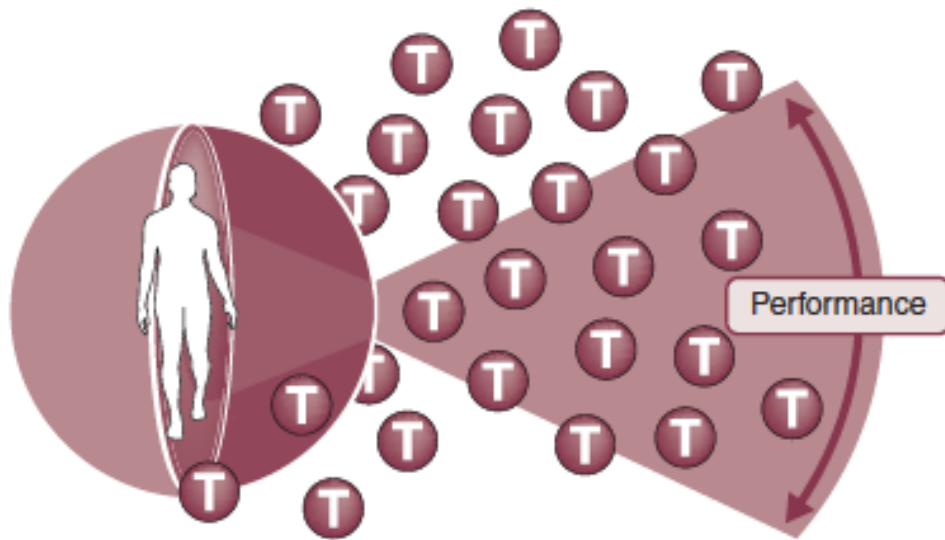
Note. From "The Ecological Model of Occupation," by W. Dunn, in J. Hinojosa, P. Kramer,

and D. B. Royeen (Eds.), *Perspectives on human occupation: Theories underlying practice*

(2nd edition., p. 213), by W. Dunn, 2017, F. A. Davis Company. Copyright 2017 by F.A.

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        Much like the BTHD, the EHP also has limitations that must be acknowledged. While the

EHP comprehensively captures the nearly infinite numbers of Tasks with respect to the Person's

roles, it describes one conglomerate, Contextual lens through which these tasks may be viewed.

In comparison to Bronfenbrenner's BTHD, which has four levels of Contexts that have more or less reciprocating influence with the Person and the stand-alone construct of Time, the EHP structures its focus on the gestalt of Context without the detail described in the BTHD. Another difference between the schemas for EHP and BTHD is how the EHP shows enhanced Performance as judged by the increasing number of Tasks that can be performed and not on the quality of Task Performance, which is an essential element for human Development, per the BTHD (J. Tudge, personal communication, June 23, 2020). Another limitation of the EHP is that it does not directly include the uniqueness of the virtual Context as depicted in the OTPF, which is relevant with circumstances surrounding the COVID-19 pandemic and the mandates for social distancing and self-isolation. Lastly, Lee (2010) identified that in comparison to other occupational therapy-based theories and models that emphasize context, the use of the EHP is less published as a guiding theory than others (p. 216).

Regardless of these limitations, the EHP served as a supportive theory that provided a framework and aligned with the constructs of this dissertation study. The Person factors of the IPE students were studied in conjunction with other Contextual factors that were present during their learning experiences (i.e., Tasks). This simultaneous assessment provided a lens for holistically appreciating the dynamic and reciprocal exchanges between EHP elements as applied to the ecology of IPE, which provided a helpful explanation about the students' performance and perspectives related to their IPE learning outcomes.

Combined Utilization of BTHD and EHP

By employing the BTHD as the primary theory and the EHP as a supporting theory for this dissertation study, the essential and complex constructs of Person, Context, Developmental, Time, and Performance-based outcomes were well represented. Additionally, these models

aligned with this investigator's philosophical worldview. Based on the (a) complementary

constructs of the BTHD and EHP, (b) their unique strengths that allow for one to fill in where the

other is limited, (c) their appreciation for interprofessionalism, and (d) their alignment with the

dissertation study's paradigm, these theoretical models guided and provided structure to the

research methodology used for this dissertation study. Additionally, opportunity existed to

discuss and test the models' utility for determining how well their constructs informed and

explained the ecology of IPE relevant to this dissertation.

At this time, three essential declaratives are provided for clarification. Because multiple

definitions and uses of the terms "context" and "environment" have been described in this

chapter, only the single term written as a proper noun, "Context," will be used as a broad

construct for reference, like its use in the OTPF-4. Additionally, emphasis has been placed on

the essential constructs of BTHD (i.e., Proximal Processes, Person, Context, and Time) and EHP

(i.e., Person, Context, Task, and Performance) by identifying them as proper nouns to signify

formal application of these terms in text. Lastly, these theories were applied to IPE in the United

States as described in Appendices C and F to best represent the collection of applicable examples

relevant to this dissertation study without influence of educational variations in other countries.

Purpose Statement

Statement of the Problem

Based on the societal disruptions caused by the COVID-19 pandemic, the current

challenges (i.e., research problems) were described from two perspectives. One perspective was

related to the students of the tri-alliance and their learning outcomes about IPCP in the presence

of highly complex ecological factors. Many students in these tri-alliance professional programs

and their educators have never lived through the repercussions of a pandemic so severe that

resulted in the deployment of multiple nonpharmacological (NPI) strategies. From this perspective, the stressors experienced by such ecological disruptions may have affected student ability to engage in their new day-to-day responsibilities and obligations, including participation in and benefit from IPE. This issue is a real-world challenge that deserves examination to understand student attitudes related to IPCP after engaging in IPE-based learning experiences during different contextual circumstances, which may have affected the ecology of IPE and the long-term effects on future IPCP well after completion of their professional programs.

The second perspective was related to the IPE knowledge base. A gap in IPE literature was identified about the effects of ecological factors, their implications on higher education (specifically, IPE and student learning outcomes), and a common theoretical base that links the two. At the beginning of this dissertation study, only assumptions were capable of being made about the success of students' IPE-based learning experiences, as well as their overall attitudes about IPCP. This academic limitation has affected the responsiveness of faculty to effectively tailor IPE learning experiences to each unique group of students during any period of time. Therefore, there is a need for a more complete understanding by comparing and synthesizing quantitative and qualitative data about student attitude changes related to IPCP while considering the complexities of the ecology of IPE.

Purpose of Research

Based on these challenges and limitations, the purpose of this dissertation study was (a) to compare and understand attitude changes about IPCP in students of the tri-alliance after participating in two different IPE-based learning experiences with respect to these students' unique ecological factors and (b) to merge outcomes for deeper understanding of phenomena. The students from April 2018 and April 2020 and their respective ecological factors were

identified as Case 2018 and Case 2020. Using statistical strategies, a comparison of Level 2a JET classification of interprofessional education outcomes (i.e., attitude changes) from the hybrid IPE learning experience in April 2018 and the online, uniprofessional IPE-based learning experience in April 2020 allowed opportunity for examining attitude changes reported by the students of the tri-alliance. The group of tri-alliance students from April 2018 was selected to compare with students of the tri-alliance from April 2020 because both groups used the same outcome measure, the modified Interprofessional Attitude Scale (IPAS), for their IPE-based learning experiences, and both groups were assumed to be homogenous.

Additionally, by studying student narrative responses to reflection questions from both Cases, content analysis allowed for comparison of themes that described student perspectives about IPCP and their overall learning outcomes after their respective IPE-based learning experiences. Examining and merging quantitative and qualitative data provided a more detailed picture about the complexities related to achieving IPE-based student learning outcomes by including the presence of ecological factors. By including ecological factors in IPE research, current IPE teaching methods and student supports will be enhanced for better preparing a collaboration-ready workforce that will be equipped to function during normal and non-normal times.

Research Questions

Based on the primary purpose of the study, the following three questions guided the research process:

1. For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative

perspectives about IPCP after their respective IPE-based learning experiences in the

presence of differing ecological factors?

- H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual

  narrative perspectives about IPCP show no significant nor meaningful evidence of

  convergence among OT, PT, and SLP students from Cases 2018 and 2020.

- H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual

  narrative perspectives about IPCP show evidence of convergence among OT, PT,

  and SLP students in Cases 2018 and 2020.

- H_{O2}: The merged quantitative results and qualitative findings show no significant

  nor meaningful evidence of influence from ecological factors on attitude changes

  about IPCP among students of the tri-alliance in Cases 2018 and 2020.

- H_{A2}: The merged quantitative results and qualitative findings show evidence of

  influence from ecological factors on attitude changes about IPCP among students

  of the tri-alliance in Cases 2018 and 2020.

2. For students of the tri-alliance, is there a difference in attitude changes about IPCP

   between the unique IPE-based learning experiences from Case 2018 (interprofessional

   learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning,

   online model, atypical curricular flow) in the presence of differing ecological factors?

   - H_O: There is no difference in attitude changes about IPCP between the students of

     the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based

     learning experiences and differing ecological factors.

- H_A: There is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

3. In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?

- Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

- Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

- Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

- Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

- Proposition 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived similarly about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

Mixed Methods Research

According to DeCuir-Gunby and Schutz (2018b), the specific design chosen for research is dependent on the research questions and the overall purpose of the study (p. 12). Based on the research problem, purpose, and questions and guided by BTHD and EHP, mixed methods research provided the necessary structure for collecting and analyzing data, integrating findings, and drawing inferences using qualitative and quantitative approaches for this dissertation study (DeCuir-Gunby & Schutz, 2018b, p. 2).

Definition of Mixed Methods Research

A variety of definitions about mixed methods research is available. Acknowledging this variety and offering a collective view, Creswell and Plano-Clark (2018) provided a definition of the core characteristics of mixed methods research that combined methods, research design, and philosophical orientation (p. 5). An investigator using mixed methods research will

- collect and analyze qualitative and quantitative data in response to research questions and hypotheses,

- integrate, mix, or combine the two forms of data and their results,

- organize these procedures into specific designs that provide the logic and processes for conducting the study, and

- frame these procedures within theory and philosophy (Creswell & Plano Clark, 2018, p. 5).

Several specific mixed methods designs are available depending on the research questions being asked. Based on the uniqueness of the aforementioned constructs of this dissertation study, a comparative mixed methods case study was best suited to structure this dissertation study and answer its questions. A comparative mixed methods case study is a design

"in which the quantitative and qualitative data collection, results, and integration are used to provide in-depth evidence for a case(s) or develop cases for comparative analysis" (Creswell & Plano Clark, 2018, p. 116).

Based on this definition, there are three important components to highlight: quantitative data collection, qualitative data collection, and cases. The quantitative data collection and related procedures were obtained through a natural experiment design. A natural experiment design, also known as natural manipulation, is a type of "nonexperimental research that examines possible causes that are not usually manipulated by a researcher, but the causal variable is one that 'describes a naturally-occurring contrast between a treatment and comparison condition'" (Christensen et al., 2014, p. 44). In other words, the variable of interest (e.g., independent variable) is naturally manipulated by an event—as opposed to a researcher—and influences the outcome of interest (e.g., dependent variable). According to Christensen et al. (2014), "if the independent variable seems like one that is not naturally manipulated, then call it a correlational study" (p. 45). The COVID-19 outbreak was the naturally occurring event in spring 2020 that caused a change in an IPE learning experience and was examined for its influence on student attitude changes about IPCP.

The corresponding qualitative measures were obtained through using a case study design, which is an important component of the overarching research design. According to Yin (2018), "a case study is an empirical method that investigates a contemporary phenomenon (the 'case') in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly defined" (p. 15). According to this definition, there were two groups within this dissertation study: (1) the students of the tri-alliance from April 2018 and (2) the students of the tri-alliance from April 2020. The real-world contexts of interest are the

ecological factors present during their respective IPE-based learning experiences, which may or may not have influenced their attitude changes about IPCP. These two student groups and all of their respective ecological factors were referred to as Case 2018 and Case 2020 for the remainder of this dissertation. As such, the comparative mixed methods case study research design allowed for careful examination of Cases 2018 and 2020 to compare and understand student attitude changes about IPCP after participating in their unique IPE-based learning experiences in the presence of very different ecological factors.

Strengths and Limitations of Comparative Mixed Methods Case Study Research

Regardless of methodology, strengths and limitations of a study design and its related components must be recognized for minimizing threats to validity and enhancing trustworthiness of a study's results. General strengths of mixed methods research include efficiency, separate then merged data analysis, and giving voice to participants while studying statistical trends. The specific strengths of a comparative mixed methods case study research design include

- providing in-depth, practical understandings about the complexities of cases and phenomena,

- comparing cases through quantitative and qualitative dimensions to portray variation in how the cases provide insights about the problem in the study, and

- describing profiles of cases to provide a detailed level of information about the cases and offer realistic pictures (Creswell & Plano Clark, 2018, pp. 71-72, 118, 120).

Conversely, limitations of comparative mixed methods case study designs appear to be based on the knowledge and experience of the researcher; however, other general limitations of convergent mixed methods research include

- issues with different sample sizes,

- the need to merge a text and a numeric database, and

- the need to explain divergence when comparing results (Creswell & Plano Clark, 2018, p.

  72).

Rationale for Proposed Mixed Methods Research

According to DeCuir-Gunby and Schutz (2018c), "the goal of mixed methods research

questions is to create deeper understandings of the phenomenon of interest than the

understanding a researcher might expect from looking at qualitative or quantitative data

separately" (p. 6). Based on (a) this goal, (b) the strengths of mixed methods research, and (c) the

limitations that must be carefully managed, the comparative mixed methods case study design

with a questionnaire variant was the best choice for answering the posed research questions as

the design was congruent with the philosophy and selected theories that guided this dissertation

study. The following statement provides justification for these claims.

The quantitative and qualitative methodologies were designed to support each other in

this dissertation study, and equal emphasis was placed on data obtained from both methods. The

Cases' data were collected over two periods of time during their respective curricula. Case 2018

and Case 2020 data came from (a) a pretest survey with Likert items that quantified attitudes

about IPCP before their respective IPE-based learning experiences and (b) the same posttest

survey with open-ended narrative reflection questions after their IPE-based learning experiences,

with approximately two to three weeks between the pretest and posttest surveys and reflections.

After quantitative and qualitative data analyses, the mixed methods design allowed for

findings to be merged and explained based on how much the statistical results and content

analysis findings converged or diverged, as well as how well they were supported by theory. The

quantitative results allowed for the comparison of attitude changes after two IPE-based learning

experiences, which is valuable to IPE education and its advancement. The qualitative results provided insight into the students' perspectives and attitudes about IPCP in the presence of differing ecological factors during their unique IPE-based learning experiences. The combined results produced outcomes that were stronger than either quantitative or qualitative methodology could produce alone. This knowledge is important because students' contexts are not included often enough in IPE research, which could call into question the validity of some previously completed studies about attitudes and other IPE learning outcomes (Olson & Bialocerkowski, 2014).

Components of Proposed Mixed Methods Research Design

Definition of Terms

The research methodological definitions contained in this section will supplement the definitions of profession- and theory-specific terms and constructs located in Appendices A, B, C, and F.

Description of Variables

Because this dissertation study used both quantitative and qualitative methodologies—natural experiment and case study, respectively—the term "variable" was used with care to correctly describe the elements of interest. The essential variables and elements of interest for this dissertation study are described in this section, including how they were represented in this dissertation study. See Appendix I for a diagram of the dissertation's research design. Of note, the independent variables representing IPE-based learning experiences (identified below) were manipulated by a naturally occurring event (COVID-19 and resultant public health mandates) and not by the investigator; therefore, an appreciation for the differences between this

retrospective-type of observational study and a traditional prospective, experimental study were understood.

- *Comparison group:* OT, PT, and SLP students from Case 2018; similar to an unexposed group in epidemiology or treatment-as-usual group in health science ($N = 119$, [$n = 41$ OT; $n = 44$ PT; $n = 34$ SLP])

- *Intervention group:* OT, PT, and SLP students from Case 2020; similar to an exposed group in epidemiology or recipients of new intervention as compared to treatment-as-usual in health science ($N = 95$, [$n = 42$ OT; $n = 38$ PT; $n = 15$ SLP])

- *Dependent variable/outcome of interest*: JET classification Level 2a, attitude changes; how student attitudes changed about IPCP from pretest to posttest after completing the students' respective IPE-based learning experiences from Case 2018 and Case 2020.

- *Independent variable/variable of interest*: IPE-based learning experiences; two levels of the independent variable, which included all ecological factors present in Cases 2018 and 2020

  - *From Case 2018*: (1) IPE intervention: the three-phase, hybrid IPE learning experience with emphasis on the classroom-based workshop that occurred in April 2018; (2) Ecological factors: interprofessional students and faculty; typical progression of curricular activity, absence of pandemic

  - *From Case 2020*: (1) IPE-based learning experience: the uniprofessional, online learning experiences about IPCP that occurred in April 2020; (2) Ecological factors: uniprofessional students and faculty; atypical curricular activity; presence of COVID-19 pandemic

- *Extraneous variables*: Gender, ethnicity, age, profession, and other Person-specific

  factors are each very important in BTHD and EHP; however, these variables were not

  included in this dissertation study due to the IPE events having already occurred and an

  inopportunity for the research design to be structured for gathering this information.

Parameters and Assumptions

Parameters. The parameters (i.e., delimitations) of this dissertation study were the

boundaries in which the study occurred. The study included only the graduate-level OT, PT, and

SLP programs in Louisville, KY for a total of three participating programs. Only the OT, PT, and

SLP students' data within these programs who participated in the interprofessional, classroom-

based IPE workshop in April 2018 (Case 2018) and who participated in the uniprofessional,

online IPE-based learning experiences in April 2020 (Case 2020) were included. These two IPE

learning experiences occurred at the same time within each program's respective curricula:

before high-level clinical internships for OT and PT students (mid-curriculum) and after high-

level clinical internships for SLP students (one month before graduation).

Of note, a unique characteristic of the SLP program that requires supplemental

information was its cohort sizes in comparison to OT and PT. Because the tri-alliance had been

offering the hybrid IPE experience two times each academic year since 2016 (fall and spring),

the SLP cohort had been required to attend both events in the same academic year in attempt to

equalize the cohort sizes. After receiving consistent student feedback indicating unfavorable

opinions about the twice-a-year attendance for the SLP students, the SLP cohorts had been

divided in half after April 2018, which allowed one half to participate in the fall IPE learning

experience and the other half in the spring. This explanation describes the large difference in

SLP cohort sizes between 2018 and 2020.

As a part of each program's existing IPE objectives, outcome measures, and related professional accreditation standards, all students were required to engage in their program's collaborative IPE-based learning experiences but were invited to voluntarily participate in the pretest/posttest survey. All students who chose to voluntarily take the survey supplied a unique numerical identifier (mother's birthdate) to maintain their anonymity and were invited to complete the survey before and after their IPE-based learning experiences. All students who chose to voluntarily take the survey were requested to provide qualitative reflections after their IPE-based learning experiences. All student data remained de-identified.

Assumptions. The study begins with the following six assumptions.

- Student groups from Case 2018 and Case 2020 are assumed to be homogenous.

- Students who volunteered to complete the survey in April 2018 and April 2020 provided honest answers and thoughts.

- The ecological factors and the IPE outcomes of interest are theoretically interrelated (Bronfenbrenner & Morris, 2006).

- Persons and their Contexts are unique and dynamic (Dunn, 2017, p. 217).

- Based on the PPCT model of the BTHD and EHP framework, these conceptual structures will illuminate similar and different factors of the ecology of IPE between Cases 2018 and 2020.

- The COVID-19 pandemic and its effects on student health and wellbeing affected the likelihood of voluntary participation in the survey for Case 2020.

Summary of Mixed Methods Research

In summary, a comparative mixed methods case study was used to collect quantitative and qualitative data for comparing, combining, and then discussing multiple components of

student attitudes related to IPCP within differing ecological factors. A questionnaire variant to this mixed methods study allowed analysis of results from a pretest/posttest survey that gathered closed- and open-ended data (Creswell & Plano Clark, 2018, p. 73). The reason for collecting quantitative and qualitative data was to converge results of the two forms of data for providing greater insight into the problem than available by either type of data separately. Because the IPE-based learning experiences had already occurred, the quantitative arm of this dissertation study was natural experiment, and the qualitative arm was case study, whereby the tri-alliance students from April 2018 and April 2020 and their unique ecological factors represent the two distinct Cases to be studied.

Significance of the Study

Due to COVID-19 pandemic, opportunity to study how differing ecological factors interrelate with student engagement in IPE was made available. Just as the documentation of historical accounts from past pandemics and their effects on higher education operations have shown, "education officials need to better understand the nuances of pandemic preparedness and public emergencies" (Navarro et al., 2016, p. 415). By examining student attitude changes about IPCP through a comparative mixed methods case study design and by using theoretical models that emphasize the importance of ecology, knowledge gained from this dissertation study may assist with enhancing future IPE learning experiences that are meaningful, relevant, and reflexive with respect to planned and unplanned contextual circumstances.

Practical concerns of context under normal operating circumstances continues to be an issue with IPE. According to Kitto et al. (2013), "space and place are under-conceptualized in the health professions literature" (p. 5). Also, distal and proximal contextual factors—to include national policy and the logistics of learning activities, respectively—continue to challenge to the

progression and/or support IPE (Reeves et al., 2016, p. 664). These unique circumstances provide opportunity to create new scientific information and share insight about the interrelatedness of context with the student and the context's effects on student learning outcomes for advancing IPE curricula.

The results of this comparative mixed methods case study design provided new information about the ecology of IPE through quantitative and qualitative data analysis. Recent publications of studies about IPE are including more mixed methodology, which is in line with recommendations from the literature and this dissertation study (Reeves et al., 2016). However, even with the acknowledgement of growing quantities and quality of mixed methodology in IPE research, more mixed methods research with consistent outcome measures and the use of theoretical or conceptual frameworks are still being recommended (Boshoff et al., 2020; Reeves et al., 2016).

Chapter Summary

With the unexpected appearance of the virus named COVID-19, reactive solutions were mandated across the United States to slow the spread of the virus. As such, the ecological factors present during typical progression of higher education were disrupted. While education continued through its contextual modifications made within a very short period of time, the individual circumstances unique to the student and their interrelatedness with Context presented opportunity for understanding their dynamic exchanges in higher education, more specifically, in IPE.

Research described in this chapter was guided by appropriate theory, which permitted testing of both theoretical models. Through a comparative mixed methods case study design using a questionnaire variant, quantitative and qualitative data were obtained and analyzed to

determine confirmation and corroboration between both sources of data about the primary

outcome of interest: student attitude changes about IPCP after participating in their IPE-based

learning experiences in the presence of differing ecological factors. The following chapter will

provide a thorough literature review according to strict search methodology parameters for

locating, appraising, and synthesizing relevant research that informed this dissertation study's

research questions and methods.

Chapter 2: Review of the Literature

The purpose of this dissertation study was to compare and understand attitude changes about interprofessional collaborative practice (IPCP) in two groups of students of the tri-alliance—specifically, occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP)—after participating in different interprofessional education (IPE)-based learning experiences. These IPE-based learning experiences involved different teaching interventions that occurred in the presence of very different ecological factors at different points in time—specifically, April 2018 and April 2020.

The two tri-alliance student cohorts and their unique IPE-based learning experiences were identified as Case 2018 and Case 2020 and were studied through a comparative mixed methods case study design. Case 2018 included 119 OT, PT, and SLP students who engaged in interprofessional, hybrid IPE—with an emphasis on an in-person, on campus workshop—during typical curricular progression in April 2018. Case 2020 included 95 OT, PT, and SLP students who engaged in uniprofessional, primarily online IPE-based learning experiences in April 2020, which was during atypical and disrupted curricular progression due to the coronavirus pandemic (COVID-19).

IPE challenges (i.e., research problems) were identified from two perspectives. One perspective was related to the students of the tri-alliance and their learning outcomes about IPCP in the presence of highly complex ecological factors. The other perspective was related to the IPE knowledge base. A gap in IPE literature was identified about the effects of ecological factors, their implications on higher education (specifically, IPE and student learning outcomes), and a common theoretical base that links the two.

Research Questions

To address these IPE challenges, this dissertation informed the following primary research question and its two sub-questions:

1. For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative perspectives about IPCP after their respective IPE-based learning experiences in the presence of differing ecological factors?

    - H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show no significant nor meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and 2020.

    - H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020.

    - H_{O2}: The merged quantitative results and qualitative findings show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

    - H_{A2}: The merged quantitative results and qualitative findings show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

2. For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?

- H$_O$: There is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

- H$_A$: There is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

3. In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?

- Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

- Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

- Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

- Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

- Proposition 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for

     Cases 2018 and 2020 were perceived similarly about the value and effectiveness

     of their unique experiences on attitude changes regarding IPCP.

Bronfenbrenner's Bioecological Theory of Human Development (BTHD) was the

guiding theory for this dissertation study, and its Process-Person-Context-Time (PPCT) model

operationalized the BTHD within this mixed methods research design (Bronfenbrenner &

Morris, 2006). Additionally, Ecology of Human Performance (EHP) was the supporting theory

for interpreting outcomes of this dissertation study (Dunn et al., 1994; Dunn, 2017). Theoretical

constructs within the BTHD, its PPCT model, and the EHP were written as proper nouns to

identify when these constructs were being applied to concepts within each chapter. Use of the

BTHD, its PPCT model, and the EHP guided this dissertation study, aided in interpretation of

results, and allowed the theories themselves to be tested (J. Tudge, personal communication,

December 9, 2020). See Appendices C, D, F, and G for full definitions of these theories, their

constructs, and supporting schemas.

Addressing the gaps in knowledge and research problems began with a literature review.

The literature review is described in this chapter and consists of seven sections. The first two

sections—(a) important concepts of this dissertation study and (b) the literature search and

critical appraisal methodologies—provide evidence of due diligence for procuring appropriate

sources of literature. The next section in this chapter is the historical overview and the current

state of research, which describe relevant and current research specific to the dissertation

questions. Within these sections, relevant theories pertaining to the ecology of IPE are discussed.

The final synthesis of the literature review is provided, and implications for IPE research are

introduced. Lastly, this chapter concludes with a summary of the literature review results and prepares the reader for the following chapter, Methodology.

Important Concepts Informing the Literature Search Methodology

The concepts described in this section consisted of the key words and descriptors that were used as search terms for effectively locating relevant information. Each concept in this list included a brief justification for inclusion, as well as providing exclusion criteria. The definitions provided in Appendices A, C, and F should be referenced as needed while reading the concepts included in this list.

Interprofessional Education (IPE)

IPE was the primary topic (i.e., concept) of this dissertation. As the primary topic, IPE served as the foundation upon which the literature search began. Interprofessional practice, interprofessional leadership, interprofessional advocacy, and other interprofessional collaborative actions as the primary topic of research or discussion in an article were excluded.

Ecology of IPE

These concepts reflected theoretical categorization that were necessary for inclusion to accurately locate pertinent information reflecting the purpose of this research. Three categories of concepts were included in the literature search methodology: students of the tri-alliance, IPE contexts, and pandemics.

Students of the Tri-Alliance

All evidence-based and evidence-informed articles were required to include pre-qualification students of OT, PT, and SLP professional programs; therefore, students of the tri-alliance, along with the topic of IPE, were considered two of the three primary concepts for any article's inclusion in this literature review. Due to international educational variations for

professional programs of study, undergraduate and graduate professional programs were included for the literature review. Articles that did not include all three professional programs were excluded. Articles that included only students from pre-professional programs, post-graduation, or post-qualification were excluded.

IPE Contexts

The following concepts were searched using terms commonly found in the literature that were also supported by the definitions of context in the fourth edition of the *Occupational Therapy Practice Framework* (OTPF-4; American Occupational Therapy Association [AOTA], 2020a). The use of the word "versus" implies that there was a comparison between the two concepts. Additionally, the concepts in the following two subcategories were relevant to the ecological factors within this dissertation study.

Interprofessional Versus Uniprofessional. These concepts identified the social Contexts in which students of the tri-alliance learned. For this search, the term "interprofessional" meant that students from all three professions were participants in the study or topic of discussion. Other terms used for literature searching were interdisciplinary, multidisciplinary, and team-based learning. Additionally, the term "uniprofessional" as it related to this search meant that students of these professions studied the concepts of IPCP independent from any other profession. "Silo" was another commonly used term also included in this search. Studies that did not include either of these concepts and related terms as they pertained to pre-qualification education were excluded because these concepts were linked to IPE as a primary topic.

Classroom-based Versus Online Learning Experiences. These concepts reflected the physical, social, and virtual Contexts in which IPE learning experiences may occur that were

relevant to this dissertation study. "Face-to-face" or "in-person" descriptors were often included with classroom-based IPE. The term "didactic" included both classroom-based and online IPE learning experiences, and terms like "workshop," "seminar," or "modules" may describe the didactic IPE method. Due to the limited number of articles available within the previously described parameters, studies that included other contexts (e.g., clinic-, hospital-, or community-based; simulation; virtual reality; etc.) were included for appraisal of relevant information to inform this literature review.

Other Ecological Factors

Other ecological factors related to higher education, specifically IPE, were included in the literature search. However, the terms "context" and "environment" were more commonly used in the literature. Additionally, because this dissertation study included the COVID-19 pandemic and was relevant to the ecology of IPE in 2020, pandemics—which create disturbances to ecological factors within higher education and most other aspects of society—were included in this literature search. Due to the relevance of these concepts to this dissertation study, "context," "environment," "pandemic," and "global health crisis" were terms included in the literature search. To maintain focus on these concepts, the two exclusion criteria applied to this subcategory were (a) if the article did not include focus on Contexts, environments, or ecology in higher education or (b) if documented health crises were not identified as pandemics by the World Health Organization (WHO). Lastly, final selection of the articles included in this literature review were assessed based on content relevance about ecological factors, after the primary concepts were met.

Attitude Changes About IPCP

To correctly apply the terminology provided by the Joint Evaluation Team (JET) classification of IPE learning outcomes about attitude changes, a Level 2a outcome, articles that contained studies or discussions about IPE and changes in student attitudes were included. Studies that measured or discussed Level 1 or Level 2b through Level 4b learning outcomes without Level 2a outcomes were excluded. Therefore, the concept of student attitude changes about IPCP was the third of three primary concepts required to be included in all articles appraised for this literature review.

Interprofessional Attitude Scale (IPAS)

The IPAS was the instrument included in this search methodology for locating applicable studies closest to this dissertation study; however, any attitude measurement tool that was used in previous research was included for review. Additionally, due to the limited number of articles available within the previously described parameters, studies that did not include the name of an instrument to measure attitude were included. Studies that did not include attitude as a topic or outcome of interest were excluded, which was in alignment with the concept of "attitudes about IPCP" previously described in this section.

Theory

This dissertation study was heavily reliant on ecology-based theory to guide its research and to make logical conclusions. "Theory," "framework," and "model" were used as interchangeable search terms, including specific searches for the BTHD and EHP, as well. However, due to the documented lack of theoretical underpinnings in IPE research, articles that fulfilled earlier parameters for this dissertation study—specifically (a) IPE-relatedness, (b)

students of OT, PT, and SLP, and (c) attitude changes about IPCP—were included for review, with or without mention of theory (Olson & Bialocerkowski, 2014).

Research Designs

To locate articles relevant to this dissertation study, search terms, such as "mixed methods," "natural experiment," and "case study," were included. However, due to the mix of literature about IPE, relevant articles also included discussions or descriptions of best practices, as well as research studies. Therefore, due to the limited number of articles available within the previously described parameters, studies that did not include a research methodology were included for purposes of locating useful information to inform components of this dissertation study.

Summary of Important Concepts

Several important concepts were included to inform this dissertation study's literature search methodology. The primary concepts that were required to be included in any article selected for this literature review were (a) the articles must be about IPE, (b) the articles must include pre-qualification students of the tri-alliance, and (c) the learning outcomes must include changes in attitudes related to IPCP. No articles were included that did not include these three inclusion criteria. The other concepts of interest included in this search methodology increased level of applicability to inform this dissertation study; however, absence of these concepts did not automatically exclude them from this literature review. As such, their absence was noted as they applied to the review and synthesis of concepts toward the end of this chapter. See Appendix J, Table J1 for a summary of inclusion and exclusion criteria based on important concepts described throughout this section.

Search and Critical Appraisal Methodologies

Search Methodology

The search strategy included using the primary concepts for the literature search

methodology described in the previous section for locating articles that satisfied each of the

inclusion criteria. Each study was required to be about IPE and include students of the tri-

alliance and IPE learning outcomes related to attitude changes about IPCP. Once searching for

literature with these three primary search criteria was complete, then each concept of interest was

searched in conjunction with the results from the primary search. For example, searches for IPE

and students of the tri-alliance as individual concepts (and their related search terms) produced

11,928 hits and 121 hits in EBSCO, respectively, and 4,297 hits and 64 hits in ProQuest,

respectively. When combined with the search term "attitude*," these three concepts produced 14

hits in EBSCO and six hits in ProQuest upon first attempt.

In addition to identifying inclusion and exclusion criteria, other limiters and strategies

assisted with completing this first practical screen of the literature. Due to the narrowness of the

inclusion criteria relevant to this research topic, all dates of publication were included. The

English language limiter was applied to all primary and secondary studies, theoretical literature,

discussion-based articles, program evaluations, gray literature, etc. that were considered for

review. Online library databases available through Nova Southeastern University (NSU) were

utilized, specifically all EBSCO and ProQuest databases due to the content of this research topic

and questions that spanned health care, education, environment, context, and ecologically-related

areas. Utilization of advanced literature search strategies within these databases, like Boolean

operators, truncation, and database-specific thesauri, assisted with locating topical articles.

Additionally, authority agency websites, like the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and Interprofessional Education Collaborative (IPEC), as well as interprofessional education and research-specific journals, were searched to perform due diligence and completeness of the search strategy. Lastly, Internet-based search engines, like Google and Google Scholar, were used to explore and locate other resources if other relevant articles were not included in the search results from the previous attempts. Database search alerts were created to inform about newly published articles that underwent immediate screening for inclusion. Periodic literature searches continued and expanded newly learned concepts during the review process. Table 1 provides an outline of the main stages of searching that informed this literature review and were influenced by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) principles for systematic reviews and meta-analyses (Moher et al., 2009).

Table 1

Literature Search Methodology Flow

Stage of Literature Search	Results
Identification	Records identified through database and other Internet-based searching for all concepts ($n = 294$)
Practical Screening	Records screened relevant to IPE and students of the tri-alliance, after duplicates removed ($n = 121$)
Methodological Screening for Eligibility	Full-text articles assessed for eligibility of all three primary concepts ($n = 28$)
Included in Literature Review	Studies included for synthesis ($n = 21$) (*6 for history; 15 for current state of research*)

Critical Appraisal Methodology

Beginning with the 121 articles from the practical screen, a methodological screen guided the critical appraisal process of these selected articles for eligibility of inclusion. During the rapid critical appraisal of these articles, the level and quality of evidence of each article, as well as applicability to the primary concepts, were investigated for selecting the best articles to inform this research. The Johns Hopkins Nursing Evidence-Based Practice model (JHNEBP) was used to inform this step of the critical appraisal (Dang & Dearholt, 2017). See Appendix K for a description of the JHNEBP model levels of evidence. Additionally, all studies underwent an assessment of their overall strength and applicability to this research topic. The following four-step process influenced by Reeves et al. (2017) provided structure for the review and synthesis processes:

1. Familiarization: Reading, re-reading, and organizing the literature to obtain an in-depth understanding of their contents.

2. Initial synthesis: Organizing and reporting the literature through the following sub-processes: (a) identify historical versus current research; (b) determine relevance to primary concepts; and (c) assess inclusion of contexts, environments, and ecological factors.

3. Secondary synthesis: Comparison of study methodologies and reporting to appraise the level and quality of evidence of historical and current research.

4. Final synthesis: Combination of the findings from the previous two steps, which allows for a synthesis of key themes. This step is provided within the section, "Final Synthesis and Implications for IPE Research," of this chapter.

Summary of Search and Critical Appraisal Methodologies

By beginning with a structured search methodology and practical screening process, 121 articles were included for rapid critical appraisal. Upon conclusion of the rapid critical appraisal, 28 articles studies were selected for a focused methodological screen. After performing a methodological screen of these selected articles, a structured process for analyzing and synthesizing the literature led to the final inclusion of 21 articles for this literature review: six secondary research studies informed the historical overview, and 15 primary research studies informed the current state of research. Of note, although literature reviews are recommended to consist of primary research sources when possible, the inclusion of secondary research was intentional because of the limited number of applicable studies that contained the three primary inclusion criteria and because secondary research sources included studies that were relevant to this historical overview (Roberts, 2010, pp. 95-96).

Historical Overview and the Current State of Research

A growing body of IPE knowledge is being published and has produced hundreds of articles to screen and appraise. As such, valuable information from all levels of evidence informed this literature review. Secondary research was selected to inform the historical overview relevant to the dissertation study. These selected systematic and scoping reviews provided a comprehensive overview of background information pertaining to the primary concepts, as well as context and environments related to IPE. The section following the historical overview includes primary studies that provided knowledge about the current state of research.

Historical Overview of Topic

With no limit placed on date of publication due to the narrowness of the primary concepts required for inclusion (i.e., must be about IPE, must include pre-qualification students of the tri-

alliance, and must report attitude changes about IPCP), six secondary research articles published

from 2014 to 2020 provided a relevant historical overview of published knowledge that included

some concepts that were applicable to this dissertation study. The article publication dates within

these reviews ranged from 1995-2017.

Overview of Selected Secondary Research (Initial Synthesis)

The initial synthesis of the secondary research selected for this literature review, which

included four systematic reviews, one scoping review, and one literature review, allowed

opportunity to determine the relevance of each review to the primary concepts included in this

dissertation study. The initial synthesis of secondary research also assessed the extent to which

ecological factors were included in these articles. Each of the six reviews was about IPE and

included assessment of attitude changes as a related learning outcome (Boshoff et al., 2020;

Brack & Shields, 2019; Eidson et al., 2018; Hean et al., 2018; Olson & Bialocerkowski, 2014;

Reeves et al., 2016). Three of which referred to the JET model and/or its authors (Brack &

Shields, 2019; Olson & Bialocerkowski, 2014; Reeves et al., 2016).

Each review included students from the tri-alliance, but only one specifically focused on

students of the tri-alliance and identified them as such (Eidson et al., 2018). Two other reviews

specifically focused on allied health professions (Boshoff et al., 2020; Olson & Bialocerkowski,

2014). The remaining three reviews included students from any health or social care professional

program (Brack & Shields, 2019; Hean et al., 2018; Reeves et al., 2016). Boshoff et al. (2020),

Olson and Bialocerkowski (2014), and Reeves et al. (2016) identified that medical and nursing

students were more commonly reported or the focus of IPE literature than allied health. Each

review focused on pre-qualification students as the targeted recipients of IPE, but one included a

mixture of pre- and post-qualification students (Reeves et al., 2016).

Each review included discussion about contexts and environments, but not equally in quantity, quality, similarity of concept, nor ecological factors. Contexts and environments were mostly used to describe a place where learning occurs, like university-, simulation-, clinic-, or practice-based IPE (Boshoff et al., 2020; Eidson et al., 2018; Olson & Bialocerkowski, 2014; Reeves et al., 2016). A theme among these reviews included the implementation of a wide variety of IPE teaching strategies within a variety of learning contexts (Boshoff et al., 2020; Eidson, 2018; Olson & Bialocerkowski, 2014; Reeves et al., 2016). Hean et al. (2018) referenced context as it applied to theory and theoretical application of pedagogy, but not to ecology nor other relevant ecological factors.

Three of the six reviews expanded on the concepts of context and environment and were better aligned with this dissertation study. Reeves et al. (2016) appraised studies that included student characteristics (i.e., demographics, work experience, professional background, stereotypes, attitudes, willingness, professional socialization), teacher characteristics (i.e., quality of facilitation and faculty preparations), and the IPE context (i.e., logistics, finances, policy, organizational support, and quantity of professions and their students; pp. 659-661). This expansion was through the application of Bigg's 3P model (presage [context]-process [teaching]-product [learning outcome]), which was applicable to some of the constructs within the BTHD and EHP (Reeves et al., 2016). Olson and Bialocerkowski's (2014) criteria included similar IPE contexts and teacher and student characteristics for inclusion in their review but did not reference the 3P model. Brack and Shields (2019) included the temporal factors by studying the effectiveness of short duration, practice-based IPE learning experiences.

Between these three systematic reviews, the authors identified the following outcomes that were relevant to this dissertation study. Student attitudes have become more positive about

IPCP; however, this evidence has been commonly produced from self-reported data, and the

degree of actual change versus perceived change cannot be determined (Olson &

Bialocerkowski, 2014; Reeves et al., 2016). Organizational and institutional support was

necessary to navigate the contextual factors that commonly influence, enable, or impede IPE

initiatives (Reeves et al., 2016).

Additional contextual factors influencing IPE were numbers, types, and existing mindsets

of students and their professions; demography and other student and facilitator characteristics;

the authenticity of the IPE learning experience; the duration of IPE learning experiences; and

geography where IPE occurs (Brack & Shields, 2019; Olson & Bialocerkowski, 2014; Reeves et

al., 2016). However, Olson and Bialocerkowski (2014) pointed out that socio-economic

background and culture were not included in the studies within their review (p. 242).

Additionally, Brack and Shields (2019) reported about the importance of determining the level of

the student when selecting IPE activities (p. 452). These two student-specific details were

relevant to the BTHD's Process-Person-Context-Time (PPCT) model, specifically Proximal

Process and Person constructs, as well as to the EHP's Person factors, which are necessary for

understanding the complete IPE experience.

Among these initial findings, evidence about the interrelatedness of these contextual

components was limited due to their inconsistent findings within studies (Olson &

Bialocerkowski, 2014; Reeves et al., 2016). This meant that there was limited ability to conclude

what mode of IPE worked for whom and in what circumstances (Olson & Bialocerkowski, 2014,

p. 243). Lastly, theory has been reportedly underutilized to guide or inform IPE, which may

explain one reason for the limited inclusion of contextual components (Hean et al., 2018, p. 542;

Olson & Bialocerkowski, 2014, p. 243; Reeves et al., 2016, p. 662). Of note, no selected article

included larger external ecological factors (e.g., societal expectations, political influences, etc.) within their reviews, especially not related to pandemics nor health crises.

Critical Appraisal of Selected Secondary Research (Secondary Synthesis)

Although secondary research is intended to be rigorous, limitations inherent to systematic reviews must be recognized, and even more so with literature reviews. Each review included outlined processes for their systematic approaches to appraisal and/or summary. However, the accuracy of the information was dependent on the consistency and objectivity of the authors' judgment and appraisal of the literature selected for their reviews.

Based on the JHNEBP model, four of the six secondary research articles were rated Level III-A evidence (Eidson et al., 2018; Hean et al., 2018; Olson & Bialocerkowski, 2014; Reeves et al., 2016). These levels of evidence were assigned due to the blend of study selections included in these reviews that consisted of varying levels and quality of evidence. The remaining two articles were rated Level V-A evidence because of the researchers' chosen research aims, which informed their research (Boshoff et al., 2020; Brack & Shields, 2019).

From the perspective of content relevant to this dissertation study, Brack and Shields (2019), Olson and Bialocerkowski (2014), and Reeves et al. (2016) emphasized contexts and environments and appeared to provide the most applicable historical overview. Brack and Shields (2019), Olson and Bialocerkowski (2014), and Reeves et al. (2016), acknowledged a need for longitudinal and mixed methods research. They described a need to study longer-term outcomes of IPE and to collect quantitative and qualitative data through more rigorous study designs for building a larger body of knowledge and specifically to better understand the contextual complexities surrounding IPE.

Summarized Results of Secondary Research

The selected secondary research articles for this literature review provided a relevant historical overview of IPE research as they pertained to the essential concepts of this dissertation study. In summary, student attitudes about IPCP were usually positive; IPE outcomes were less frequently reported about students of allied health than traditional medical professions; a variety of IPE teaching methods have been utilized in a variety of teaching/learning contexts; and theory was minimally used to guide research or IPE teaching. Although each of these secondary research articles was selected based on how it met the three primary concepts/inclusion criteria, each was rated Level III evidence or lower in strength and quality. Additionally, only three of the six articles appeared to be the most applicable to this dissertation study based on how the authors' reported contextual and environmental factors beyond a place for learning (Brack & Shields, 2019; Olson & Bialocerkowski, 2014; Reeves et al., 2016). Despite the applicability of these reviews, only two of the three pertained to pre-qualification students of allied health professions, and none fully informed this dissertation study's research questions about student attitude changes related to IPCP in the presence of varying ecological factors.

Current State of Research

Due to the most recent applicable conditions that had potential for informing this dissertation study having occurred from the Swine Flu of 2009, primary studies published from 2009 through the present were considered current. That being said, the range of articles selected for this section were published from 2013 through 2020. There were 15 primary studies and original articles selected to inform the current state of research related to this dissertation study.

Overview of Selected Primary Research (Initial Synthesis)

Each publication selected for this section included the three primary concepts relevant to this dissertation study (i.e., about IPE, included students of the tri-alliance, and reported attitudes changes). The current state of research was organized, appraised, and synthesized by the other important concepts described in Appendix J, Table J1: (a) IPE contexts (i.e., interprofessional versus uniprofessional learning experiences and classroom-based versus online delivery of IPE), (b) ecological factors, (c) outcome measures, (d) research designs, and (e) theory.

Interprofessional Versus Uniprofessional Learning Experiences. Seven of the 15 articles selected to inform this section included content about uniprofessional learning experiences in addition to IPE (Black et al., 2016; Brewer & Flavell, 2020; Brewer & Barr, 2016; Jernigan et al., 2016; Sincak et al., 2017; Thompson et al., 2016; Vanier et al., 2013). IPE has been reported to make more conceptual sense to students when learning in interprofessional contexts, which may affect carry-over into other interprofessional and uniprofessional interactions (Brewer & Flavell, 2020). Additionally, Black et al. (2016) reported that team-based IPE outcomes appeared to be congruent with uniprofessional teaching methods (p. 21). However, Sincak et al. (2017) found that the longevity of outcomes may wane when IPE is introduced early in the curriculum and not followed up later in future courses that may be taught uniprofessionally (p. 6).

However, none of these articles included studies about the effectiveness of one method over the other for determining best practices of IPE education. In fact, some studies documented that health professions education is traditionally provided in "profession-specific silos" or within separate training programs, which may contribute to the perpetuation of uniprofessional education and research (Thompson et al., 2016, p. 754; Vanier et al., 2013, p. e105).

Additionally, Brewer and Barr (2016) identified that comparisons of interprofessional to uniprofessional placements has been limited (p. 748). They also made the point that uniprofessional education is necessary for students to meet profession-specific learning outcomes, to include developing profession-specific identities, as well as interprofessional outcomes (p. 750).

Classroom- Versus Online-Based IPE. Five articles included mention or study of online IPE learning experiences, and 10 included classroom-based IPE. Of these, four articles included both as topics (Beverly & Wooster, 2018; Black et al., 2016; Jernigan et al., 2016; Sincak et al., 2017). Each of these studies included either a brief mention or a full study about the use of online technology for IPE. Sincak et al. (2017) reported about transitioning an online learning experience to a live, interprofessional course, and Beverly and Wooster (2018) described an IPE experience that was entirely online due to conflicting schedules prohibiting live IPE. Both reported success with their efforts. An additional report of online-based IPE was in preparation for upcoming IPE learning experiences and for gathering evaluation data via surveys (Beverly & Wooster, 2018; Black et al., 2016; Jernigan et al., 2016; Sincak et al., 2017).

Much like interprofessional and uniprofessional learning experiences, neither classroom- nor online-based IPE was identified as being superior to the other. By assessing the nature of its reported use, online technologies appeared mostly to be a means to an end for either preparing students in an early phase of IPE or gathering evaluative data (Beverly & Wooster, 2018; Black et al., 2016; Jernigan et al., 2016; Sincak et al., 2017). Additionally, it appeared that online technology was selected because in-person IPE was not feasible due to logistical challenges and because transitioning to live IPE was pursued as the next phase in progression (Beverly & Wooster, 2018; Sincak et al., 2017).

Contexts and Environments. The concepts of "contexts" and "environments" appeared to describe the physical features about where IPE took place or other teaching/learning IPE delivery methods. Seven of the 15 articles representing the current state of research included mention of or specifically reported studies about practice-based IPE (Brewer & Barr, 2016; Brewer & Flavell, 2020; Brewer et al., 2017; Manspeaker et al., 2019; Paul et al., 2019; Sincak et al., 2017; Thompson et al., 2016). Specifically, Brewer and colleagues advocated for interprofessional placements or practice-based IPE due to the outcomes of their quantitative and qualitative studies (Brewer & Barr, 2016; Brewer & Flavell, 2020; Brewer et al., 2017). Additionally, four studies either described or provided analyses about simulation as an IPE learning experience to include standardized patients, virtual reality, patients-as-trainers, and mannequins (Sincak et al, 2019; Thompson et al., 2016; Vanier et al., 2013).

Whether directly studied or simply mentioned, teaching/learning contexts have been included in IPE research in small or large capacity. While each of these contexts informed the general topic about IPE and how they affected attitude changes among many students—including students of the tri-alliance—the extent to which this important concept was studied did not include the ecological factors of interest as described by the BTHD nor EHP. This analysis was the same for the preceding context-based subsections. This emerging issue about the absence of ecological factors received an individual analysis at the conclusion of the "Historical Overview and the Current State of Research" section.

Outcome Measures. A variety of outcome measures from quantitative-specific or the quantitative portions of mixed methods studies have been reported, and two of the 15 articles selected for this portion of the literature review included use of the Interprofessional Attitude Scale (IPAS). Including the IPAS for measuring attitude changes in students of the tri-alliance

was important due to this instrument being the outcome measure used for this dissertation study. King and Violato (2020) reported experiencing challenges with the usefulness of the IPAS for longitudinal data collection with large cohorts, specifically reporting a ceiling effect (p. 5). However, Pechak et al. (2018) reported significant increases in attitudes, but their study was short-term with a smaller cohort. Additionally, Pechak et al. (2018) combined the IPAS with another popularly used outcome measure, Readiness for Interprofessional Learning Scale (RIPLS), for purposes of achieving their study's intended outcomes.

Research Designs. Similar to outcome measures, a variety of quantitative, qualitative, and mixed methods studies were employed within the 15 studies selected for this section. Specific to this dissertation study, four studies included mixed methods research designs; one study indicated it was a case study; and no studies included use of natural experiments (Brewer et al., 2017; Jernigan et al., 2016; Manspeaker et al., 2019; Paul et al., 2019; Sincak et al., 2017). Although each study included attitude changes and other JET student learning outcomes, they mostly differed on other IPE outcomes thereafter. In reference to the BTHD and its PPCT model, Jernigan et al. (2016) and Sincak et al. (2017) reported on Microsystem and Person-related IPE influencers, specifically student factors and characteristics, but beyond this similarity, each study reported a variety of ecological influencers; again, none were similar in findings. None appeared to directly report on Macrosystem factors per the BTHD definition, like national policy or cultural implications. Of the four mixed methods studies, Sincak et al. (2017) included the most applicable ecological factors specifically related to the operations of education, including IPE learning experiences (lectures, small groups, simulations), context/environment (college credit course, classroom-based, online, and simulation center), adequate university resources and support, and other contextual influencers, such as curricular factors. However, the inclusion of

these relevant ecological factors within their mixed methods study design still left a gap about other relevant ecological factors necessary to inform this dissertation study.

Theory. Although some authors appeared to identify the inconsistent use of theory, conceptual models, or frameworks as a limitation of IPE, 13 of the 15 articles selected for this section of the literature review included one of those three grounding items in some capacity. The purposes for use of a theory, model, or framework ranged from a single mention to active use throughout research. For instance, Singh et al. (2019) identified that the framework of Transformative Learning Theory was useful for guidance with IPE simulation learning experiences, but the study did not include detail of this theory's use beyond the literature review (p. 2).

Some studies reported use of the competencies within the Canadian Interprofessional Health Collaborative (CIHC) or the Interprofessional Professions Education Collaborative (IPEC) that guided IPE interventions (Doucet et al., 2014; Jernigan et al., 2016; Pechak et al., 2018; Sincak et al., 2017; Vanier et al., 2013). Along those lines, Beverly and Wooster (2018) and Black et al. (2016) based their IPE learning experiences being studied on the Team-Based Learning method. King and Violato (2020) used the Experiential Learning Theory, and Brewer et al. (2017) used the Community of Practice Theory. Both theories were used to ground the authors' IPE programs being studied. Thompson et al. (2016) applied Contact Theory to explain the positive results of their study (p. 760). Whereas Brewer and Flavell (2020) described their qualitative research being grounded in constructivist-based theory, and Brewer et al. (2017) employed Bigg's 3P model to guide their exploratory case study.

Despite the frequency with which theory, frameworks, or conceptual models were reported within these primary research articles, most were about the process of teaching and

learning, and only one study included a theory that highlighted context: the 3P model. None were inclusive of the individual students; the internal, proximal, and distal contexts within and around the students; nor their interactions or interrelatedness as a part of a system. According to Hean et al. (2018), "Group and systems-level theories may provide the sophisticated theoretical justifications that the interprofessional field requires to propel itself forward" (p. 555). A gap in IPE theory was present in the literature for using theory to guide and be tested within research that emphasized the importance of the ecology of IPE.

Of note, no articles about IPE were located that reported use of the current, mature version of Bronfenbrenner's theory, the BTHD, nor the EHP. Only one journal article related to IPE was found that included Bronfenbrenner's original theory, Ecological Systems Theory; however, its application to IPE was inconsistent with the mature version of his theory, the BTHD (Bluteau et al., 2017; Bronfenbrenner, 1979; Tudge et al., 2009; Tudge et al., 2016). Additionally, the EHP framework has been applied to IPCP, but no articles included any of the primary inclusion criteria for this literature review. This dissertation study was the first to incorporate the mature BTHD and the EHP into IPE research.

Critical Appraisal of Selected Primary Research (Secondary Synthesis)

The research designs reported in the selected primary studies and articles for the current state of research varied from quasi-experimental to program evaluation. As such, their levels of evidence per the JHNEBP levels were from II to V, and their quality of evidence was primarily rated high (A) to good (B). Focusing specifically on the mixed methods studies due to their applicability to this dissertation study, their study designs were each level II, and three of the four were of high quality. Their sample sizes ranged from 12 to 275 students, and their specific quantitative arms within the mixed methods designs were quasi- to weak experimental,

specifically two longitudinal studies, one pilot study, and one retrospective study, each used

pre/posttest survey data (Jernigan et al., 2016; Manspeaker et al., 2019; Paul et al., 2019; Sincak

et al., 2017). Each of these four mixed method studies employed written narrative responses to

questions with thematic analysis for their qualitative arms, and one also included video

observation of group interactions (Sincak et al., 2017).

Although the strength of evidence of the mixed methods study designs was good, only

one was the most applicable to ecological factors surrounding IPE. Sincak et al. (2017) appeared

to include all of the primary concepts and most of the other important concepts related to this

dissertation study. Although the response rate was small (783 students enrolled in the IPE

program; 130 students who completed all three time points of survey evaluation; 16.6% response

rate), student feedback was overall positive about IPE with the most common positive feedback

being about meeting students from other professions and the most common negative feedback

being about the time of day the course was offered. These outcomes of this published study were

useful for highlighting the importance of many ecological factors students of IPE may

experience.

Summarized Results of the Primary Research

Fifteen of the 21 articles selected for this literature review informed the current state of

research as it applied to this specific dissertation. In addition to meeting the primary inclusion

criteria, most articles included components of context, as well as theory, framework, or

conceptual model application. The results of these studies included multiple JET learning

outcomes, other indicators of IPE effectiveness and shortcomings, as well as other influencing

factors. Quasi- and non-experimental studies and non-research reports were included for

appraisal. Four of the 21 articles were mixed methods and were highlighted within this appraisal

due to their applicability to the research topic. Per the JHNEBP, these mixed methods studies were considered level II evidence; however, the designs included at this level had varying amounts of control, which meant varying levels of validity and reliability. Even though Sincak et al. (2017) published what appeared to be the best suited study to inform this dissertation study, it was still absent of the *specific* ecological factors being sought. Due to the varying strength of primary research within this literature review, as well as their limited applicability to this dissertation study, a gap in the literature remained.

Summary of Historical Overview and the Current State of Research

Twenty-one articles consisting of primary and secondary research, nonexperimental research, and non-research were selected to inform this literature review. The historical overview provided perspective about past IPE research pertaining to this dissertation study, upon which the current state of research was framed. Based on the outcomes of the historical overview and the current state of research, IPE appeared to be effective, but there were limitations with understanding "what works, for whom, [and] in what circumstances" (Olson & Bialocerkowski, 2014, p. 242). Numerous and complex ecological factors have challenged the full understanding of IPE, and an important ecological factor related to this dissertation study remains unexplored and has become an emerging issue that warrants attention: pandemics in higher education.

<div align="center">

Emerging Issue

</div>

No studies were found to have the three primary inclusion criteria for this literature review (i.e., about IPE, included students of the tri-alliance, and measured attitude changes) that also included relevant theoretically defined ecologic factors, specifically pertaining to global health crises. At this point, this aspect of the dissertation had not been informed nor provided with direction. As such, reviewing literature that had broader focus on higher education and

included some degree of relevancy to pandemics was a necessary leap in order to connect the two disparate concepts of IPE and pandemics for completing this literature review and synthesis.

Using NSU's online library EBSCO databases with the search terms "interprofessional education" and "pandemic," two relevant articles were located. Both described an IPE intervention that was a team-building game called Pandemic™; however, neither article was a research study nor was directly applicable to the way pandemics were included in this dissertation study (McCave, 2016; Edler et al., 2018). After changing the search term from "pandemic" to "disaster," two more articles were located that included IPE. Livingston et al. (2016) described an IPE event called "Disaster Day" where students from medical and allied health professions collaborated—physical therapy was the only tri-alliance program—and worked together during a one-day simulated disaster. Similarly, Kim et al. (2017) conducted a mixed methods study that included students from nursing, pharmacy, medicine, and allied health professions—allied health was undefined—who engaged in a one-day IPE event that had disaster- or trauma-based simulated stations including, but not limited to, mass casualty triage, hazardous material decontamination, and resuscitations (p. 12). Although these articles reported positive outcomes because of their IPE events, both were about simulated crises, and neither included real health care crisis situations.

In effort to locate specific research about higher education and pandemics, three articles were selected that provided insight into this dissertation study despite not meeting any of the primary inclusion criteria. Guh et al. (2011) and Mitchell et al. (2011) published two separate but related quantitative studies about the 2009 H1N1 influenza outbreak (the Swine Flu) at the University of Delaware, which was the first documented university outbreak during this pandemic. Based on these studies' results, approximately half of the total survey respondents

reported following self-protective, hygiene-related, non-pharmaceutical interventions (NPI); however, very few reported practicing isolation measures and social distancing (Guh et al., 2011, p. S137; Mitchell et al., 2011, p. S143). According to a qualitative study by Davis et al. (2019), students participated in focus group discussions, and themes included general complacency and lack of preparedness related to pandemics, as well as other disasters (p. 40).

All three studies included recommendations for improved pandemic preparedness and public health education under the leadership and guidance of university administrators and faculty; however, the authors included that students must also take an active role in their own health and safety during outbreaks (Davis et al., 2019; Guh et al., 2011; Mitchell et al., 2011). Previous literature published by the CDC about university pandemic preparedness had been primarily about influenza; however, current literature and online resources reflect the COVID-19 pandemic (CDC, n.d.).

Final Literature Synthesis and Implications for IPE Research Literature Synthesis

After reviewing each of the 21 articles that met the primary concepts and other important concepts and seeking relevant literature related to higher education and pandemics, this literature synthesis compared, contrasted, and merged the information into a coherent whole. Plentiful literature exists about interprofessional education and attitude changes related to IPCP; however, literature significantly decreased in quantity when searching for relevant articles that included all three professions of the tri-alliance. Figure 3 illustrates this issue through a color-coded pie chart that quantifies pertinent articles found during the searching process that pertained to this dissertation study.

Figure 3

Journal Articles Specific to IPE and the Tri-Alliance

Legend:
- Tri-Alliance (specifically): 2
- Tri-Alliance (with other professions): 19
- Methodological Screening: 28
- Practical Screening: 121
- Relevant Articles: 294
- IPE and Attitudes: 2,254
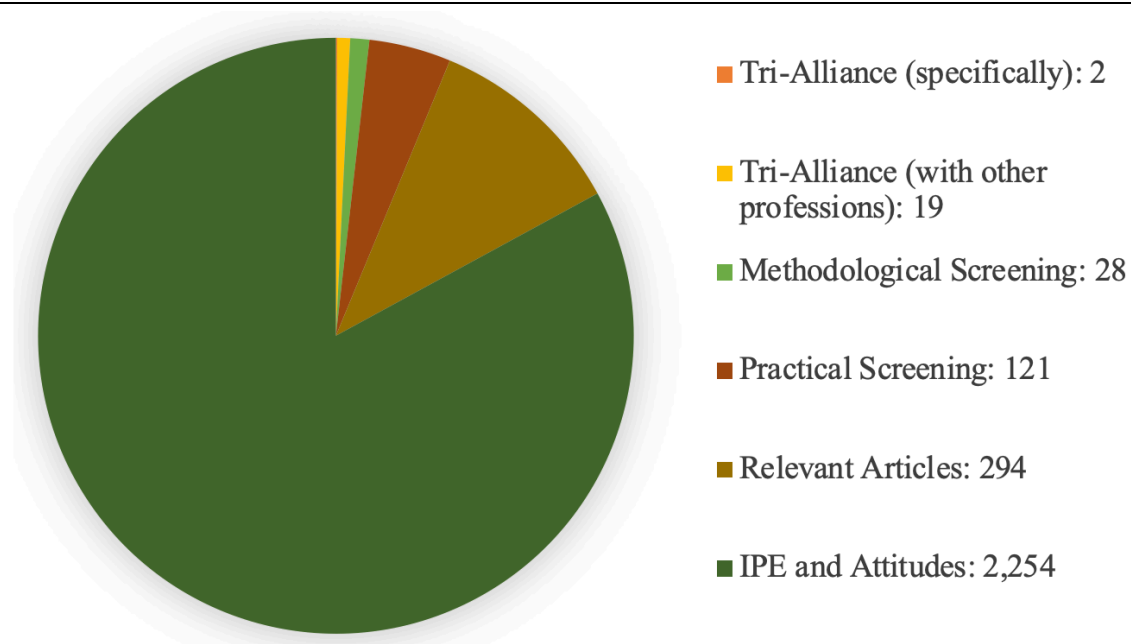
Note. See Appendix L, Figures L1-L5 for other illustrations that visually represent the findings of this literature synthesis.

Out of the 21 articles selected for this literature review, six were related to secondary research for the historical overview, and the remaining 15 were primary studies or relevant non-research articles. Four of the primary studies were mixed methods, which matched the design for this dissertation study, and one primary research article was an exploratory case study. However, no articles included natural experiments; in fact, no IPE articles at all were found containing natural experiments. Lastly, only two studies included use of the IPAS, which was the selected instrument for this dissertation study.

The quality and strength of evidence for the sum of these articles were good; however, their levels of evidence varied from Level II (quasi-experimental research) to Level V (non-

research) according to the JHNEBP model. Along these lines, the sample sizes varied from very small to very large, and sample sizes are one way of grading the quality of a study due to its effect on validity. While there were no randomized controlled trials to include in this literature review (Level I evidence), some authors questioned the applicability of this type of experimental design to IPE (Olson & Bialocerkowski, 2014, p. 243).

The synthesized outcomes of these studies were described by the positive effects related to IPE, shortcomings of IPE, and influencers (i.e., enablers or barriers) to IPE. These outcomes were not all inclusive of all IPE literature, but they were inclusive of the 21 articles selected for this literature review. Summative positive effects from this literature review showed that attitudes and other JET learning outcomes continue to be mostly positive after IPE learning experiences; IPE is generally effective; and the use of theory, mixed methods, and qualitative studies is increasing.

Several articles reported that methodological rigor remained low, especially with the frequent use of self-reported outcomes. Additionally, there has been an inconsistent use of validated outcome measures and lack of outcomes data about the long-term effects of IPE. Of note, three of the studies reported that there has been a limited number of studies about allied health professions, especially about students of the tri-alliance, because many IPE studies have targeted students of medical professions. Lastly, there appeared to be limited information about other ecological factors, such as student-specific characteristics beyond age, gender, and profession; the perception or presence of hierarchies within professions and professional programs; and about the economic value of IPE.

The influencers of IPE included in the selected literature were wide ranging and varied. In alignment with the shortcomings, approximately 11% of the studies identified influencers that

were related to how limited attention is given to student-specific factors, which may be a barrier to fully understanding how to best provide IPE learning experiences. Applying these results to PPCT model in the BTHD, this influencer is an example of Proximal Processes and Person elements in the Microsystem, which facilitate student Development.

Other Micro- and Mesosystem elements were included in approximately 37% of the studies, which included items to include educator characteristics, IPE-related vocabulary, and the range and number of professions represented during IPE learning experiences. Of similar quantity, approximately 43% of the studies identified Exosystem elements as influencers, such as university support, program evaluation, and logistical challenges. Approximately 4% of the studies described Macrosystem influencers, including national policy and theory. Lastly, 5% of the studies identified that IPE influencers were also related to the Time, to include duration of IPE learning experiences, as well as when an IPE event occurs during a program's curriculum. Of note, the sum of these percentages does not equal 100% due to each study containing differing amounts and levels of influencers.

Lastly, the articles that described higher education and pandemics were integrated with the influencers of IPE. Although the two studies about IPE and simulated disasters described teaching interventions, the level of authenticity of the learning environment appeared to influence the nature of the interactions among students in different professions, thus altering the dynamic of the event (Brewer & Barr, 2016). These events included examples of multi-level Contextual influencers because they relied on the individual student's innate abilities (i.e., Person characteristics) to perform under perceived urgent pressure in simulated catastrophic circumstances (Proximal Processes), as well as collaboratively working across any Contextual level throughout the flow of the events.

Additionally, the three studies about NPI at universities during the Swine Flu in 2009 included influencers at all levels of the PPCT model from the Proximal Processes and Person elements in Microsystems, which may influence likelihood of NPI use, to Macrosystem influencers like public health, which may influence the likelihood of university closures. Based on the applicability of the inclusion of pandemics in this literature review, opportunity was available to examine how COVID-19 influenced IPE learning experiences for students of the tri-alliance and their attitudes about IPCP. Appendix L, Figures L1-L5 illustrate findings related to each synthesized concept: methodology, levels of evidence, trends and shortcomings in IPE, and ecological influencers.

Implications for IPE Research

The summaries and synthesis of this literature review described multiple themes and outcomes related to IPE. However, three main outcomes of this literature review appeared most relevant to this dissertation study and have strong implications for IPE research. The first implication was about the existing gap in knowledge about IPE pertaining to the students of the tri-alliance. Although IPE research is growing and is beginning to include more allied health professions, very few studies specifically focused on OT, PT, or SLP students. In practice, these three professions often work collaboratively, but they have not been the focus of research in neither the practice nor the education to date (M. Brewer, personal communication, April 28, 2020).

This issue affects how IPE experiences are tailored to their intended recipients. Per PPCT, Person and Context elements must be recognized as important considerations for Proximal Processes to occur, which are the "engines of development" for students engaging in IPE (Bronfenbrenner & Morris, 2006). Per EHP, the Person is influenced by the Context, which

may or may not support Performance (Dunn et al., 1994). Based on the unique characteristics of a student and the student's dynamic and reciprocal exchanges with their learning Context, IPE learning outcomes may be enhanced when including strategies devoted to optimizing Proximal Processes reflected in the PPCT model of the BTHD and in Performance of the EHP.

Another implication for IPE research was about the dearth of literature that included a systems-level, holistic perspective of ecological factors. Jones et al. (2013) explained that "medical, professions allied to medicine, and health-focused professions are seen as more focused on the individual patient rather than on their social and wider context" (p. 53). Along the same lines, but pertaining to IPE, an allied health IPE researcher stated, "I can't think of anyone who is doing research related to these professions, particularly related to ecological factors. . . . Each time we interview students, they describe contextual factors as having a significant impact on interprofessional practice behaviors, [and] also whether staff have an interprofessional mindset" (M. Brewer, personal communication, April 28, 2020).

The whole ecology of IPE requires more research attention. Student characteristics include more than their basic demographic data. Teaching/learning contexts include more than space where education occurs. University cultures include more than how much administrators and faculty support IPE. The external circumstances that surround students within their homes, communities, and parts of the world must also be studied for having a fuller understanding of teaching and learning in higher education. This enhanced understanding may help with providing learning experiences, academic resources, and student supports that are malleable for responding to each student's needs, as well as immediate educational context modifications that optimize learning outcomes.

Lastly, due to the varying strengths of primary and secondary research and non-research publications about IPE, opportunity was available to employ methodology suggestions recommended by these authors. Some of the literature suggested that IPE research must include more contextual information, more rigorous methods, more use of valid outcome measures, and more inclusion of theory. By addressing these previously documented limitations and gaps in knowledge about the students of the tri-alliance and including more holistic and systems-level ecological factors, the COVID-19 pandemic has presented an opportunity to positively utilize this phenomenon through a comparative mixed methods case study design guided by BTHD's PPCT model and EHP framework for examining student outcomes. Both BTHD and EHP are holistic, systems-based models that assert importance of the interrelatedness between human beings and environment for development at any life stage. Additionally, they are designed for interprofessional use (Bronfenbrenner & Morris, 2006; Dunn et al., 1994; Dunn, 2017).

By using the BTHD to guide this research study, a natural experiment allowed for comparison of two IPE-based interventions—one interprofessional and one uniprofessional—using the IPAS outcome measure for determining their respective effectiveness with attitude changes (i.e., student development) related to IPCP. Supporting this dissertation study design, Reeves et al. (2013) reported that an objective of their systematic review was "to understand the effects of IPE better in relation to the current dominant uniprofessional education model, where ideally the control group should receive the same education in a uniprofessional manner" (p. 5). The natural experiment design allowed for comparison and intervention group analysis to understand the effects of two different IPE-based learning experiences based on the occurrence of a naturally manipulated event.

Additionally, this methodology allowed for qualitative examination of two cases bounded by unique ecological circumstances. Content analysis of student written responses to open-ended reflection questions after the IPAS enhanced understanding of student perspectives. This analysis allowed for deeper understanding about (a) how IPE learning experiences transpired with respect to the students' unique ecological factors and (b) how attitudes about IPCP may have been influenced during their respective moments in time. Although Rosenfield et al. (2011) advocated about the importance of measuring beyond surveys for attitudes to gather other perspectives, the unplanned nature of this pandemic and the immediate, reactive directives that were mandated across nations eliminated the opportunity for gathering a greater variety of qualitative data. However, in alignment with the EHP, the quantity and quality of IPAS survey results and written narrative responses provided greater understanding about student Performance based on Task selection within their Contexts.

This comparative mixed methods study relied on the natural experimental quantitative design for events that have already occurred and on the case study to understand qualitative data through written narratives, which provided perspective relevant to the ecological factors surrounding both cases. By merging qualitative results with quantitative findings, outcomes were not stripped of context and were richer with detail by providing a fuller understanding of the phenomenon.

Summary of the Literature Review

Through a detailed literature search methodology and appraisal criteria, 21 primary and secondary research studies and non-research publications were selected to inform this specific dissertation. Each article met the three primary inclusion criteria—IPE, students of the tri-alliance, and attitudes about IPCP—and were appraised for inclusion of other important concepts

related to this dissertation study. Overall, outcomes appeared to indicate that IPE is effective for meeting student learning outcomes, to include attitudes, but methodological rigor and inclusion of holistic, systems-level contextual and student factors remain limited. Additionally, IPE research that includes all three professions of the tri-alliance was severely underrepresented.

This research study will begin to fill theses gaps through a unique approach that targets students of the tri-alliance using a theory-guided research methodology that involves systems-level ecological factors, to include circumstances involving the COVID-19 pandemic. Due to the extenuating environmental circumstances surrounding COVID-19 and its effects on higher education operations, specifically at three universities in Louisville, KY, a comparative mixed methods case study guided by BTHD and EHP informed the research questions within this dissertation study. The rarity of this circumstance provided unique opportunity for examination from a systems-level theoretical perspective because this opportunity would be otherwise unavailable to ethically study. It also allowed for a positive outcome from the unfortunate, real-life experience of a global health crisis that will optimize future delivery of IPE for maximizing student learning outcomes given their unique personal and contextual factors.

Chapter 3: Methodology

The purpose of this dissertation study was to compare and understand attitude changes about interprofessional collaborative practice (IPCP) in two groups of students of the tri-alliance—specifically, occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP)—after participating in different interprofessional education (IPE)-based learning experiences. These IPE-based learning experiences involved different teaching interventions that occurred in the presence of very different ecological factors at different points in time—specifically, April 2018 and April 2020.

The two tri-alliance student cohorts and their unique IPE-based learning experiences were identified as Case 2018 and Case 2020 and were studied through a comparative mixed methods case study design. Case 2018 included 119 OT, PT, and SLP students who engaged in interprofessional, hybrid IPE—with an emphasis on an in-person, on campus workshop—during typical curricular progression in April 2018. Case 2020 included 95 OT, PT, and SLP students who engaged in uniprofessional, primarily online IPE-based learning experiences in April 2020, which was during atypical and disrupted curricular progression due to the coronavirus pandemic (COVID-19).

IPE challenges (i.e., research problems) were identified from two perspectives. One perspective was from the students of the tri-alliance and their learning outcomes about IPCP in the presence of highly complex ecological factors. The other perspective was related to the IPE knowledge base. A gap in IPE literature was identified about the effects of ecological factors, their implications on higher education (specifically, IPE and student learning outcomes), and a common theoretical base that links the two.

Research Questions

To address these IPE challenges, this dissertation informed the following primary research question and its two sub-questions:

1. For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative perspectives about IPCP after their respective IPE-based learning experiences in the presence of differing ecological factors?

    - H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show no significant nor meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and 2020.

    - H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020.

    - H_{O2}: The merged quantitative results and qualitative findings show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

    - H_{A2}: The merged quantitative results and qualitative findings show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

2. For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?

- H_O: There is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

- H_A: There is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

3. In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?

   - Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

   - Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

   - Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

   - Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

   - Proposition 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for

    Cases 2018 and 2020 were perceived similarly about the value and effectiveness

    of their unique experiences on attitude changes regarding IPCP.

These three research questions were addressed using quantitative and qualitative

procedures that supported the overarching comparative mixed methods case study research

design. A natural experiment design was the method for quantitative data collection using a

modified version of the Interprofessional Attitude Scale (IPAS), which is a validated 27-item

survey that measured self-reported student attitudes about IPCP using a 7-point Likert scale

(Norris et al., 2015). A case study methodology influenced by Yin's holistic multiple-case design

was used to collect and understand qualitative student data in the form of written responses to

reflection questions. The results from the natural experiment and case study were analyzed

separately and then merged to provide a deeper understanding about attitude changes and the

ecology of IPE for the students of the tri-alliance from Cases 2018 and 2020.

Bronfenbrenner's Bioecological Theory of Human Development (BTHD) was the

guiding theory for this dissertation study, and its Process-Person-Context-Time (PPCT) model

operationalized the BTHD within mixed methods research design (Bronfenbrenner & Morris,

2006). Additionally, Ecology of Human Performance (EHP) was the supporting theory for

interpreting outcomes of this dissertation study (Dunn et al., 1994; Dunn, 2017). Theoretical

constructs within the BTHD, its PPCT model, and the EHP were written as proper nouns to

identify when these constructs were being applied to concepts within each chapter. Use of the

BTHD, its PPCT model, and the EHP guided this dissertation study, aided in interpretation of

results, and allowed the theories themselves to be tested (J. Tudge, personal communication,

December 9, 2020). See Appendices C, D, F, and G for full definitions of these theories, their

constructs, and supporting schemas.

Assumptions

In this dissertation study, the following six statements were assumed to be true:

- Student groups from Case 2018 and Case 2020 are assumed to be homogenous.

- Students who volunteered to complete the survey in April 2018 and April 2020 provided

  honest answers and thoughts.

- The ecological factors and the IPE outcomes of interest are theoretically interrelated

  (Bronfenbrenner & Morris, 2006).

- Persons and their Contexts are unique and dynamic (Dunn, 2017, p. 217).

- Based on the PPCT model of the BTHD and EHP framework, these conceptual structures

  will illuminate similar and different factors of the ecology of IPE between Cases 2018

  and 2020.

- The COVID-19 pandemic and its effects on student health and wellbeing affected the

  likelihood of voluntary participation in the survey for Case 2020.

Chapter Overview

The flow of this chapter consists of nine sections that expand on its introduction. The first

four sections of this chapter—research methodology, mixed methods study design, quantitative

study design, and qualitative study design—provide descriptions of each component of this

dissertation study, as well as supporting literature for their use in this research. These sections

included details like strengths and limitations of the designs, threats to validity/trustworthiness

and possible controls, participant characteristics, sampling, study setting, specific processes, data

collection instruments, and anticipated limitations.

The next section describes data management, which provides details about how quantitative and qualitative data were collected, stored, managed, merged, and analyzed. After data management, a brief section about resource requirements describes the financial, human, and physical resources needed for this dissertation study. The following two sections include ethical considerations of this research and timeline and parameters of the study. The chapter ends with a summary that prepares the reader for the fourth chapter, Results.

Research Methodology

An important component included in a paradigm or researcher's worldview is research methodology. According to Creswell and Plano Clark (2018), "mixed methods researchers bring to their inquiry a worldview composed of beliefs and assumptions about knowledge that informs their study" (p. 35). The pragmatic paradigm has been identified by some research experts as being a well-suited worldview for mixed methods research (Creswell & Plano Clark, 2018; DeCuir-Gunby & Schutz, 2018a). The worldview of this investigator aligns with the pragmatic paradigm; therefore, the selection of mixed methods research methodology for this dissertation study was supported through the pragmatic paradigm.

A variety of terminology and uses of paradigm- and philosophy-oriented terms exist when describing and discussing research methodology. To provide clarity of concept, the following list provides and defines philosophical and methodological terminology relevant to this mixed methods research design according to the levels and explanations provided by Edmonds and Kennedy (2017). By following their detailed process, the research designs described in this chapter were products of careful decisions made about the methodology and subsequent components as defined below (Edmonds & Kennedy, 2017).

- *Methods* provide the theoretical, philosophical, and analytic stance for a study and are usually considered either quantitative or qualitative methods.

- *Research* is systematic investigation that may be experimental, quasi-experimental, or nonexperimental.

- The *quantitative approach* and the *qualitative perspective* are the first steps for creating structure to the design and includes theoretical models or lenses for how the researcher engages with the research and how data are collected.

- *Design* is the specific framework that provides structure for how the study will occur and includes details such as individuals or groups, research settings, and time frames (pp. 23-24).

Research, Approach, and Design

Determining the most appropriate research methodology and design for a study begins with the questions being asked (Edmonds & Kennedy, 2017, p. 23). After identifying this dissertation study's questions, Edmonds and Kennedy (2017) recommended deciding on the type of research, then the quantitative approach and qualitative perspective. As the last step, the research design is identified, which describes the strategies used for answering the research questions.

Because the IPE learning experiences included in Case 2018 and Case 2020 have already occurred, the quantitative arm of this mixed methodology was observational research because no variables were manipulated. The qualitative arm was nonexperimental research because data collected from students' narrative responses to reflection questions were organic reflections and were collected within their own contexts, which allowed unmanipulated and natural themes to emerge. The quantitative approach was between groups examination, and the qualitative

perspective was explanatory for understanding students' perspectives influenced by unique

ecological factors within Cases. Finally, the quantitative design was natural experiment, and the

qualitative design was case study. Table 2 outlines components of mixed methods research

according to the structure and terminology provided in this section based on instruction provided

by Edmonds and Kennedy (2017, pp. 23-28).

Table 2

Mixed Methods Research Components

Research Components	Research Specifications	
Method	Quantitative	Qualitative
Research	Observational	Nonexperimental
Approach/Perspective	Between-subjects	Explanatory
Design	Natural Experiment	Case Study

Note. Components of this table were influenced by Edmonds and Kennedy (2017, pp. 23-28)

Justification for Mixed Methods Methodology

According to Creswell and Plano Clark (2018), "research problems suited for mixed

methods are those in which one data source may be insufficient" (p. 8). Due to the extenuating

contextual circumstances surrounding this dissertation study, quantitative nor qualitative data

alone sufficiently addressed the challenges presented in this dissertation study. The quantitative

arm measured attitude changes before and after IPE-based learning experiences; however,

without the qualitative arm to provide insight into the students' responses as influenced by their

unique ecological factors, the quantitative data would have only provided "half the story."

Qualitative data provided supportive evidence of convergence with and divergence from the

quantitative data through the comparison and understanding of two different Cases.

In addition to the structure of this dissertation study naturally lending itself to mixed methods research, the design was relevant to IPCP and supporting theory. Mixed methods research that is underpinned by or translated in the context of relevant theory was recommended to measure the impact of IPE on individual, population, and systems-level outcomes and to produce meaningful contributions to the body of IPE and IPCP knowledge (Institute of Medicine [IOM], 2015; Khalili et al., 2019). Ødegård and Bjørkly (2012) suggested that a combination of qualitative and quantitative methodologies may be a feasible way to enhance the understanding of IPCP with a special focus on reliability and validity issues, which may strengthen the quality of the research (p. 287). Lastly, the interprofessional and systems-orientation of the BTHD and EHP emphasize consideration of multiple ecological factors that align with mixed methodological procedures related to gathering, analyzing, and merging quantitative and qualitative data for better understanding a situation as a complex whole.

In short, this dissertation study (a) examined attitude changes about IPCP among the students of the tri-alliance from Case 2018 and Case 2020, (b) sought understanding of these students' perspectives about their learning experiences and attitudes related to IPCP within different learning contexts and environments, and (c) merged outcomes for deeper understanding of phenomena. Because this research study sought to *examine*, *understand, and merge* specifically defined constructs within two unique Cases in the presence of differing ecological factors (specifically related to the presence and absence of a pandemic), employing a comparative mixed methods case study was best suited for this research.

Comparative Mixed Methods Case Study Design

Strengths and Weaknesses of Design

Regardless of methodology, strengths and limitations of a study design and its related components must be recognized for minimizing threats to validity and enhancing trustworthiness of a study's outcomes. Generally speaking, the strengths of mixed methods research include (a) capitalizing on strengths and minimizing weaknesses of both quantitative and qualitative designs to more thoroughly answer questions that neither can do separately; (b) offering new insights into a topic or problem by producing new knowledge through triangulation of quantitative results and qualitative findings; (c) practicality for conducting research that employs the best suited quantitative and qualitative study designs to answer the questions through multiple worldviews; (d) giving voice to participants while studying statistical trends; and (e) allowing the opportunity for multiple publications, if desired (Creswell & Plano Clark, 2018, pp. 12-13; IOM, 2015, p. 43).

The strengths of the specific design selected for this research, a comparative mixed methods case study research design, included (a) providing an in-depth, practical understanding about the complexities of and between Cases 2018 and 2020; (b) comparing cases through quantitative and qualitative dimensions to portray variation in how the Cases provided insights about the research challenges; and (c) describing profiles of Cases to provide a detailed level of information about them and offer realistic pictures (Creswell & Plano Clark, 2018, pp. 71-72, 118, 120). Additionally, Craig et al. (2017) stated that "qualitative research undertaken in preparation for, or alongside, [natural experiment] studies can help to identify which outcomes might change as a consequence of the intervention and which are priorities for decision makers" (p. 50).

Conversely, limitations of mixed methods in general, as well as the specific design, comparative mixed methods case study, appear to be based on the knowledge and experience of the researcher, as well as the amount of time and resources required to do a thorough mixed methods study. Additionally, other general limitations of mixed methods research that converges data include (a) issues with different sample sizes, (b) the methodological challenges with merging qualitative and quantitative datasets, and (c) the need to explain divergence when comparing results (Creswell & Plano Clark, 2018, p. 72; IOM, 2015, p. 43).

Strengths associated with mixed methods designs as it applies to this dissertation study include the following:

- Having two bounded systems (i.e., Cases), which allow twice the opportunity for corroboration between their Cases' unique quantitative and qualitative data for between-subjects comparison. Although between-subjects analysis is commonly employed in quantitative designs, with content analysis and data transformation, opportunity was available to attempt this method with qualitative data, as well.

- The ability to employ a qualitative research design (case study) that was complementary to mixed methodology and filled gaps in quantitative research design (natural experiment) that sought answers to questions about a phenomenon (IPE-based learning experiences and ecological factors) and outcome of interest (attitude changes) that quantitative measures (modified IPAS alone) were not be able to do.

- The ability to use a quantitative research design through a retrospective lens based on naturally occurring events that had already happened, which complemented the qualitative research design for close examination of two Cases.

Threats and Controls

According to Creswell and Plano Clark (2018), threats to validity and strategies to

minimize threats must specifically relate to the type of research design being used (p. 251). Table

3 describes the specific threats and strategies to minimize threats that pertain specifically to

mixed methods case study designs, as well as application to this dissertation study. Additional

threats and controls are described in the following sections for the specific quantitative and

qualitative arms of the study.

Table 3

Threats and Strategies to Minimize Threats for Mixed Methods Case Study Designs

Threats	Strategies to Minimize Threats	Application to this Study
Not adequately defining the case(s)	Specify the bounding of the case(s) and describe each case	Bounded systems are defined within this chapter based on influences from Yin and other experts in case study research
Failing to clearly articulate the case(s), a rationale for their use, and the core design(s) used	Identify the type of core design(s) used to select or generate cases and provide the rationale for this approach	Convergent mixed methods was the core mixed methods design, and comparative mixed methods was the complex variation based on the research questions (Creswell & Plano Clark, 2018, pp. 116-123).
Reporting the case(s) based on either quantitative or qualitative results but not on integration of the results	Explicitly merge the quantitative and qualitative databases for each case	Quantitative and qualitative data for Cases 2018 and 2020 will be analyzed separately (IBM SPSS Statistics® and NVivo®) and then merged for discussion
When multiple cases are selected, failing to make a meaningful cross-case comparison	Engage in cross-case analysis of the integrated quantitative and qualitative results for the multiple cases	Same as above

Note. Adapted from Creswell & Plano Clark, 2018, pp. 252-253

Participants, Sample, Characteristics, and Demographic Data

The participants for this research study included students of the tri-alliance (i.e., OT, PT, and SLP) from three neighboring academic institutions in Louisville, KY who were included in Case 2018 and Case 2020 and were the primary units of study. Employing influences from quantitative and qualitative sampling procedures, participant selection was nonrandomized, and sampling was through (a) convenience because the data had already been collected based on academic processes in April 2018 and April 2020 and (b) purposive because the participants met the requirement of consisting of only students from the tri-alliance whose ecological factors allowed for conditions that were similar to experimental research with a control group. These strategies were appropriate due to how students in Cases 2018 and 2020 were anticipated to have some degree of homogeneity and have experienced the central phenomenon of interest (attitude changes about IPCP after IPE learning experiences; Creswell & Plano Clark, 2018, p. 176).

Students in Cases 2018 and 2020 were at the same academic level within their respective curricula: (a) before high-level clinical internships for OT and PT students (mid-program) and (b) after high-level clinical internships for SLP students (one month before graduation). For Case 2018, there were 41 OT, 44 PT, and 34 SLP students for a total of 119 students in this cohort. For Case 2020, there were 42 OT, 38 PT, and 15 SLP students for a total of 95 students. The sample sizes for both cases were adequate as evidenced by quantitative power analysis; see following section titled "Quantitative Design: Natural Experiment."

A unique characteristic of the SLP program was its cohort sizes in 2018 and 2020 in comparison to OT and PT. Because the tri-alliance programs had been offering the hybrid IPE experience twice each academic year (fall and spring) since 2016, each class of SLP students had been required to attend both IPE events to more closely resemble group size relative to the OT

and PT cohorts. After receiving consistent student feedback indicating unfavorable student

opinions about the twice a year attendance for the SLP students, the SLP cohorts had been

divided in half beginning fall 2018, which allowed one half of the SLP student cohort to

participate in the fall IPE learning experience and the other half in the spring. This explanation

describes the large difference (~44%) in SLP cohort sizes between 2018 and 2020.

Due to Cases 2018 and 2020 being bounded systems, they represented two unique cases

that have similar qualities due to the nature of their academic program status. However, Person

factors like age, gender, ethnicity, cultural background, and other important demographic and

descriptive data were not recorded due to the IPE events having already occurred without

opportunity for the research design to have been structured for gathering this information.

Because the only unique Person factor being included in this dissertation study was attitude

change, there was inability to determine if these two samples (Cases 2018 and 2020) were

representative of the entire population of tri-alliance students in the United States. Although

other Person factors could be obtained through student records, requesting this information from

each of the three partnering programs would have created undue hardship on their staff and

faculty, especially due to the timing of the request during the COVID-19 pandemic and ongoing

academic institution responses to the pandemic.

Recruiting Procedures, Inclusion Criteria, and Exclusion Criteria

Recruiting procedures and the inclusion and exclusion criteria for participants were solely

based on permissions from the three partnering program leaders to release student data for

analysis after Nova Southeastern University (NSU) Institutional Review Board (IRB) approval

was obtained. The IPE-based learning experiences for Cases 2018 and 2020 were required events

for all three professional program curricula; however, participation in the survey was voluntary

for both Cases. Students indicated agreement to participate in the survey after reading

instructions about the survey and its intended use and by advancing to the first survey item (i.e.,

informed consent for completing the modified IPAS). As such, all students from both Cases were

included in the sample sizes for this dissertation study, but all students may not have volunteered

to participate in the pretest or posttest surveys.

Study Setting

Due to the retrospective nature of this research, describing a study setting was not

applicable. However, the settings in which Case 2018 and Case 2020 engaged in their IPE-based

learning experiences and completed the surveys were important to understand. For Case 2018,

their IPE learning experience was hybrid, and their settings were a blend of the virtual context

for any online component of the experience and the physical context for the in-person workshop

that was on campus in a classroom and able to accommodate all 119 students (plus faculty). For

Case 2020, the online, uniprofessional IPE-based learning experience was primarily virtual;

however, the physical contexts for these students were their homes due to the public health

mandates of self-isolation and social distancing at the time (Centers for Disease Control and

Prevention, n.d.). Based on the PPCT model of the BTHD, as well as the EHP, other Contextual

elements are important to consider when discussing relevant components of a study setting;

however, these additional Context factors will be addressed in the Discussion chapter after the

data analyses are complete. See Appendix I for a diagram of this dissertation study, which

illustrates the primary components discussed in this section and identified as "Step 1: Case

Selection." More details about the Cases as bounded systems are provided in the follow sections

of this chapter.

Mixed Methods Data Analysis and Format for Presenting Results

Role of Theory

According to Coffey et al. (2018), the way in which theories create and guide a study are also used to help analyze data (p. 4). Per the section about substantive content theories in Chapter 1, the PPCT model operationalizes the BTHD, which was the primary theory providing the framework that guided this dissertation study (Bronfenbrenner & Morris, 2006). The EHP was the supporting theory to assist with data interpretation.

Based on Tudge's work (2017), the PPCT may be operationalized by the following method with simultaneous application to the research (see Appendix C for theory-specific definitions). First, the investigator focused on Proximal Processes, specifically the IPE-based learning experiences for and the interactions (or lack thereof) between the students and faculty of the tri-alliance. Next, at least one relevant Person characteristic should be included. Specific to this dissertation study, one Person characteristic was identified: attitude changes (a Force characteristic and the outcome of this dissertation study). However, another Person characteristic that was identified during analysis was the student's profession (a Resource characteristic).

Next, at least one relevant aspect of Context must be assessed, and when applied to this dissertation study, the contexts in which the IPE-based learning experiences occurred were the physical Contexts of interest: hybrid settings for Case 2018 and online at home for Case 2020. Lastly, Time was represented in two ways: (a) by the attitude changes from pretest through posttest and reflections, which was between two to three weeks of time, and (b) by the events being situated in time that represented historical context. The historical context for Case 2018 was typical curricular flow (absence of a pandemic) and for Case 2020 was disrupted curricular flow (presence of COVID-19 pandemic).

With careful application of the operationalized constructs of the PPCT, the BTHD

formula with modifications by Merçon-Vargas et al. (2020) assisted with data analysis when

finalizing results of this research (Bronfenbrenner, 1989; Johnson, 2008, p. 4). The modified

formula is $\mathbf{D_t} = f_{(t-p)}\,\mathbf{PE}_{(t-p)}$, and the concepts explaining the formula's variables mean that

development (**D**) is a joint function of person (**P**) and environment (**E**; Merçon-Vargas et al.,

2020). The variables **"t-p"** appear twice in the equation to indicate that "the process producing

developmental change is not instantaneous, but one that takes place over time, and, like the other

terms in the equation, can change over time" (Bronfenbrenner, 1989, p. 190; Merçon-Vargas et

al., 2020). Per Merçon-Vargas et al. (2020), Bronfenbrenner stated that the intention of this

modified formula was to define human development as the joint function of the Person and

Environment by including interactive effects of PPCT factors as opposed to models that only

analyze the person and environment independently of each other (p. 324). When each variable is

completely written, the formula is stated in Table 4. This formula was specifically described and

applied in the Results chapter.

Table 4

The Full Bioecological Theory of Human Development (BTHD) Formula

Human **D**evelopmental outcome (time that a given developmental outcome is observed) = Joint **F**unction (the period during which person and environment were jointly operating to produce the developmental outcome observed) (**P**erson characteristics multiplied by **E**nvironment [i.e., ecological factors of Context] [the period during which person and environment were jointly operating to produce the developmental outcome observed])

Lastly, the EHP served as a supportive framework to the PPCT model and BTHD (Dunn

et al., 1994; Dunn, 2017). Through analysis of the qualitative data, EHP assisted with

understanding students' performance in the presence of their unique IPE-based learning experiences and differing ecological factors during different points of time (not over a period of time as represented in the PPCT model). This theoretical framework was tested by applying the merged data to its constructs: Person, Context, Task, and Performance (Dunn et al., 1994; Dunn, 2017). A formula for the EHP was applied to Case-specific data in the same way as the BTHD formula. The EHP formula is **PC+T=Pf**: Spelled out, the constructs are (**P**erson * **C**ontext) + **T**ask = **Pe**r**f**ormance. Because this was a formula crafted by this investigator, the originating theorist approved this formula's use and is also described in Table 5 (W. Dunn, personal communication, August 15, 2020). This formula was also applied in the Results chapter.

Table 5

Ecology of Human Performance (EHP) Formula

Person (Students of the tri-alliance) * **C**ontext (IPE-based learning experience with peers and faculty during a semester) + Individual and group **T**asks = **P**erformance measured by the output of attitude changes about IPCP

Merged Data Analysis

According to Creswell and Plano Clark (2018), quantitative and qualitative data integration is the "centerpiece of mixed methods research," and "integration is the point in the research procedures where qualitative research interfaces with quantitative research" (p. 220). The comparative mixed methods case study design is a complex version of the core mixed methods design, convergent. Within convergent design data analysis and interpretation, four key considerations must be addressed to fully integrate quantitative and qualitative research: (1) intent of integration; (2) primary data analysis and integration procedures; (3) representation of

integration results; and (4) interpretation of the integration results (Creswell & Plano Clark, 2018, pp. 220-234). Each key consideration is explained in the following sections as they applied to convergent design data analysis and interpretation.

The intent of integration explains the reason why researchers merge studies (Creswell & Plano Clark, 2018, p. 220). Applied to this dissertation study, the intent of integration was to develop results and interpretations that expand understanding about the ecology of IPE and its influences on student attitude changes about IPCP through comprehensive and validated procedures. This consideration was addressed after quantitative and qualitative data were studied individually. When these steps were completed, the quantitative and qualitative data were merged for the results to inform the overarching mixed methods question, Research Question #1.

Research Question #1 asked, "For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative perspectives about IPCP after their respective IPE-based learning experiences in the presence of differing ecological factors?" This question's hypotheses are listed as follows:

- H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show no significant nor meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and 2020.

- H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020.

- H_{O2}: The merged quantitative results and qualitative findings show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

- H_{A2}: The merged quantitative results and qualitative findings show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

The next consideration was like a subcomponent of the first key consideration because it described the primary data analysis integration procedures. The steps within this consideration include (a) obtaining and analyzing the quantitative and qualitative results separately, (b) comparing or transforming qualitative data and quantitative data, (c) merging data, and then (d) analyzing together to locate common concepts (Creswell & Plano Clark, 2018, p. 224).

Next, the results should be jointly displayed though visual representations (i.e., representation of integration results), such as tables and figures, which assist with explaining when the integrated results confirm, disconfirm, or expand each other. A joint display of the quantitative and qualitative data provides a visual representation for how the data are compared. Data may be integrated by key topics, data results (statistics and quotations), or congruent or discrepant findings (Creswell & Plano Clark, 2018, p. 226-232).

Lastly, the interpretation of the integrated results allows the investigator to assess how the analysis answers the mixed methods research question, which is in direct relation to how it is analyzed earlier in the process (data comparison, data transformation, or both). Depending on how much congruency and discrepancy are identified, a new understanding about the problem will come to light, and the investigator may consider extending the research project for obtaining more data to further enhance the newly acquired insights. When followed, the four key

considerations of mixed methods data integration will enhance understanding of and provide

insight into the research problem (Creswell & Plano Clark, 2018, p. 224-225, 233-234).

Format for Presenting Results

After quantitative and qualitative results were obtained from both Cases and applied to

the BTHD and EHP formulas, the merged outcomes included narrative description and table

presentation of comparisons and integration, as well as interpretation of testability of these

theories as applied to IPE. Following the key principles for mixed methods integration, the final

integrated and interpreted results were displayed through application of formulas for PPCT

model of the BTHD and the EHP. This strategy accomplished the two intentions for the use of

both theories: to assist with interpreting results and to be tested. After the integrated results from

the data analysis were applied to the PPCT and EHP, then final conclusions about the research

study provided a conclusive answer for the mixed methods research question and provided

information about the utility of the PPCT and EHP in IPE about the ecology of IPE.

Anticipated Limitations

The intent of this section per NSU guidelines is to identify the limitations of this

dissertation study as applied to the results and interpretation of data. The quantitative and

qualitative analyses and limitations are discussed in detail in the following sections. One general

limitation occurred at the time of data collection before this dissertation study began: Important

Person factors for descriptive data about participants were not collected. This limitation

influenced the breadth of information about the Person construct that could have better informed

the interrelations with the Person's Contexts and how they affected the quality of Proximal

Processes and related Development. For this dissertation study, the only Person factor that was

analyzed was attitude change. However, student professions, another Person factor, were appreciated as they applied to portions of the analysis.

After quantitative and qualitative data were separately analyzed, they were merged for final analysis. Because only two sources of data were used—the modified IPAS survey and open-ended narrative reflection questions after the modified IPAS posttest—efficiency was optimized for collecting multiple facets of a phenomenon from each participant. Because the intent was to analyze data in a way that produced corroborated and valid conclusions, using these primary sources of data limited methodological rigor because qualitative data was limited to one single source as opposed to more than one, which is usually necessary for triangulation in qualitative research.

Also, the merging process was limited due to the unequal cohort sizes in Cases 2018 and 2020. However, due to the circumstances affecting IPE related to COVID-19, selecting these primary data sources was the best opportunity to study the phenomenon of interest. Additionally, size differential between the quantitative and qualitative databases is less of an issue in mixed methods research because "quantitative data collection aims to make generalizations to a population while qualitative data collection seeks to develop an in-depth understanding from a few people" (Creswell and Plano Clark, 2018, p. 188).

Quantitative Study Design: Natural Experiment

Following the structure influenced by Edmonds and Kennedy (2017), the method, research, approach, and design for the quantitative arm of this dissertation study are described and justified. The *method* level for this portion of the mixed methods design was informed from the quantitative analytic stance based on the nature of the questions being asked. The quantitative research question specifically sought to study and compare attitude changes about IPCP in Cases

2018 and 2020. The *research* level was the systematic investigation that informed the study, which was specifically observational because of this dissertation study's retrospective nature. No component of this dissertation study allowed for future variable manipulation nor future data collection by the investigator. The quantitative *approach* identified how the investigator engaged with the research. For this dissertation study, the investigator engaged by collecting quantitative data allowing for between-subjects analysis through Case-specific outcome comparisons.

Lastly, the specific quantitative *design* was natural experiment based on how it aligned with the definition provided by Christensen et al. (2014): "A type of nonexperimental research that examines possible causes that are not usually manipulated by a researcher, but the causal variable is one that 'describes a naturally occurring contrast between a treatment and comparison condition'" (p. 44). The definition provided by Shadish et al. (2002) added that a natural experiment "investigates the effects of a naturally occurring event, sometimes limited to events that are not manipulable" (p. 509). An example would be how researchers retrospectively studied whether earthquakes in California caused drops in property values (Shadish et al., 2002, p. 17). Additionally, Christensen et al. (2014) further clarified that "if the independent variable seems like one that is not naturally manipulated, then call it a correlational study" (p. 45).

In addition to these definitions, Leatherdale (2019) described three specific features that apply to natural experiments. The first feature pertains to the period of time in which an intervention has been implemented, but the circumstances surrounding implementation are not under the control of the researchers. Secondly, the implementation of the intervention is not dependent on whether or not there is a plan to evaluate. Lastly, random allocation is not feasible for ethical or political reasons (Leatherdale, 2019, p. 19). According to Craig et al. (2017), natural experiments also need control groups with knowledge of the assignment mechanism for

determining how alike or different the groups may be (e.g., "exchangeability"), especially in

observational studies (p. 41).

Applied to this dissertation study, the COVID-19 pandemic was the naturally occurring

event in spring 2020 that caused a change in an IPE learning experience, which was examined

for its influence on student attitude changes about IPCP by comparing their outcomes with

outcomes from the IPE learning experience from spring 2018 (i.e., Cases 2018 and 2020). These

items aligned with the features described by Leatherdale (2019) and Craig et al. (2017). Based on

the justification provided at each level, natural experiment was the best quantitative research

design to answer the quantitative research question and inform the overarching mixed methods

research question (see Table 6).

Table 6

Concepts and Rationale for Natural Experiment

Research Component	Research Specification	Rationale for Natural Experiment
Method	Quantitative	Seeks to compare outcomes based on variables; statistical studies needed
Research	Observational	Retrospective-based; No prospective variables may be manipulated, nor prospective data collected
Approach	Between-subjects	Comparisons between interprofessional student groups in Cases 2018 and 2020
Design	Natural experiment	COVID-19 was the naturally occurring event that created contrast between the IPE events in Cases 2020 and 2018; No manipulation to variables occurred by the investigator; Permits investigation for what may have been considered unethical or impractical regarding IPE

Note. Concepts in this table were influenced by Edmonds and Kennedy (2017).

Strengths and Limitations of Natural Experiment Research Design

Each type of natural experiment study possesses its own strengths and limitations for making inferences about the intervention and outcome of interest (Leatherdale, 2019, p. 20). According to Leatherdale (2019), from a public health perspective, there are three core strengths and two limitations related to natural experiments. Strengths include (a) the ability to evaluate government policy, (b) strength of evidence about policy effectiveness, and (c) timely evidence for policy development. Limitations include (a) bias due to confounding based on the nature of the study design (e.g., inability to implement randomized controlled trials) and (b) timing of policy implementation (Leatherdale, 2019, p. 30).

While these features apply to natural experiments in general, there are specific strengths and limitations of this quantitative research design that apply to this dissertation study. Some of the strengths include (a) using data that already exist and align with criteria of natural experiments; (b) the ability to study heterogenous contextual influences, which may enhance external validity; and (c) a strategy through which this dissertation study's research questions may be answered in a practical and ethical way (Leatherdale, 2019).

Limitations applied to this dissertation study primarily include the strength of the design as a whole due to being observational (i.e., studying events retrospectively by using data that had already been collected from two different groups during two different periods of time). Additionally, an observed difference between the literature and this dissertation study that may be a limitation was that the literature primarily discussed natural experiments related to intervention/exposed groups and control/unexposed groups that were from the same time, and the structure of this dissertation study included a two-year difference in time between Case 2018

and Case 2020. These limitations affected the ability to make causal inferences about ecological factors' influence on IPE and student learning outcomes based on the presence of unmeasured confounding variables (Lewis-Beck et al., 2011; Messer, 2012). Of note, although a limitation associated with natural experiments may be associated with sampling, sampling methods were not applicable because of how students from Cases 2018 and 2020 were bounded systems and how they were studied (Lewis-Beck et al., 2011).

Description of Quantitative Variables

The quantitative question for this dissertation study, Research Question #2, asked "For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?" Its null hypothesis stated that there is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors. Its alternate hypothesis stated that there is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

To begin operationalizing the natural experiment study design to inform Research Question #2, descriptions and details about the quantitative variables are described in the following list:

- *Comparison group:* OT, PT, and SLP students from Case 2018; similar to an unexposed group in epidemiology or treatment-as-usual group in health science ($N = 119$, [$n = 41$ OT; $n = 44$ PT; $n = 34$ SLP])

- *Intervention group:* OT, PT, and SLP students from Case 2020; similar to an exposed group in epidemiology or recipients of new intervention as compared to treatment-as-usual in health science ($N = 95$, [$n = 42$ OT; $n = 38$ PT; $n = 15$ SLP])

- *Dependent variable/phenomenon of interest*: Joint Evaluation Team (JET) classification Level 2a, attitude changes; how student attitudes changed about IPCP from pretest to posttest after completing the students' respective IPE-based learning experiences from Case 2018 and Case 2020.

- *Independent variable/ variable of interest*: IPE-based learning experiences; two levels of the independent variable, which included all ecological factors present in Cases 2018 and 2020

  o *From Case 2018*: (1) IPE intervention: the three-phase, hybrid IPE learning experience with emphasis on the classroom-based workshop that occurred in April 2018; (2) Ecological factors: interprofessional students and faculty; typical progression of curricular activity, absence of pandemic

  o *From Case 2020*: (1) IPE intervention: the uniprofessional, online learning experiences about IPCP that occurred in April 2020; (2) Ecological factors: uniprofessional students and faculty; atypical curricular activity; presence of COVID-19 pandemic

- *Extraneous variables*: Gender, ethnicity, age, profession, and other Person-specific factors are each very important in BTHD and EHP; however, these variables were not included due to the IPE events having already occurred and an inopportunity for the research design to be structured for gathering this information.

Validity and Reliability

Types of Applicable Validity and Related Threats

There are four major types of research validity: internal, construct, external, and statistical conclusion validity (Christensen et al., 2014, pp. 159-181). Each type of validity is identified and defined as it applied to this dissertation study.

Internal validity. Internal validity is concerned with the correctness of inferences made from the results of a study. Because the quantitative arm of this mixed methods design was observational, applicable threats to internal validity are listed below.

- *History,* from the perspective of internal validity, is something that happened to participants or their environments between baseline and follow-up measures that was not included in the original research design and may affect observed effects on the outcome of interest.

- *Maturation* is when changes occur to the participant due to passage of any duration of time.

- *Attrition* is the loss of subjects during a study.

- *Testing* is the change in scores from pretest to posttest due to having previously taken the test.

- *Selection bias* may occur by the participant or the researcher. Selection bias may occur when participants who enroll in a study are volunteers and may be more motivated than the true population. Also, selection bias may occur when a researcher uses nonrandomized sampling.

Construct validity. Construct validity is concerned with how well operations within the study accurately represent the constructs being studied, and participants and researchers have

influence on this type of research validity. Applicable threats to construct validity are listed below.

- *Selection bias* may also influence construct validity, as well as internal validity.

- *Halo effect* is when the researcher's expectations about participant performance may affect the researcher's judgment or behavior.

- *Hawthorne effect* is when participants engage in the study in a way that may be caused by the attention of the researcher and not due to the treatment itself.

- Similarly, the *placebo effect* involves participant expectations that the intervention will cause a change.

- *Reactive self-report changes* are changes on a self-report due to motivational shifts from being in a study.

- *Disruption effects* are when participants usually respond poorly to situations that disrupt routine and affects the treatment effects of an intervention.

Within construct validity, several elements relate to the operationalization of constructs that may threaten research validity if not closely addressed during the planning of a study, especially this dissertation study because of its generous use of theoretical constructs.

- *Inadequately explaining a construct* may result in inaccurately measuring the construct in the study.

- *Construct confounding* and *mono-operation bias* may occur through over- or underrepresentation of a construct, respectively.

External validity. While internal and construct validity are concerned with the accuracy and trustworthiness of results and findings, external validity is concerned with generalizability of

research outcomes to other contexts and settings. Threats to external validity related to this dissertation study are listed below.

- *Population validity* is the ability to generalize from a sample to a population and is threatened by selection bias, which was identified as an internal and construct validity threat.

- *Ecological validity* is the ability to generalize across settings and, incidentally, was first identified by Urie Bronfenbrenner. This kind of validity is threatened when researchers attempt to generalize from labs or contrive settings to natural settings.

- *Temporal validity* is the ability to generalize across time, and history and maturation of participants identified in this dissertation study may threaten this validity.

- *Treatment variation* is the ability to generalize findings across variations of treatment.

Statistical validity. Finally, statistical validity is concerned with how well independent variables and dependent variables covary and with the accuracy of inference for determining probability versus chance—one of the conditions for making claims of cause and effect. Although the quantitative arm of this mixed methods study was a natural experiment, it was considered observational due to its retrospective perspective. As such, the literature supports the use of terms of independent and dependent variables because manipulation to the independent variable occurred due to acts of nature. Therefore, carefully selected statistical tests were selected and implemented based on how well the quantitative data met statistical assumptions. Lastly, statistical validity is enhanced by using reliable outcome measures, and the following section provides essential detail that completes the discussion about statistical validity.

Reliability Related to Instruments and Measures

Interprofessional Attitude Scale. The primary quantitative data source for this dissertation study was the 27-item Interprofessional Attitude Scale (IPAS) with modifications. The original IPAS is a validated instrument that aligns with the four core competencies from the Interprofessional Education Collaborative ([IPEC], 2011; Norris et al., 2015). The 2011 and 2016 IPEC core competencies have been used to guide outcomes for the tri-alliance IPE learning experiences from the beginning; using a tool that was intentionally designed to measure these competencies was an appropriate decision (see Appendix B for 2016 IPEC competencies).

According to Norris et al. (2015), through independent exploratory factor analysis (EFA; n=342) and confirmatory factor analysis (CFA; n=336), the IPAS aligned its five subscales with the IPEC core competencies with Cronbach's alpha coefficient scores ranging from 0.62 to 0.92. The five subscales are (a) Teamwork, Roles, and Responsibilities; (b) Patient-Centeredness; (c) Interprofessional Biases; (d) Diversity & Ethics; and (e) Community-Centeredness (Norris et al., 2015). Based on the EFA and CFA statistical outcomes, the authors concluded that the IPAS demonstrated good construct validity and internal consistency reliability (Norris et al., 2015).

The IPAS may be used by students from a range of health science professions (Norris et al., 2015). In its original form, all 27 items on the IPAS include a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) for users to rank their self-reported interprofessional attitudes (Norris et al., 2015). When the IPAS is used only one time, it meets Level 1 JET classification of IPE outcomes: reactions. When the IPAS is used as a pretest and posttest instrument, it measures attitude changes that occur after IPE interventions, which is a Level 2a learning outcome and was the primary outcome of interest for this dissertation study. The Level 2a outcome is defined as a modification of attitudes or perceptions that recognizes (a)

changes in reciprocal attitudes or perceptions between participant groups or (b) changes in

perceptions or attitudes toward the value and/or use of team approaches to caring for a specific

client group (Barr et al., 2005, p. 43).

Since 2015, studies using the IPAS have been published with mixed reviews. Marshall et

al. (2020) modified the IPAS for similar reasons as the tri-alliance IPE faculty and reported the

"combination of quantitative and qualitative data provided complementary and corroborative

evidence" about learning outcomes (p. 226). Nichols et al. (2019) reported using the IPAS to

guide focus group discussion questions, which produced relevant outcomes for their study.

Gillette et al. (2019) reported statistically significant changes from pretest to posttest in one

subscale of the IPAS. They also identified that the targeted health profession students who took

the survey were not at the same level of education and advised educators to take this into

consideration (Gillette et al., 2019, p. 396).

Other researchers published findings about the effectiveness of the IPAS for their uses to

measure pretest/posttest attitude changes from sample sizes ranging from 71 to 430 students after

a wide range of short- to long-duration IPE learning experiences with varying levels of

authenticity of learning experiences (Byrne & Connor, 2020; Connaughton et al., 2019; Costello

et al., 2017; Fusco et al., 2019; Muzyk et al., 2017; Pechak et al., 2018). However, Cerny et al.

(2018) reported no significant scores using the IPAS for a sample size of 21 students, and King

and Violoato (2020) reported limited utility of the IPAS for longitudinal data with large student

cohorts (n=994). Of note, only two studies referenced in this section were included in the

literature review because of how they met inclusion criteria (King & Violato, 2020; Pechak et al.,

2018). While these published reports indicate mixed success with the IPAS, the use of the

modified IPAS fit the needs of the tri-alliance IPE learning experiences for the times it was

selected, which appeared to align with the circumstances surrounding the researchers whose outcomes were from sample sizes resembling Cases 2018 and 2020.

The IPAS was the selected tool from the beginning of the tri-alliance hybrid IPE experience in 2016; however, findings from the instrument were not significant using the 5-point Likert scale. Pretest and posttest results showed that student attitudes were usually positive from the beginning, and the IPAS appeared to lack sensitivity to change when attitudes were already positive. Having high attitudes at pretest was consistent with some the literature (Byrne & Connor, 2020; Fusco et al., 2019).

At that point, the IPAS was modified from a 5-point Likert scale to a 7-point Likert scale, which appeared to be somewhat more sensitive to attitudes from pretest to posttest. IPE faculty also decided to transition the modified IPAS instrument from a paper survey to an electronic format using Qualtrics® for more efficient and accurate analysis. However, the modified IPAS was administered via paper/pencil format for the posttest survey in Case 2018 to encourage a higher completion rate. Narrative responses to reflection questions were obtained separate from the modified IPAS posttest for Case 2018. After Case 2018, the tri-alliance IPE faculty decided to change instruments to measure behavior changes as the new learning outcome for future IPE events.

Following chronologically from 2018, the ongoing tri-alliance IPE workshop was severely affected by the COVID-19 pandemic in spring 2020. The IPE learning outcomes could no longer measure behavior changes because of how the IPE learning experiences were modified to achieve compliance with public health mandates. IPE faculty decided to return to using the same modified IPAS that was used with Case 2018 because it was a more accurate tool to

capture learning outcomes (i.e., attitude changes versus behavior changes) in consideration of the modified learning context, which was online and uniprofessional.

Because the IPE experience changed from interprofessional to uniprofessional, the method through which narrative student responses also changed to match the modified learning context. As such, for Case 2020, the modified IPAS posttest included the three original reflection questions from Case 2018 and an additional question about student perceptions related to attitude changes to permit greater opportunity for determining if learning outcomes were met. These reflection questions were included after the final survey item on the electronic modified IPAS. See Appendix M for the unmodified IPAS and Appendix N for the modified IPAS used for Cases 2018 and 2020. Of note, approval of modifications was obtained from an author of the IPAS who has also modified the IPAS from a 5-point to 7-point Likert, as well as using it as a pre-/posttest instrument (D. Blumenthal, personal communication, April 2, 2020). However, a limitation with using a modified version of the IPAS is that modifications are currently undergoing validation.

Controls and Limitations

Having discussed validity and reliability, controls and limitations related to these factors within this dissertation study's natural experiment design are described to provide insight into the quality and usefulness of its outcomes. Controls and limitations are discussed based on the type of threat they addressed.

Internal Validity Controls and Limitations

The internal validity threats previously identified are modestly controlled due to the retrospective design of the quantitative arm of this dissertation study; however, the homogeneity of characteristics between student groups in Cases 2018 and 2020 provided some control.

History, maturation, attrition, and selection bias were threats because of events that occurred

between pretest and posttest measurements and the resultant changes to the students, which

affected their likelihood of participation in their full IPE-based learning experiences and outcome

measures. Although circumstances for Case 2018 appeared stable, the historical events for Case

2020 were unpredicted and everchanging for the duration of the IPE learning experience due to

COVID-19.

However, excluding the historical event in 2020, these threats were constant between

both Cases due to their homogeneity and were therefore controlled. Students from both Cases

were enrolled in their respective programs at the exact same point in curricular achievement, so

level of education and academic experiences were the same between both cases. Testing had the

potential to be a threat; however, the detail of the instrument and the span of time from pretest to

posttest (two to three weeks) were perceived to have controlled this threat.

Construct Validity Controls and Limitations

Construct validity threats were modestly controlled mostly due to the study design. The

Hawthorne effect may have been a threat for either cohort. Because Case 2018 included the in-

person IPE workshop where other faculty and peers were present while taking the posttest

survey, the Hawthorne effect may have influenced the results of the posttest survey for Case

2018. Additionally, the placebo effect may have been a limitation based on student expectations

of positive outcomes from the IPE-based learning experiences because of pre-existing positive

attitudes. Reactive self-report and disruption effects were limitations because of historical events

most notably in Case 2020. But, because of the retrospective nature of this dissertation study and

its mixed methods design, the halo effect was controlled.

Although the previous construct validity elements were limitations, construct validity is a strength from the perspective of operationalization of constructs. Some construct validity threats were controlled during the planning of this dissertation study. Carefully defined concepts with illustrations and employing two complementary theories ensured accurate assessment of constructs.

External Validity Controls and Limitations

External validity was largely threatened due to the extenuating circumstances surrounding the historical event, COVID-19, in Case 2020. Generalizing to the whole population of the students of the tri-alliance and across settings, time, and variations of treatment was not feasible because of the novel complexities associated with a pandemic and the resultant contextual impacts that are not reproducible. Findings from Case 2018 were more likely to have stronger external validity than the findings from Case 2020.

Statistical Validity Controls and Limitations

Statistical validity was the strength of this dissertation study based on its controls. As previously noted, modifications to the IPAS were an approved strategy. To ensure accurate measurement, an operational definition about "shared learning" was provided for both Cases so that they had information and context to accurately answer five questions within the first subsection of the instrument. (This strategy also enhanced construct validity.) Students in Cases 2018 and 2020 were their own controls for pretest and posttest measures and had homogenous characteristics for between-group comparison.

Despite these controls, the differing sizes of the SLP student groups from Cases 2018 and 2020 limited comparisons between the Cases as whole groups. Case 2018 had 44% more SLP students than Case 2020, and OT and PT students were closer to equal group sizes in both cases.

Additionally, there were mixed results about the accuracy and utility of the IPAS in the

literature, despite confirmatory analysis.

Specific Procedures

Another strategy to control for threats is by following specific procedures for collecting

data, which promote process accuracy and reproducibility. Communication occurred with a

partnering program for access to Qualtrics® data for Cases 2018 and 2020, and access was

transmitted via encrypted email. The quantitative data from both cases were accessed and

transferred to IBM SPSS Statistics® software, Version 26.0 where data were cleaned,

coded/recoded as needed, tested, analyzed, and summarized. The qualitative data from Case

2018 were requested from a partnering program, and the document containing the students'

reflections was emailed via encrypted email.

After collecting these data for Case 2018 and qualitative data from Qualtrics® for Case

2020, data were organized, and content was analyzed for both Cases separately and transferred to

NVivo®, Release 1.3.1 software for word-based analysis. After separate Case-based analyses,

findings from both Cases were synthesized. After separate quantitative and qualitative analyses,

data were compared and analyzed together for synthesis of merged outcomes. Results from each

analysis informed all three research questions, hypotheses, and propositions.

Quantitative Data Analysis and Format

Variables and their Scales of Measurement

Based on the previously described variables, scales of measurement for each variable

assisted with determining the statistical tests appropriate for this dissertation study. The

dependent variable represented the outcome of interest: attitude changes about IPCP. Based on

the modified IPAS, which included a 7-point Likert scale, the dependent variable was considered

a summative response scale, which is a scale item that is more accurate than ordinal ranking and less specific than interval scales. This measurement variable is called "summative response scale" because the ratings of a set of items may be summed and averaged to obtain a participant's score on an inventory (Meyers et al., 2013, p. 15). As such, the average derived from the summative response scale is closer to interval-level than ordinal-level measurement, which allows for meaningful interpretation of averaged values (Meyers et al., 2013, p. 15). This detail is important to clarify because one assumption that must be met for selecting statistical tests is based on the measurement scale of the dependent variable. Because meaningful averages may be obtained by using summative response scale data from the modified IPAS ranging from "1-7," statistical tests that require interval or ratio scales of measurement may be considered.

IPE-based learning experiences was the independent variable with two levels. The first level represented Case 2018: the hybrid IPE learning experience with emphasis on the classroom-based workshop during typical curricular progression. The second level represented Case 2020: the uniprofessional, online modules and videos about IPCP during a pandemic. For this independent variable with two levels, the scale of measurement was nominal (i.e., categorical), and the numeral "18" was assigned to the IPE-based learning experience for Case 2018, and "20" was assigned to Case 2020.

Lastly, the students' professional programs were included for appreciation of similarities and differences within groups based on the Person construct of the PPCT model. Because the student professions were OT, PT, and SLP, this variable was also considered a nominal measurement scale. As such, the numbers "1," "2," and "3" were used to identify OT, PT, and SLP students, respectively.

Statistical Power

Statistical power allows the researcher to detect true effects of a variable like the power of a magnifying glass allows a person to see more detail (Meyers et al., 2013, p. 33). Three basic factors contribute to the level of statistical power: alpha level, effect size, and sample size (Meyers et al., 2013, p. 231). The alpha is the probability of rejecting the null hypothesis when it is true (i.e., Type I error). Alpha levels are typically set at .05, which means there is an estimated 5% chance of committing a Type I error; setting a more stringent alpha level decreases this dissertation study's statistical power. The effect size relates to the magnitude of group differences in the population, and larger effect sizes are associated with greater statistical power. Identifying effect sizes are typically informed by the literature. Lastly, sample size is attributed to statistical power because as sample size increases, standard errors decrease, confidence intervals are narrower, and statistical power increases (Meyers et al., 2013, p. 34-35, 231).

When calculating statistical power, the formula is $1-\beta$, and a power level is customarily set at .80 (Meyers et al., 2013, p. 231). Beta in hypothesis testing is the probability of accepting the null hypothesis when it is false, which is a Type II error. Based on this calculation, beta is .02, which means there is a 20% chance of making a Type II error.

When each component of statistical power was applied to this dissertation study, the power level of .80 was attempted to be achieved. The alpha was set $\alpha=.05$. The sample sizes are 119 students for Case 2018 and 95 students for Case 2020. Because convenience sampling was selected, achieving a specific sample size to represent a population was not applicable. However, if the total sample sizes for both cases were treated like the population, then, based on a sample size calculator, having 75-80% response rates on the modified IPAS would have produced meaningful and useful data (Christensen et al., 2014, p. 153). Therefore, for responses to be

generalized to both Cases' full sample sizes, Case 2018 required at least 89 responses, and Case

2020 required at least 71 responses.

Lastly, no literature was found to inform the effect size for this dissertation study.

However, based on experience, the effect size was anticipated to be at least medium between

Case 2018 and Case 2020 (Christensen et al., 2014, p. 256). According to an *a priori* power

calculation using GPower®, version 3.1.9.7, at least 64 student responses were needed from both

Cases to achieve a medium effect size.

Statistical Tests

Specific to Natural Experiments. Most literature that provided guidance on statistical

tests and analyses for natural experiments recommends use of the Instrumental Variable (IV).

The IV is a class of methods designed to control confounding and measurement error, but the

validity and interpretation of IV estimates depend on meeting its assumptions (Messer, 2012).

The assumptions are (a) the IV must be associated with exposure to the intervention, (b) must

have no association with any other factors associated with exposure, and (c) must be associated

with outcomes only through its association with exposure to the intervention (Craig et al., 2017,

p. 47; Messer, 2012). If all three assumptions are met, then a linear regression model (or IV

regression) is appropriate (Muller et al., 2013, p. 2; Salkind, 2011, p. 2). Although this

description appears to be a well-suited statistical method and test, its use was limited due to its

strict assumptions. As Messer (2012) pointed out, "even a small association between the [IV] and

the outcome, which is not solely mediated by the exposure of interest, can produce serious biases

on the IV effect estimates" (p. 4). There was an anticipated association between the IV (presence

of COVID-19) and the outcome, attitude changes; therefore, this assumption was not met, and

following advice from the literature, the IV statistical method and related tests were not appropriate for this dissertation study.

According to Craig et al. (2017), difference-in-differences (DiD) is another statistical method that may be appropriate for use in natural experiments. DiD is a statistical technique that tests changes in the outcome of interest pre-/postintervention compared in exposed and unexposed groups (Craig et al., 2017, p. 43). Through the use of linear regression, DiD is used to estimate the treatment effect on those who receive an intervention (i.e., causal effect in the exposed; Columbia University Mailman School of Public Health, n.d.).

However, a requirement for DiD involves the nature of the intervention and control groups: The intervention group is exposed to an intervention, and the control group is unexposed to an intervention. Although Case 2018 was treated like a comparison ("control") group, an IPE intervention was provided to them; therefore they, too, were "exposed," which did not meet the requirement to use DiD. Lastly, the use of DiD is to determine causal effect, but the intention of this dissertation study was to examine differences in outcomes through observation of retrospective-based data, not to identify cause.

Specific to the Modified IPAS. Because the variables within this dissertation study did not meet either statistical tests' assumptions or requirements commonly used for natural experiments, two articles were located that statistically tested the modified IPAS using a 7-point Likert scale. Although King and Violato (2020) reported no meaningful differences in attitude changes using data from the IPAS, they modified the IPAS from the original 5-point Likert to 7-point Likert scale after initial validation (p. 3). The statistical tests selected for their study that were applicable to this research included Repeated Measures ANOVAs for measuring changes in

IPAS scores over time and MANOVA for determining differences between cohorts on the five subscales of the IPAS (King & Violato, 2020, p. 3).

Marshall et al. (2020) conducted a mixed methods study using the modified IPAS for its quantitative instrument. Although use of the 7-point Likert scale was not specified in the article, one of its authors confirmed inclusion of this modification separately (D. Blumenthal, personal communication, April 2, 2020). The statistical test included in their study was the paired *t* test to allow pairing of pre/posttest survey data for each student using a unique anonymous code (Marshall et al., 2020, p. 218).

Specific to This Dissertation Study. Because of (a) the quantitative research question posed in this dissertation study, (b) the retrospective nature of its quantitative design, (c) the variables in this dissertation study, and (d) their identified limitations, statistical tests that were specifically described for natural experiments and that used the IPAS in previous research were considered not appropriate to use. However, the quantitative Research Question #2, was informed by other appropriate statistical tests. The dependent variable, attitude changes, was a summative response scale of measurement and, based on the literature, was used like an interval scale of measurement, therefore permitting use of parametric statistical tests. Because parametric tests must comply with specific assumptions, their results were more robust and sensitive.

Based on Research Question #2, the intent was to compare attitude changes between two independent groups: the students from Case 2018 and the students from Case 2020. Based on this intent, the independent samples *t* test was considered the most appropriate statistical test. In order to appropriately apply the independent samples *t* test, the following assumptions were required to be met:

- Assumption #1 requires that one dependent variable is measured at the continuous level.

- Assumption #2 requires that one independent variable consists of two categorical/independent groups (i.e., dichotomous).

- Assumption #3 requires an independence of observations.

- Assumption #4 requires that there are no significant outliers.

- Assumption #5 requires that the dependent variable is approximately normally distributed.

- Assumption #6 requires homogeneity of variances (Laerd Statistics, 2015).

If assumptions for the independent samples *t* test were not met, then the nonparametric Mann-Whitney *U*-Test was considered the most appropriate statistical test for two group comparisons. The assumptions underlying the Mann-Whitney *U*-Test are as follows:

- Assumption #1 requires that the dependent variable is continuous or ordinal.

- Assumption #2 requires that one independent variable consists of two categorical/independent groups (i.e., dichotomous).

- Assumption #3 requires that there is an independence of observations.

- Assumption #4 requires that the distribution of scores for both groups of the independent variable is the same (Laerd Statistics, 2015).

Both statistical tests were considered appropriate to inform Research Question #2. Their results were merged with qualitative data for informing the overarching mixed methods question.

Anticipated Limitations

The primary limitation anticipated within the quantitative arm of this dissertation study was the effects of differing response rates on the outcome measures of the natural experiment. Assumptions and hypotheses were made in anticipation that the ecological factors from Cohort 2020 affected students' likelihood of voluntarily completing the outcome measures

(pretest/posttest IPAS and responses to reflections). This limitation may have produced findings that were not truly representative of Case 2020 for an accurate comparison between Cases. However, statistical strategies using IBM SPSS Statistics® software, Version 26.0 allowed opportunities to test data in ways that produced meaningful and valid results.

This natural experiment produced meaningful results using the independent samples *t* test and the Mann-Whitney *U*-Test using IBM SPSS Statistics® software, Version 26.0. These quantitative results generated "timely practice-based evidence by determining what works [IPE intervention], for whom [students of the tri-alliance], and in what context [ecological factors]" (Leatherdale, 2019, p. 20). If this statement is true, then it may be applied to the ongoing IPE issue of not knowing "what works for whom and in what context" (Olson & Biolocerkowski, 2014).

Qualitative Study Design: Case Study

Like the rationale for the quantitative design per Edmonds and Kennedy's (2017) levels, the *method* level for this mixed methods design was informed by qualitative philosophical and analytical consideration, and the *research* level was nonexperimental. In this dissertation study's research design, no attempt was made to control or manipulate variables, and the focus was on understanding and meaning. Research Questions #3 in this dissertation study specifically sought to understand student perspectives about their experiences and perceptions in the presence of differing ecological factors present in Cases 2018 and 2020. Additionally, narrative data were analyzed through a qualitative explanatory *perspective* through examination of written responses to reflection questions provided by the students in Cases 2018 and 2020.

Lastly, the specific qualitative *design* was a case study based on how it aligned with Yin's perspective: time, place, person, event (Edmonds & Kennedy, 2017, p. 144; Yin, 2018).

According to Yin (2018), a case study is an empirical method that "investigates a contemporary phenomenon within its real-world context," especially when "boundaries between phenomenon and context may not be clearly evident" (p. 15). The student groups from Cases 2018 and 2020 were bounded systems based on real-world contexts of the presence or absence of COVID-19. Because both student groups met the definitions of a Case (see the following section for more Case definitions), Case 2018 and Case 2020 were the units of study. Additionally, case studies include the use of qualitative and quantitative data for fully understanding the identified cases and other phenomena of interest, which complements the mixed methods design of this dissertation study. Based on the justification provided at each level, the case study method (a) was considered the best qualitative research design to answer the qualitative research question, (b) was considered to accurately inform the overarching mixed methods research question, and (c) provided additional insight into the quantitative results that would not be available otherwise (see Table 7 for a summary of these concepts and their rationale).

Table 7

Concepts and Rationale for Case Study

Research Component	Research Specification	Rationale for Case Study
Method	Qualitative	For understanding student perspectives to gain insight about attitudes related to IPCP and to merge with quantitative data
Research	Nonexperimental	Because students' narrative responses were organic reflections and were collected from within their own contexts, which allowed natural themes to emerge
Perspective	Explanatory	For learning about students' perspectives about attitudes related to IPCP in the presence of differing ecological factors within Cases
Design	Case Study	Cases 2018 and 2020 were bounded systems; Case study naturally accepts analysis of qualitative and quantitative data for full understanding these Cases and related phenomena

Note. Concepts in this table were influenced by Edmonds and Kennedy (2017).

Because this case study research design primarily followed Robert Yin's perspectives, Yin-based instructions and advice were applied throughout this dissertation study. Yin described four specific case study designs that are commonly used for single- and multiple-case designs (see Figure 4; Yin, 2018, p. 48).

Figure 4

Yin's Basic Types of Designs for Case Studies
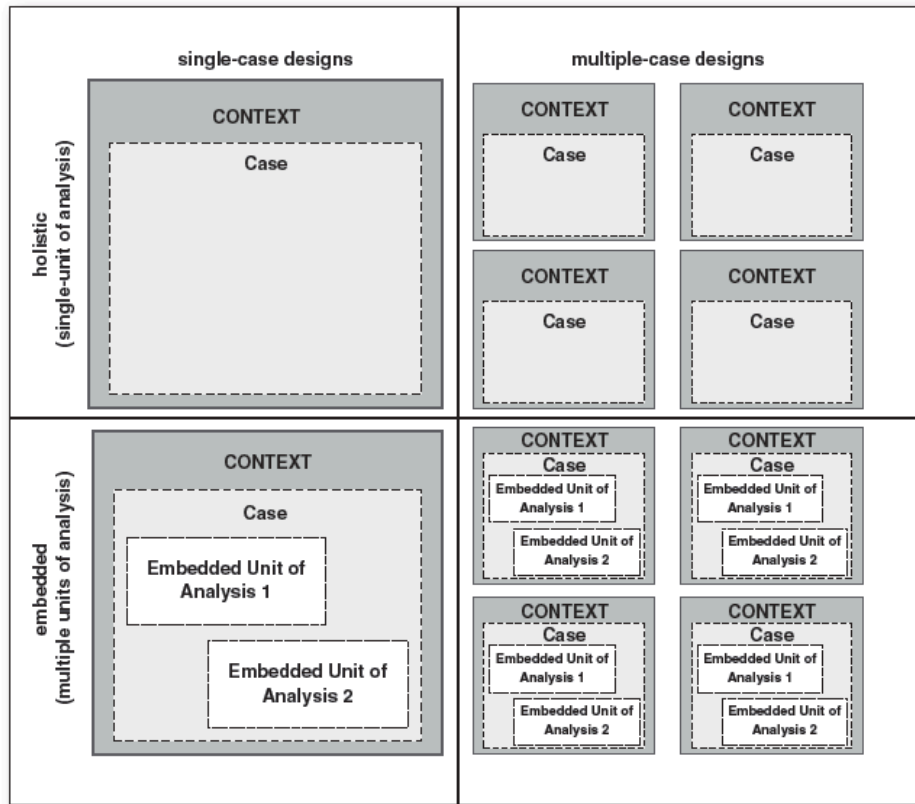
Note. From *Case Study Research and Applications: Design and Methods* (p. 48), by R. K. Yin, 2018, SAGE Publications. Copyright 2018 by SAGE Publications, Inc. Reprinted with permission (See Appendix O).

Applied to this dissertation study, a holistic multiple-case design was selected. See Appendix I for an illustration influenced by Yin that visually describes the holistic multiple-case design applied to this dissertation study. Holistic designs include a single unit of analysis within

a given context. The students from the tri-alliance represented one unit of study within their

respective Cases.

Strengths and Limitations of Design

The case study research design has many strengths and limitations. Because case study

research generally is classified as a qualitative method, strengths include creating in-depth

descriptions of complex phenomena situated within naturalistic contexts and developing an

understanding of personal meanings and experiences related to phenomena (NSU, 2017, p. 37).

The case study design in educational research is an effective method that allows researchers to

develop policy in order to set teaching standards and helps teachers become more knowledgeable

of and prepared for a variety of situations in the classroom (Mills et al., 2012a, p. 6). Specific to

the use of multiple-case design for comparison in this dissertation study, the evidence was more

robust and compelling, which will contribute to education research. Additionally, Cases 2018

and 2020 were heavily influenced by contextual factors that affected IPE-based learning

experiences. The qualitative findings may contribute to academic and policy-based knowledge

for enhancing IPE learning experiences in the future. Also, the large sample sizes for Cases 2018

and 2020 had potential for providing perspectives from multiple viewpoints.

General limitations about case study research are similar to other qualitative studies.

Some of these limitations include the inability to generalize findings and participant fear of

repercussions (NSU, 2017, p. 37). Informed consent and deidentification of student narrative

responses were controls used to protect participants within this dissertation study. However, a

characteristic of qualitative research is its concern with and interest in understanding unique

perspectives rather than generalizing findings. Therefore, no attempts were made to structure the

case study to address generalizability, especially with respect to the unique ecological factors in Case 2020.

Additionally, other limitations of case study research include being resource intensive (e.g., time, funding, experience of researcher; Mills et al., 2012a, p. 5). Of these, the primary limitation applicable to this research was the experience of the investigator. Another notable limitation within this case study was using data from two events that had already occurred, and opportunity to obtain richer, deeper qualitative information from students from either case was not available. Therefore, the only qualitative data gathered were from the students' narrative responses to reflection questions from Cases 2018 and 2020, which limits the depth of their perspectives about IPCP.

The Case Study Question and Propositions

Identifying research questions is the first of five components of a case study research design (Yin, 2018, p. 27). Case study research traditionally asks "how" and "why" questions, and these questions commonly arise during the literature review (Yin, 2018, p. 27). According to the literature review results in Chapter 2, two specific articles that met inclusion criteria were case study research designs, but neither was a part of mixed methods design (Brewer & Flavell, 2020; Brewer et al., 2017). The aims for their case studies were to understand student perceptions about practice-based IPE and to discover how a conceptual model that included context affected teaching and learning during practice-based IPE (Brewer & Flavell, 2020; Brewer et al., 2017). Although relevant, the results of their studies did not inform the qualitative research question for this dissertation study. Research Question #3 asked, "In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?"

After identifying the qualitative research question in Yin's process, the next step was to identify propositions about the question. Theoretical study propositions are the second component of case study research and are identified to shape research design and guide data collection and analysis (Layder, 2019, p. 4; Yin, 2018, p. 35). After data collection and analysis, the propositions are confirmed, rejected, or modified (Layder, 2019, p. 4). Propositions within this case study were informed by theory (i.e., BTHD and EHP), specifically about the importance of the interrelatedness of the Person with Context. The specific theoretical propositions pertaining to Research Question #3 complemented the assumptions of this dissertation study and aligned with BTHD and EHP. The propositions' corresponding rival hypotheses will be explained in the section, "Criteria for Interpreting Findings."

- Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

- Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

- Proposition 3.3: The IPE-based teaching interventions selected for Cases 2018 and 2020 were perceived differently concerning the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

The Cases

The third component of case study research is to define and bound the cases being studied, and research questions and propositions assist with identifying relevant information to be collected about individuals (Yin, 2018, p. 29). A case is a bounded unit of study about a

contemporary phenomenon within its natural context (Yin, 2012; Yin, 2018). As such, Case

2018 and Case 2020 were defined and bounded by spatial and temporal dimensions.

Case 2018

The three primary components of Case 2018 were the students of the tri-alliance, their

IPE intervention, and the contextual conditions during this time. The students of the tri-alliance

represented an entire cohort consisting of pre-qualification OT, PT, and SLP students equaling a

total of 119 students. This cohort engaged in the regularly scheduled hybrid IPE learning event in

April 2018 according to the typical curricular sequence. This event included some independent

student activities, but the majority of learning experiences were either in small interprofessional

groups or the collective cohort.

Case 2020

Like Case 2018, the three primary components of Case 2020 were students of the tri-

alliance, their uniprofessional IPE-based interventions, and the contextual conditions during this

time. The pre-qualification, uniprofessional student cohorts of the tri-alliance consisted of 95

students altogether. This cohort engaged in modified learning experiences in April 2020 due to

abrupt curricular changes from COVID-19 public health mandates. This IPE-based event

primarily consisted of online modules or web-based simulations about IPCP that each student

completed independently according to their respective programmatic instructions.

Linking Data to Propositions

The fourth component of case study research foreshadows the data analysis steps for the

study (Yin, 2018, p. 33). Based on alignment with the research question and with BTHD and

EHP, the specific strategies of data analyses relied on theoretical propositions, which is one of

four general strategies recommended by Yin (2018, p. 168). By relying on theoretical

propositions, the plan for data collection and analysis plan was organized in a way that informed the research questions while simultaneously testing theory (see also "Specific Protocol for Collecting and Analyzing Qualitative Data" section).

Criteria for Interpreting Findings

Just as quantitative data analysis includes calculation of statistical significance, effect sizes, and confidence intervals for interpreting findings, the strategy through which case study data are interpreted is to identify and address rival explanations of the findings (Yin, 2018, p. 33). Rival explanations are alternate explanations to the same set of data, so they provide another way to explain the same results of a study (Discover Your Solutions, n.d.). A study's findings are stronger when more rival explanations, also called rival hypotheses, are identified in the beginning of the research project and rejected after data are analyzed (Yin, 2012). For this dissertation study, rival hypotheses (listed below) were influenced by their corresponding theoretical propositions. These rival hypotheses provided the criteria by which theoretical propositions were confirmed, rejected, or modified.

- Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

- Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived similarly about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

Data Collection Instruments

The data source for qualitative analysis was student responses to predetermined, open-ended reflection questions about the phenomena of interest, which were the students' unique experiences with their IPE-based learning format and respective perspectives and attitudes about IPCP. The specific questions for Cases 2018 and 2020 are as follows:

Case 2018

1. What did you find beneficial or like the most from this IPE workshop?

2. How will your new knowledge of and experience with interprofessional collaboration affect your future practice?

3. How would you improve this IPE workshop for future students?

Students from Case 2018 provided their narrative responses to these three reflection questions on a web-based document (Google Docs® on Google Drive®) for their interprofessional teams to access, read, and provide comment for asynchronous, interprofessional, electronic dialogue.

Case 2020

1. What did you find beneficial or like the most from this IPE learning experience?

2. How has your attitude changed about interprofessional collaboration after this IPE learning experience?

3. How will your new knowledge of interprofessional collaboration affect your future practice?

4. How would you improve this IPE learning experience for future students?

Students from Case 2020 provided their narrative responses to these four reflection questions individually as a part of the ending section on the electronic modified IPAS posttest.

Questions 1, 3, and 4 were conceptually the same between Cases 2018 and 2020, which were about the students' overall experiences; however, Case 2020 had an additional question specifically about the overarching outcome: attitude changes about IPCP. Reflection question #2 was added for the students of Case 2020 specifically due to ecological factors surrounding the COVID-19 pandemic. IPE faculty were interested in how these factors may have influenced the students' perceptions of attitude changes about IPCP because their learning experience for Case 2020 was uniprofessional and not interprofessional. The responses to all questions from Cases 2018 and 2020 were expected to provide deeper understanding about how students completed their pretest and posttest self-reported surveys (i.e., modified IPAS), but there were no expectations about the likelihood of qualitative and quantitative data converging or diverging due to the complexities surrounding Case 2020.

Specific Protocol for Collecting and Analyzing Qualitative Data

The investigator requested from the partnering academic programs the pretest and posttest modified IPAS survey results for Cases 2018 and 2020 and the student narrative responses for Case 2018. Data from Case 2018 and Case 2020 analysis began with familiarization then content examination, interpretation, and synthesis. Familiarization strategies included notetaking, memoing, and rereading student responses. Coding, theme identification and organization, and finding word frequencies were the content analysis strategies used after familiarization. Pattern matching and explanation building began the interpretation of qualitative findings from the content analysis, which pertained to confirming, rejecting, and modifying propositions through application of rival hypotheses. Cross-case synthesis—an analysis technique that applies to multiple-case studies—completed the qualitative analysis (Yin, 2018). Exemplar student quotes were linked with specific themes, interpretations, and synthesis. After

cross-synthesis, Research Question #3 was addressed. Lastly, the qualitative findings were

compared with quantitative results, and the outcomes were merged to inform Research Question

#1.

Trustworthiness and Integrity

One of the reported limitations of qualitative research is its reliance on subjective data

sources as opposed to objective data sources, which may affect validity and reliability of a study.

However, case study, as a traditionally qualitative method, enhances trustworthiness and

integrity by following specific strategies that address construct validity, internal validity, external

validity, and reliability (Yin, 2018, p. 42-47). Yin (2018) recommended implementing four

specific strategies of data collection from six types of evidence to enhance validity and reliability

in the data collection phase (pp. 114, 126-137). According to Yin (2018), the six types of

evidence that are important for case study research are documentation, archival records,

interviews, direct observations, participant observation, and physical artifacts. The four data

collection strategies are (1) use multiple sources of evidence for triangulation; (2) create a case

study database for organization of data and notations; (3) maintain a chain of evidence for

enhancing construct validity; and (4) exercise care when using data from social media sources

(Yin, 2018).

Applied to this dissertation study, several strategies were employed to address

trustworthiness and integrity of findings during data collection and analysis. All qualitative data

were from one type of data source: archival records. Although this type of evidence was stable

and specific to Cases 2018 and 2020, selection bias limited validity based on incomplete or

absent reflection responses. Additionally, archival records were the only source of qualitative

data available for this dissertation study.

However, this dissertation study utilized the data from two complementary sources: quantitative modified IPAS data and qualitative narrative responses to reflection questions after the IPE-based learning experiences, which means low level data triangulation occurred. Although the investigator was the primary person performing all parts of this research, a qualified peer reviewer was recruited for investigator triangulation. Lastly, theory triangulation was employed for testing the BTHD and EHP with the results of the qualitative analysis. Also, because the qualitative evidence was limited to archival records, creating a database was not necessary, and the tables in Appendices S through U were sufficient. These tables also provided a modest chain of evidence that described an organized, logical flow of analysis that linked case study findings to research questions.

Additionally, Yin (2018) described the use of replication logic to enhance reliability of findings. The individual cases within the multiple-case design must either predict similar results (i.e., literal replication) or predict contrasting results for anticipated reasons (i.e., theoretical replication; Yin, 2018, p. 55). Much as quantitative studies usually include measures of statistical significance and confidence intervals, case studies provide a number of replications that an investigator would want in the multiple-case results (Yin, 2018, p. 59).

Applied to this dissertation study, theoretical replication is the most appropriate replication logic and was applied during data interpretation with pattern matching and explanation building. In addition, investigators must decide on the number of replications necessary to provide evidence of reliability. Based on confidence in the propositions within this dissertation study, at least two theoretical replications were hypothesized to produce consistent results. However, if theoretical propositions (and replication) were rejected, the propositions

would be modified, which would then produce literal replication and maintain reliability of findings.

Based on data collection and analytical strategies, validity and reliability of the findings were enhanced. Construct validity was strengthened by using two sources of data: the quantitative data from the modified IPAS and the qualitative data from the students' narrative responses to reflection questions. Internal validity was enhanced through content analysis, interpretation procedures, and cross-case synthesis. External validity was enhanced using theory and replication logic. Lastly, reliability was enhanced by following the case study protocol, developing and using data organization strategies, and maintaining a chain of evidence (Yin, 2018, p. 43). By following careful steps to enhance validity and reliability, the trustworthiness and integrity of findings produced high quality findings from the case study arm for this mixed methods study.

Anticipated Limitations

As previously described, this case study has limitations largely associated with having only one source of qualitative data. This portion of the study had low level evidence due to relying on responses to questions after a survey (e.g., "derived" data) versus collection of qualitative data in natural settings (Yin, 2012, p. 5). This limitation was due to this case study's retrospective-type approach and an inability to seek more qualitative data from different sources. Additionally, using the modified IPAS with 27 quantitative items and three to four open-ended questions does not produce a rigorous, in-depth qualitative inquiry nor database (Creswell & Plano Clark, 2018, p. 190).

Another limitation was that the qualitative data were unable to be matched the participant's specific quantitative data from Case 2018. This limitation was due to how their data

were deidentified separately in April 2018. Lastly, the assumption that student participation

might be affected by ecological factors predicted a limited supply of qualitative data sources

from Case 2020. However, according to Creswell and Plano Clark (2018), size differential

between the quantitative and qualitative databases is less of an issue because "quantitative data

collection aims to make generalizations to a population while qualitative data collection seeks to

develop an in-depth understanding from a few people" (p. 188).

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Data Management

</div>

Collection

According to Creswell and Plano Clark (2018), "Data collection decisions for mixed

methods case study design involve determining the boundaries for a case and deciding on criteria

for distinguishing among cases if data are collected on multiple cases, employing rigorous

quantitative and qualitative data collection through convergent core design, and aligning multiple

cases in order to facilitate cross-case comparisons" (p. 200). Because the IPE-based learning

experiences for Case 2018 and Case 2020 had already occurred, all three professional program

leaders from each partnering university provided written permission to share their students' data

that were specific to the IPE experiences in Cases 2018 and 2020.

The deidentified pretest quantitative data were collected via the modified IPAS through a

partnering university's survey software license with Qualtrics®. The posttest for Case 2018 was

the paper-based modified IPAS at the end of the IPE workshop, and for Case 2020, the posttest

was the electronic modified IPAS. All quantitative survey data were deidentified (but remained

organized) by asking students to provide their mothers' birthdays as their unique student

identifier. Only student profession was tracked for demographic data. The qualitative data

collection was different between Cases 2018 and 2020 based on their unique ecological factors

described in the sections below. Case 2018 qualitative data was obtained separate from the

modified IPAS, and, for Case 2020, they were obtained with the modified IPAS after the final

survey item.

For Case 2018

For the students from Case 2018 who agreed to participate in the survey, the pretest

modified IPAS quantitative data were collected as the first step of the students' IPE learning

experience, which was approximately two weeks before the classroom-based IPE workshop. The

paper-based posttest IPAS quantitative data were collected at the end of the classroom-based IPE

workshop that same day. As a part of each program's requirements for finishing the IPE event,

all students shared narrative reflections about their learning experiences; these qualitative data

were linked with the student's identity because it was required for earning full credit on the

assignment.

Students shared their narrative reflections by answering three open-ended questions

located on the free, web-based word processing software, Google Docs®, in Google Drive®, a

web-based, password protected server. Members of the students' interprofessional teams were

able to read and respond, and faculty were able to appraise. Google Drive® was selected by IPE

faculty based on its accessibility to each program's students and faculty and because no

academic program had ability to give permissions for accessing its learning management systems

to other academic programs.

For Case 2020

For Case 2020, faculty modified the hybrid IPE event in anticipation of campus closures

due to COVID-19 pandemic. The decision to modify as opposed to cancel was in hope of sparing

the intent of the experience by utilizing online, uniprofessional modules or simulations about

IPCP. Students in Case 2020 were given instructions about the modified IPE-based learning experience in time for the first step to begin with the modified IPAS pretest via Qualtrics®; the time at which they took the pretest survey was approximately the same point as Case 2018. Like Case 2018, taking the IPAS was voluntary for the students of Case 2020, as well.

After students from each program completed their uniprofessional online learning experience about IPCP, they were provided with the electronic modified IPAS posttest to voluntarily complete. Students were encouraged to share individual reflections by answering four open-ended questions about their learning experiences, which were located at the end of the modified IPAS. No student peers had opportunity to provide comments. Unlike Case 2018 for whom the narrative reflections were required and who were not deidentified at the time (but were deidentified by a partnering program for this study; see below), Case 2020 provided their narrative reflections as a part of the modified IPAS posttest through their own volition while remaining deidentified.

Storage

Prior to NSU IRB approval, the deidentified quantitative survey data from Case 2018 and the deidentified quantitative and qualitative data from Class 2020 were stored in a partnering program's Qualtrics® account. After IRB approval, the deidentified data were transferred from Qualtrics® to Microsoft Excel® spreadsheet for password protected, secure electronic file storage. The narrative reflections from Case 2018 were removed from Google Drive® by the document administrator at a partnering program, deidentified by an IPE faculty colleague at the partnering program through the removal of student names (but keeping their professions) and stored on the partnering program's web-based data management system until requested after IRB approval.

Although these qualitative data have been previously accessed by this investigator as a part of the IPE learning experience requirements for Case 2018, the qualitative data had not been viewed by this investigator since that time. After NSU IRB approval, the freshly deidentified qualitative data from Case 2018 were requested, sent as a password-protected Microsoft Word® document via encrypted email, and stored in password protected, secure electronic file storage. Although the responses to open-ended questions for Case 2018 were obtained differently from the other data, the data inclusion process was easy to perform and preserved the integrity of the data. Of note, the sequence and method of deidentifying quantitative and qualitative student responses for Case 2018 were the reasons why their quantitative and qualitative data could not be matched at the participation level.

Management and Organization

The password protected, electronically stored, deidentified quantitative and qualitative data were managed and organized separately prior to merging. All tasks were performed on a password protected computer. The quantitative data gathered from the modified IPAS pretest and posttest surveys were entered into IBM SPSS Statistics® software, Version 26.0 for appropriate statistical tests and analyses. The qualitative data gathered from the narrative responses to reflection questions were analyzed using Microsoft Word® documents for coding, organization, and content analysis. NVivo®, Release 1.3.1 software was used for word-specific analysis. No transcription was necessary due to the responses already being typewritten by the original sources in response to the open-ended questions. Upon the completion of the separate analyses for quantitative results and qualitative findings for Cases 2018 and 2020, the outcomes were merged for collective analysis necessary for mixed methodology research designs.

Resource Requirement

The financial, human, and physical resources required for this research were minimal. The financial resource requirement was $200, which included the costs to purchase licenses for use of IBM SPSS Statistics® software, Version 26.0 and NVivo®, Release 1.3.1 software. The other costs were associated with gifts of gratitude to the programs and professionals who have provided assistance throughout the research process. All items have been afforded through personal financial resources.

Because the IPE learning experiences for Cases 2018 and 2020 have already occurred, the human resources to complete this dissertation study were also minimal. The investigator was the sole individual who conducted, analyzed, and disseminated this research. For accuracy of data analyses, a qualified peer reviewer was recruited to assist with verification of qualitative findings. The only other individuals involved in this research were IPE faculty from partnering programs who oversaw storage of the data until requested and those who were serving on the investigator's dissertation committee. Lastly, the physical resources were also minimal. Other than basic office equipment, no other physical resources were needed to conduct this research.

Ethical Considerations and Review

No matter how complex or basic a research project is planned to be, all research must be ethical. According to Summers (2019), there are four commonly used principles of health care ethics: nonmaleficence, beneficence, autonomy, and justice (p. 41). As a part of the Health Sciences program at NSU, these principles were applied to the conduct of this dissertation study. Additionally, as per the Office for Human Research Protections (n.d.), the Common Rule, 45 CFR 46, which is influenced by the Belmont Report, outlines the provisions for IRBs, informed consent, and Assurances of Compliance. As such, NSU IRB complies with the Common Rule,

and NSU IRB approval for this dissertation study was obtained on September 18, 2020 (see

Appendix P for IRB approval letter).

No matter the preliminary assurances, research participants' rights, health, and welfare

must be protected throughout the process. Although this dissertation study required information

from and about students of the tri-alliance from Cases 2018 and 2020, only student professions

were matched with their responses, and all other student data were deidentified. Additionally,

students were informed that (a) participation in the pretest and posttest surveys was voluntary,

(b) their identities were protected using their mothers' birthdays as the only identification source

for data management, and (c) their progression to the first survey item indicated their agreement

to participate. This process protected them from harm through deidentification when their data

were analyzed. Because the events have already occurred and data were deidentified, the benefits

of this dissertation study were considered to greatly outweigh the risks, which qualified this

dissertation study as exempt from full NSU IRB review.

Timeline and Delimitations

Timeline

Because the IPE learning experiences had already occurred, the timeline for this research

was based on the timing of IRB approval, the investigator's ability to consistently work on the

research, and the dissertation committee's ability to review each written draft of the research.

Parameters

The parameters (i.e., delimitations) of this dissertation study were the boundaries in

which the study occurred. The study included only the graduate level OT, PT, and SLP programs

in Louisville, KY for a total of three participating programs. Only the OT, PT, and SLP students'

data within these programs who participated in the interprofessional, classroom-based IPE

workshop in April 2018 (Case 2018) and who participated in the uniprofessional, online IPE-based learning modules in April 2020 (Case 2020) were included. These two IPE-based learning experiences occurred at the same time within each program's respective curricula: before high-level clinical internships for OT and PT students (mid-curriculum) and after high-level clinical internships for SLP students (one month before graduation).

As a part of each program's existing IPE objectives, outcome measures, and related professional accreditation standards, all students were required to engage in their program's collaborative IPE learning experiences but were invited to voluntarily participate in a survey. All students who chose to voluntarily take the survey supplied a unique numerical identifier to maintain their anonymity and were invited to complete the survey before and after their IPE learning experiences. All students who chose to voluntarily take the survey were requested to provide qualitative reflections after their IPE learning experiences. All student information (excluding profession) was deidentified upon receipt of their raw data.

Summary

In summary, a comparative mixed methods case study was used to test the research hypotheses through collection of quantitative and qualitative data for comparing, combining, and then discussing multiple components of student attitudes related to IPCP within varying ecological factors. A questionnaire variant to this mixed methods study allowed for analysis of results from a pretest/posttest survey that gathered closed- and open-ended data (Creswell & Plano Clark, 2018, p. 73). The reason for collecting quantitative and qualitative data was to converge results of the two forms of data for providing greater insight into the problem than was available by either type of data separately. Because the IPE-based learning experiences have already occurred, the quantitative arm of this dissertation study was natural experiment, and the

qualitative arm was case study. The tri-alliance students from April 2018 and April 2020 and their unique ecological factors represented the two distinct Cases that were studied in this comparative mixed methods case study, thus providing new insight and knowledge into the ecology of IPE.

Chapter 4: Quantitative Results, Qualitative Findings, and Merged Outcomes

The purpose of this dissertation study was to compare and understand attitude changes about interprofessional collaborative practice (IPCP) in two groups of students of the tri-alliance—specifically, occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP)—after participating in different interprofessional education (IPE)-based learning experiences. These IPE-based learning experiences involved different teaching interventions that occurred in the presence of very different ecological factors at different points in time—specifically, April 2018 and April 2020.

The two tri-alliance student cohorts and their unique IPE-based learning experiences were identified as Case 2018 and Case 2020 and were studied through a comparative mixed methods case study design. Case 2018 included 119 OT, PT, and SLP students who engaged in interprofessional, hybrid IPE—with an emphasis on an in-person, on campus workshop—during typical curricular progression in April 2018. Case 2020 included 95 OT, PT, and SLP students who engaged in uniprofessional, primarily online IPE-based learning experiences in April 2020, which was during atypical and disrupted curricular progression due to the coronavirus pandemic (COVID-19).

IPE challenges (i.e., research problems) were identified from two perspectives. One perspective was from the students of the tri-alliance and their learning outcomes about IPCP in the presence of highly complex ecological factors. The other perspective was related to the IPE knowledge base. A gap in IPE literature was identified about the effects of ecological factors, their implications on higher education (specifically, IPE and student learning outcomes), and a common theoretical base that links the two.

Research Questions

To address these IPE challenges, this dissertation informed the following primary research question and its two sub-questions:

1. For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative perspectives about IPCP after their respective IPE-based learning experiences in the presence of differing ecological factors?

   - H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show no significant nor meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and 2020.

   - H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020.

   - H_{O2}: The merged quantitative results and qualitative findings show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

   - H_{A2}: The merged quantitative results and qualitative findings show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

2. For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?

- H_O: There is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

- H_A: There is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

3. In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?

    - Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

    - Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

    - Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

    - Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

    - Proposition 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for Cases 2018 and 2020 were perceived similarly about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

Bronfenbrenner's Bioecological Theory of Human Development (BTHD) was the guiding theory for this dissertation study, and its Process-Person-Context-Time (PPCT) model operationalized the BTHD within mixed methods research design (Bronfenbrenner & Morris, 2006). Additionally, Ecology of Human Performance (EHP) was the supporting theory for interpreting outcomes of this dissertation study (Dunn et al., 1994; Dunn, 2017). Theoretical constructs within the BTHD, its PPCT model, and the EHP were written as proper nouns to identify when these constructs were being applied to concepts within each chapter. Use of the BTHD, its PPCT model, and the EHP guided this dissertation study, aided in interpretation of results, and allowed the theories themselves to be tested (J. Tudge, personal communication, December 9, 2020). See Appendices C, D, F, and G for full definitions of these theories, their constructs, and supporting schemas.

Chapter Overview

The flow of this chapter consists of four sections. The first section provides results from quantitative testing and analysis that informed Research Question #2. The next section provides descriptions of the findings from qualitative data and analysis that informed Research Question #3. The final analysis is provided in the following section that merged the quantitative results and qualitative findings that informed Research Question #1. This section also describes results from testing the BTHD, its PPCT model, and the EHP. Lastly, this chapter ends with a summarizing section that prepares the reader for Chapter 5, Discussion.

Quantitative Results

Quantitative Research Question 2 and Hypotheses

The quantitative question being examined is "For students of the tri-alliance, is there a difference in attitude changes about interprofessional collaborative practice (IPCP) between the unique interprofessional education (IPE)-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?" Its null hypothesis states that there is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors. The alternative hypothesis states that there is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

Preparing the Data

Coding

Quantitative data from the modified Interprofessional Attitude Scale (IPAS) were obtained from Qualtrics® survey software, transmitted via secure email communication from a partnering program, and presented in Microsoft Excel® format for Cases 2018 and 2020. This version of the IPAS received the following modifications: (a) changed from paper-based survey to electronic, (b) expanded the 5-point Likert scale to a 7-point Likert scale, and (c) used as a pretest/posttest instrument. Raw data from the modified IPAS were in text format, which required conversion to numbers based on the 7-point Likert scale for all 27 survey items ranging

from 1 (*strongly disagree*) to 7 (*strongly agree*). After converting text to numeric data for coding, three survey items were reverse coded.

The IPAS (original and modified) includes five subcategories. In the subcategory "Teams, Roles, and Responsibilities," item #8 states, "It is not necessary for health sciences students to learn together," and due to its negative wording, the instrument authors' recommended reverse coding (Norris et al., 2015, p. 16). In the subcategory "Interprofessional Biases," item # 15 states, "Health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying"; item # 16 states, "I have prejudices or make assumptions about health professionals/students from other disciplines." Ideal answers for items #15 and 16 would be lower on the Likert scale versus higher, which is inconsistent with how the other survey items would be ideally answered (i.e., higher along the Likert scale versus lower).

According to Norris et al. (2015), the initial confirmatory factor analysis of the original IPAS indicated that the Interprofessional Bias subcategory did not load significantly on the IPAS and was the least reliable indicator of interprofessional attitudes (k = 3, path coefficient = 0.03, *p* = 0.61; pp. 6, 11). The authors identified that this outcome was likely due to having the fewest items of measurement. The authors did not mention the need for reverse coding items #15 and 16; however, coding the data without reverse coding would produce unreliable results for the Interprofessional Biases subcategory (see Appendix N for modified IPAS survey items).

Based on wording about negative interprofessional traits and based on the wording of the Likert scale, inconsistency in measurement and scoring of items #15 and 16 in comparison to the remaining 24 items threatened validity of findings and presented opportunity for reverse coding. After inquiring with an IPAS author, the decision to reverse code items #15 and 16 was

supported (D. Blumenthal, personal communication, September 28, 2020). Unfortunately, the

literature does not report reverse coding of items #15 and 16, which eliminated opportunity for

comparison of this subcategory's results, at a minimum, with past studies.

Cleaning

After all coding and reverse coding were completed, the data were cleaned and missing

data from nonresponses were managed. The modified IPAS data from Case 2018 had 100%

pretest and posttest completion rate with no missing data from its entire sample of 119 students.

For Case 2020, students' pretest and posttest responses did not have 100% completion rate like

Case 2018.

For Case 2020, the pretest/posttest missing responses appeared to be missing at random

(MAR). For data to be MAR, "the propensity for a data point to be missing is not related to the

missing data, but it is related to some of the observed data" or "the missingness is conditional on

another variable" (Grace-Martin, n.d.). Therefore, the pretest/posttest responses for Case 2020

were MAR because the pattern of the missing survey items did not appear to be related to the

missing values themselves but related to the values of some other variable (e.g., Contextual

factors or IPE learning experiences; Grace-Martin, n.d.; Spiess, 2017, p. 3). Based on the

conditions of missingness for the characters of the data gathered from the modified IPAS for

Case 2020, conditions did not meet those that would identify the missing data to be considered

Missing Completely at Random (MCAR) or Missing not at Random (MNAR; Kang, 2013, pp.

402-403).

To begin management of the MAR data gathered from the modified IPAS and to compare

complete versus incomplete response rates in Case 2020, a cut-off point of $\geq$70% completion

was selected. Establishing this cut-off point meant that at least 19 out of the 27 survey items had

a participant's original response prior to management of the missing data. After this cut-off point was applied, students' overall pretest and posttest participation rates for Case 2020 were 75.8% and 22.1%, respectively (see Table 8). Based on *a priori* power analysis, the pretest response rate was adequate for generalization to all students in Case 2020; however, their posttest response rate was not.

Table 8

Cases 2018 and 2020 Modified Interprofessional Attitude Scale (IPAS) Pretest/Posttest Response Rates

Students	Pretest participation rate	Posttest participation rate
	Case 2018	
OT	(41/41) 100%	(41/41) 100%
PT	(44/44) 100%	(44/44) 100%
SLP	(34/34) 100%	(34/34) 100%
Total	(119/119) 100%	(119/119) 100%
	Case 2020	
OT	(36/42) 85.7%	(12/42) 28.6%
PT	(25/38) 65.8%	(3/38) 7.9%
SLP	(11/15) 73.3%	(6/15) 40%
Total	(72/95) 75.8%	(21/95) 22.1%

Note. The response rates are based on ≥70% completion rate, meaning at least 19 out of 27 survey items were completed by each student before missing data management strategies were applied.

Missing Data Management

Because pretest/posttest survey results for Case 2018 were 100% complete and Case 2020 were not, only the data from Case 2020 required management for the missing items (i.e., nonresponses). One strategy to obtain responses to missing items is to gather more data;

however, due to the nature of this natural experiment being retrospective, opportunity to gather

more information from Case 2020 was not available. According to Kang (2013), if collecting

more data is not possible, then a common approach to managing MAR data is by omitting those

cases through listwise deletion. Another strategy is to replace each missing value by an arbitrary

or predicted value through simple or complex imputation (Spiess, 2017). The management

strategy for the survey nonresponses in Case 2020 involved a combination of listwise deletion

and simple imputation.

For Case 2020, $N = 95$, all nonresponses in the pretest/posttest surveys were coded with

"0." With this modification, which is considered a simple imputation, the Likert scale changed

from a 7-point scale to an 8-point scale beginning with 0 (*no response*) through 7 (*strongly*

agree). This data management strategy was selected to permit full sample comparisons between

Case 2018, $N = 119$ and Case 2020, $N = 95$. The effect of using the 0 simple imputation strategy

was no different than leaving responses empty; however, the significance of using 0s was to

reflect the importance of each student in both Cases as bounded systems. Next, data were entered

into IBM SPSS Statistics® software, Version 26.0, validated, and confirmed to have no missing

data for Case 2018, $N = 119$ and Case 2020, $N = 95$ (total of 214 participants).

After filling in nonresponses with "0" for Case 2020, $N = 95$ and completing the first

phase of statistical testing (see section Quantitative Results for Research Question #2), listwise

deletion was selected to remove all participants with 0% completion from pretest and posttest

survey responses. After deleting all participants' responses with 0% completion, 74 pretest and

24 posttest participants remained. The remaining pretests included 65 participants with 100%

completion and nine participants with a range of response rates from 3% (1/27) to 96% (26/27)

completion. The remaining posttests included 20 participants with 100% completion and four participants with 3-96% completion.

As such, posttest completion for Case 2020 was prioritized over pretest to use for examining the most complete outcomes. This strategy was preferred for maintaining the integrity of posttest responses as opposed to having a majority of posttest imputations from nonresponses if pretest completion was prioritized for achieving a larger sample size. Prioritizing the integrity of responses over sample size was influenced by the importance of Process and Person constructs of the Process-Person-Context-Time (PPCT) model within Bronfenbrenner's Bioecological Theory of Human Development (BTHD). The posttest participants' responses were matched with their corresponding pretest survey responses, which totaled 24 participants' pretest/posttest responses that were kept for analysis from Case 2020. The remaining participants' pretest responses that were unmatched with a posttest response were deleted. As such, Case 2020 with its new sample size of $N = 24$ consisted of 13 OT students, four PT students, and seven SLP students (see Table 9).

Table 9

Case 2020 Missing Data Listwise Deletion Results

Missing Data Deletion Step	Case 2020, Pretest	Case 2020, Posttest
Before listwise deletion	$N = 95$	$N = 95$
After listwise deletion	$N = 74$	$N = 24$
After matching pretest and posttest participants	$N = 24$	$N = 24$

Note. All students with 0% completion were deleted through listwise deletion. Pretest and posttest completion rates ranged from 3-100% completion resulting in 74 pretest student responses and 24 posttest student responses. Posttest responses were prioritized, so pretest and posttest Ns were matched for the final $N = 24$ in Case 2020.

After listwise deletion was completed, five participants' pretest responses and four participants' posttest responses required imputation. Missing data were managed through conditional mean substitution—another simple imputation strategy—because this method "takes into account relationships between the variables to be imputed and the other variables in the data set" and "has the potential of allowing unbiased references" (Spiess, 2013, p. 601). Therefore, the conditional mean substitution method was anticipated to supply reliable estimates for missing data from Case 2020, $N = 24$. The process by which conditional mean substitution was employed is described as follows:

- If the participant had 50% or more of a modified IPAS *subcategory* completed, then that participant's own average response from that specific subcategory was used to fill in missing data.

- If the participant had less than 50% of a subcategory completed, then the average response of that participant's peers from the same professional group for that specific subcategory was used to fill in missing data.

After conditional mean substitution was completed for Case 2020, $N = 24$, 12.8% of pretest responses and 9.7% posttest responses required imputations (see Table 10).

Table 10

Case 2020, N = 24 Imputation Results

IPAS	Participants with Missing Data ($N = 24$)	Total Imputed Items	OT Imputations ($n = 13$)	PT Imputations ($n = 4$)	SLP Imputations ($n = 7$)
Pretest	5	83 (12.8%)	0	1	82 [a]
Posttest	4	63 (9.7%)	23	20	20

Note. Each cell with imputations contains the number of imputations and resultant percentages out of 648 possible survey items (27 modified IPAS survey items multiplied by 24 students equals 648 possible survey items).

[a] Three SLP students did not complete the pretest but completed the full posttest with responses to reflection questions. They remained in the sample as opposed to being deleted due to their valuable qualitative input.

This missing data management strategy was preferred based on its accurate representation of data for Case 2020 and the strategy's alignment with theory. This decision was validated after piloting a different mean-based imputation strategy for Case 2020, $N = 95$ by filling in all nonresponses with the mean of all responses for each of the 27 items and adjusting the pretest and posttest modified IPAS results accordingly. For the pretest, the overall average

and dispersion were ($M = 6.17$, $SD = 0.74$); for the posttest, the overall average and dispersion were ($M = 6.56$, $SD = 0.84$). Based on the outcomes of this pilot, these descriptive statistics were more similar to Case 2020, $N = 24$ as opposed to Case 2020, $N = 95$ (to be discussed in greater detail in the following section). Because this dissertation study was interested in the influence of ecology on student attitude changes after their respective IPE learning experiences, the selected data management methods were justified by rejecting the mean-based imputation for representing Case 2020, $N = 95$. The selected strategies for missing data management and simple imputation for Case 2020 provided the most accurate representation of all variables of interest by using the cleanest data for analysis, which was consistent with the principles of BTHD and EHP.

Data Analysis

Descriptive Statistics

In alignment with Yin's holistic multiple-case units of analysis by which this mixed methods study was structured, descriptive statistics were reported for "students of the tri-alliance" as a group, with appreciation for the interprofessional mix of student professions represented in each group (Yin, 2018, p. 48). The descriptive statistics reported for Cases 2018 and 2020 included measures of central tendency and measures of spread. The self-reported attitudes from the students of the tri-alliance were calculated by using the overall pretest/posttest modified IPAS scores, which consisted of the averages from the instrument's five subcategories. The five subcategories were not analyzed individually due to (a) nonresponses from Case 2020, $N = 95$, (b) limited ability to produce meaningful data from this level of detail for comparison with Case 2018, and (c) the decision to reverse code two of the three items from the subcategory, Interprofessional Biases, which was a decision unique to only this study.

Case 2018, *N* = 119. Case 2018, *N* = 119 included 41 OT, 44 PT, and 34 SLP students, and all students completed 100% of the pretest and posttest modified IPAS. Using the 7-point Likert scale (1-7), the overall pretest average and dispersion for Case 2018, *N* = 119 were (*M* = 6.40, *SD* = 0.39), and the overall pretest median was 6.49 with an overall range of 2.18 (from 4.82 minimum to 7.00 maximum). The overall posttest average and dispersion were (*M* = 6.50, *SD* = 0.33), and the overall posttest median was 6.47 with an overall range of 1.62 (from 5.38 minimum to 7.00 maximum). The pretest and posttest modes were 7.00. These data revealed that the students of the tri-alliance from Case 2018 had a "yea saying" tendency by scoring highly on the 7-point Likert scale at pretest and posttest, as well as the mode for pretest and posttest.

Additionally, the data demonstrated a negatively skewed distribution (pretest > posttest) with scores of -0.85 and -0.41. Despite the skewness, the posttest results appeared to have a fairly normal bell curve as confirmed by the One-Sample Kolmogorov-Smirnov Test: Pretest results were *p* = .006, and posttest results were *p* = .200, meaning that posttest results were normally distributed. See Table 11 for details about the measures of central tendency and measures of spread, Figure 5 for pretest and posttest histograms and normal curves, and Table 12 for results from the One-Sample Kolmogorov-Smirnov Test.

Table 11

Descriptive Statistics for Case 2018, N = 119

Statistics		Overall participant pretest average	Overall participant posttest average
N	Valid	119	119
	Missing	0	0
Mean		6.402	6.499
Median		6.493	6.467
Mode		7.000	7.000
Standard deviation		0.393	0.328
Variance		0.154	0.108
Skewness		-0.852	-0.408
Kurtosis		1.598	0.127
Range		2.183	1.622
Minimum		4.817	5.378
Maximum		7.000	7.000

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Figure 5

Pretest and Posttest Histograms for Case 2018, N = 119
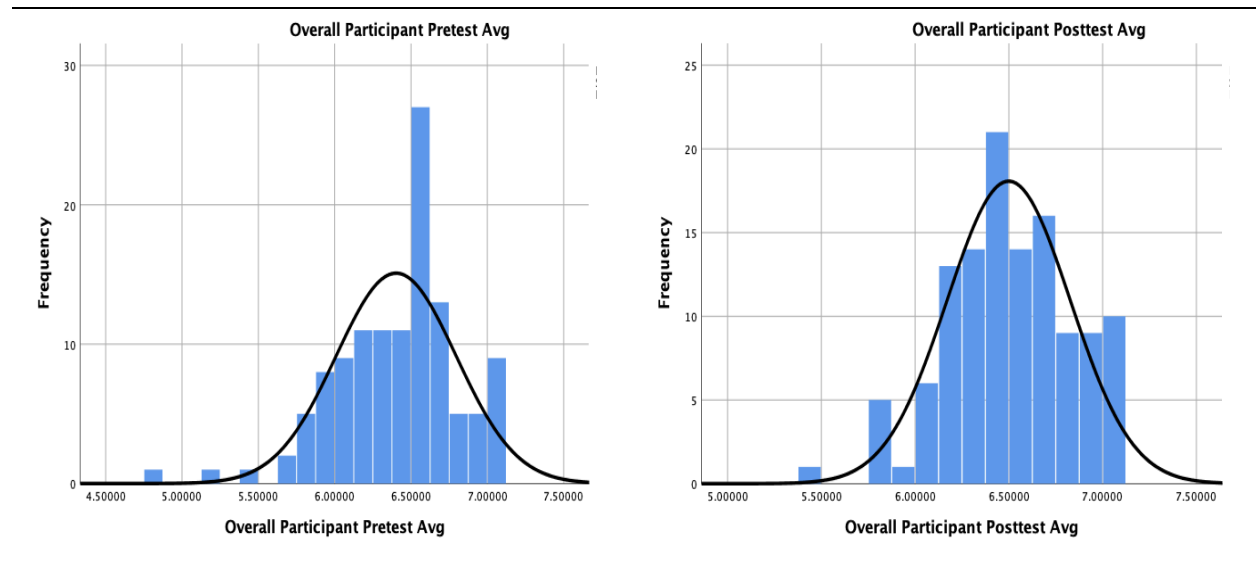
Note. Pretest *M* = 6.402 (*SD* = 0.393). Posttest *M* = 6.499 (*SD* = 0.328). Image of histograms are from IBM SPSS Statistics® software, Version 26.0 output.

Table 12

Test of Normal Distribution for Case 2018, N = 119 (Hypothesis Test Summary)

	Null hypothesis	Test	Significance	Decision
1	The distribution of the overall participant pretest average is normal with M = 6.40247 and SD = 0.39306200.	One-Sample Kolmogorov-Smirnov Test	.006 [a]	Reject the null hypothesis.
2	The distribution of the overall participant posttest average is normal with M = 6.49895 and SD = 0.32832815.	One-Sample Kolmogorov-Smirnov Test	.200 [a, b]	Retain the null hypothesis.

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

[a] Lilliefors Corrected. b This is a lower bound of the true significance.

Case 2020, N = 95. Case 2020, N = 95 included 42 OT, 38 PT, and 15 SLP students. With a ≥70% completion cut-off point and prior to listwise deletion, the pretest and posttest completion rates for all students were 75.8% and 22.1%, respectively, on the modified IPAS. Using the 8-point Likert scale (0-7), the overall pretest average and dispersion for Case 2020, N = 95 were (M = 4.59, SD = 2.64), and the overall pretest median was 5.99 with an overall range of 6.89 (from 0.00 minimum to 6.89 maximum). The overall posttest average and dispersion were (M = 1.44, SD = 2.67), and the overall posttest median was 0.00 with an overall range of 6.93 (from 0.00 minimum to 6.93 maximum). The pretest and posttest modes were 0.00. The frequency of "no response" for the overall pretest was from 21.10% of participants; however, for the items with responses, 49.5% of the participants reported ≥6.00 ("mostly agree") for the overall pretest frequency. Overall posttest frequency of "no response" was from 74.7% of the participants, and 18.9% of the participants reported ≥6.00.

Additionally, the pretest and posttest data demonstrated non-normal distribution. Assessment of the pretest data histogram appeared to present with an inverse normal curve, and the posttest data histogram was positively skewed with the majority of responses rated at 0.00. These assessments were confirmed by the One-Sample Kolmogorov-Smirnov Test: Pretest and posttest results were p = .000, meaning that neither sets of results were normally distributed. See Table 13 for details about the descriptive statistics, Figure 6 for pretest and posttest histograms and normal curves, and Table 14 for results from the One-Sample Kolmogorov-Smirnov Test.

Table 13

Descriptive Statistics for Case 2020, N = 95

	Statistics	Overall participant pretest average	Overall participant posttest average
N	Valid	95	95
	Missing	0	0
Mean		4.589	1.438
Median		5.992	0.000
Mode		0.000	0.000
Standard deviation		2.639	2.666
Variance		6.965	7.107
Skewness		-1.086	1.368
Kurtosis		-0.684	-0.104
Range		6.889	6.933
Minimum		0.000	0.000
Maximum		6.889	6.933

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Figure 6

Pretest and Posttest Histograms for Case 2020, N = 95
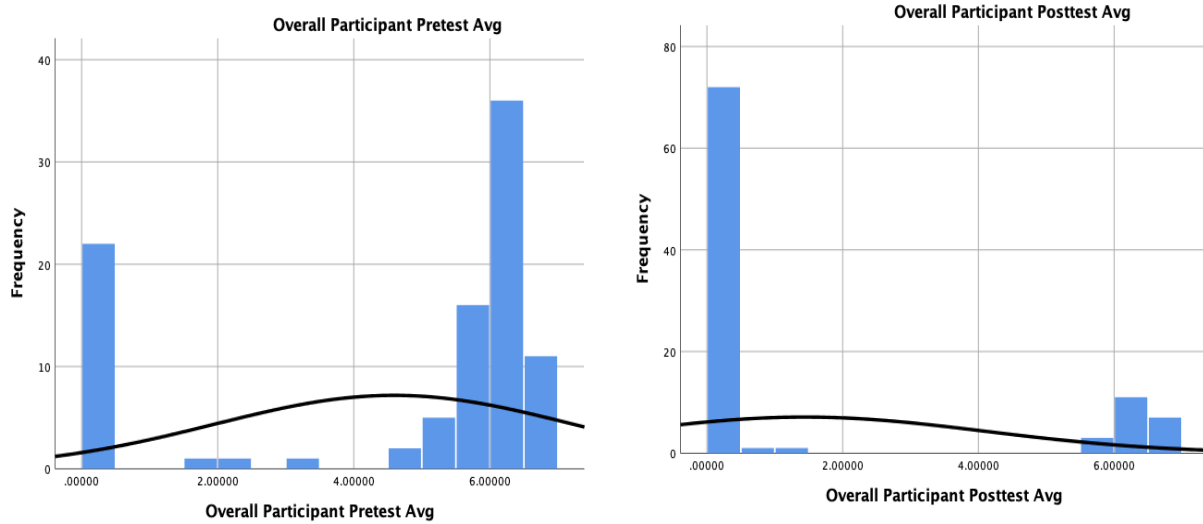
Note. Pretest *M* = 4.589 (*SD* = 2.639). Posttest *M* = 1.438 (*SD* = 2.666). Image of histograms

are from IBM SPSS Statistics® software, Version 26.0 output.

Table 14

Test of Normal Distribution for Case 2020, N = 95 (Hypothesis Test Summary)

	Null hypothesis	Test	Significance	Decision
1	The distribution of the overall participant pretest average is normal with $M = 4.58880$ and $SD = 2.63914719$.	One-Sample Kolmogorov-Smirnov Test	.000 [a]	Reject the null hypothesis.
2	The distribution of the overall participant posttest average is normal with $M = 1.43828$ and $SD = 2.66593009$.	One-Sample Kolmogorov-Smirnov Test	.000 [a]	Reject the null hypothesis.

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

[a] Lilliefors Corrected.

Case 2020, N = 24. Case 2020, $N = 24$ included 13 OT, four PT, and seven SLP students. After listwise deletion and simple imputations were performed, the pretest and posttest adjusted completion rate for the students of the tri-alliance ($N = 24$) was 100% on the modified IPAS. Returning to the 7-point Likert scale (1-7), the overall pretest average and dispersion for Case 2020, $N = 24$ were ($M = 6.06$, $SD = 0.78$); the overall pretest median was 6.23 with an overall range of 3.88 (from 3.01 minimum to 6.89 maximum), and the overall pretest mode was 6.12. The overall posttest average and dispersion were (M = 6.36, $SD = 0.35$); the overall posttest median was 6.42 with an overall range of 1.22 (from 5.72 minimum to 6.93 maximum); and the overall posttest mode was 6.47. Similar to Case 2018, $N = 119$, the data for Case 2020, $N = 24$ revealed that the students of the tri-alliance also appeared to have a "yea saying" tendency by scoring so highly on the 7-point Likert scale at pretest and posttest.

Additionally, the data demonstrated a negatively skewed distribution (pretest > posttest) with scores of -2.73 and -0.12. Again, like Case 2018, $N = 119$, the posttest results appeared to have a fairly normal bell curve as confirmed by the One-Sample Kolmogorov-Smirnov Test: Pretest results were $p = .004$, posttest results were $p = .200$, meaning that the overall posttest results were normally distributed. Considering this sample was approximately 75% smaller than its original size, the Shapiro-Wilk test provided a more sensitive assessment of normal distribution for smaller sample sizes (Laerd Statistics, 2015). Results of the Shapiro-Wilk test confirmed normal distribution of the overall posttest results ($p = .697$). See Table 15 for details about descriptive statistics, Figure 7 for pretest and posttest histograms and normal curves, and Table 16 for results from the One-Sample Kolmogorov-Smirnov Test and Shapiro-Wilk test.

Table 15

Descriptive Statistics for Case 2020, N = 24

Statistics		Overall participant pretest average	Overall participant posttest average
N	Valid	24	24
	Missing	0	0
Mean		6.058	6.364
Median		6.233	6.417
Mode		6.123	6.467
Standard deviation		0.782	0.346
Variance		0.611	0.120
Skewness		-2.726	-0.115
Kurtosis		9.908	-0.777
Range		3.878	1.217
Minimum		3.011	5.717
Maximum		6.889	6.933

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Figure 7

Pretest and Posttest Histograms for Case 2020, N = 24
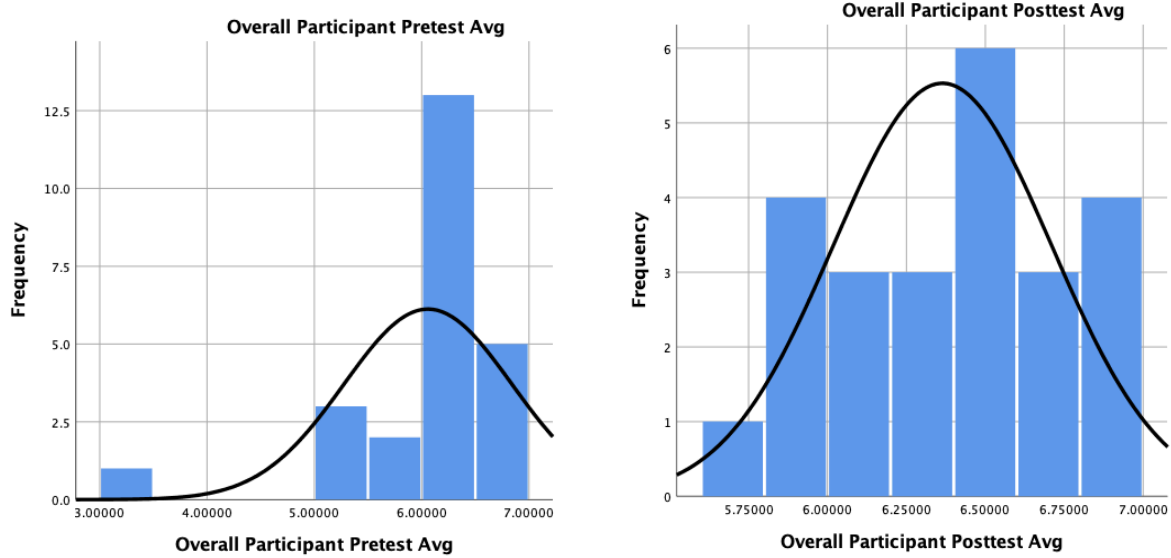
Note. Pretest *M* = 6.058 (*SD* = 0.782). Posttest *M* = 6.364 (*SD* = 0.346). Image of histograms are from IBM SPSS Statistics® software, Version 26.0 output.

Table 16

Test of Normal Distribution for Case 2020, N = 24 (Tests of Normality [a])

IPAS averages	IPE experience (IPE intervention PLUS ecological factors)	Kolmogorov-Smirnov [b]			Shapiro-Wilk		
		Statistic	*df*	Sig.	Statistic	*df*	Sig.
Overall participant pretest average	Online, uniprofessional & COVID-19	.220	24	.004	.734	24	.000
Overall participant posttest average	Online, uniprofessional & COVID-19	.092	24	.200*	.971	24	.697

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced

from IBM SPSS Statistics® software, Version 26.0 output.

[a] IPE experience (IPE intervention PLUS ecological factors) = online uniprofessional &

COVID-19. [b] Lilliefors Significance Corrected.

* This is lower bound of the true significance.

Lastly, Table 17 provides a side-by-side comparison of descriptive statistics from the modified

IPAS pretest and posttest results for each Case and its specific sample size.

Table 17

Comparison of Overall Pretest/Posttest Descriptive Statistics

Statistics	Case 2018, $N = 119$	Case 2020, $N = 95$	Case 2020, $N = 24$
		Pretest	
Mean	6.40	4.59	6.06
Standard deviation	0.39	2.64	0.78
Median	6.49	5.99	6.23
Mode	7.00	0.00	6.12
Range (min-max)	2.18 (4.82-7.00)	6.89 (0.00-6.89)	3.88 (3.01-6.89)
Normal distribution	$p = .006$ [a]	$p = .000$ [a]	$p = .004/ p = .000$ [a, b]
		Posttest	
Mean	6.50	1.44	6.36
Standard deviation	0.33	2.67	0.35
Median	6.47	0.00	6.42
Mode	7.00	0.00	6.47
Range (min-max)	1.62 (5.38-7.00)	6.93 (0.00-6.93)	1.22 (5.72-6.93)
Normal distribution	$p = .200$ [c]	$p = .000$ [a]	$p = .200/ p = .697$ [a, c]

[a] Data were not normally distributed in specified cell. [b] Results from the Kolmogorov-Smirnov test/results from Shapiro-Wilk test. [c] Data were normally distributed in specified cell.

Quantitative Results for Research Question #2

Case 2018, $N = 119$ and Case 2020, $N = 95$. Based on the descriptive statistics and the properties and characteristics of the data, the primary test selected to answer Research Question #2 was the nonparametric Mann-Whitney U-Test; the data did not meet essential assumptions for parametric tests. According to Laerd Statistics (2015), there are three study designs that are appropriate for the Mann-Whitney U-Test. One that applies to this study is when a study design

includes two independent groups that performed different interventions and are measured on the same dependent variable at the beginning and end of the study, and a change score is calculated.

This test compared the overall pretest and posttest survey results from Case 2018, $N =$ 119 and Case 2020, $N = 95$ to fully understand the extent to which both cases' unique IPE experiences affected attitude changes about IPCP as reflected in their survey responses. Because Case 2020, $N = 95$ included multiple nonresponses for pretest/posttest results, the nonresponses were filled with "0" indicating "nonresponse," while Case 2018, $N = 119$ had no nonresponses. To ensure the appropriateness of the Mann-Whitney U-Test for this question with the available data, the following assumptions were addressed:

- Assumption #1 requires that the dependent variable is continuous or ordinal. "Attitude changes" was measured at the summative response level but had non-normally distributed data for overall pretest scores for Case 2018, $N = 119$ and Case 2020, $N = 95$, as well as for overall posttest scores for Case 2020, $N = 95$, thus failing the assumption for a parametric test: Assumption #1 for the Mann-Whitney U-Test was satisfied.

- Assumption #2 requires that one independent variable consists of two categorical/independent groups (i.e., dichotomous). IPE experiences had two categories: "interprofessional, hybrid intervention during typical curricular flow" and "uniprofessional, online intervention during atypical curricular flow due to pandemic": Assumption #2 was met.

- Assumption #3 requires that there is an independence of observations. The IPE-based learning experiences occurred in April 2018 and April 2020 involving different groups of students: Assumption #3 was met.

- Assumption #4 requires that the distribution of scores for both groups of the independent variable is the same. The medians and distribution of scores between Case 2018, $N = 119$ and Case 2020, $N = 95$ were different, as further described in the next paragraph: Assumption #4 was violated.

The results of the Mann-Whitney U-Test informed the degree to which differences existed in overall pretest and posttest attitudes scores between Case 2018, $N = 119$ and Case 2020, $N = 95$. The medians for overall pretest and posttest scores between both Cases were different, and their distribution shapes were dissimilar. Overall pretest attitudes scores for Case 2018, $N = 119$ (mean rank = 133.00) were statistically significantly higher than Case 2020, $N = 95$ (mean rank = 75.56), $U = 2618.500$, $z = -6.745$, $p = .000$. Overall posttest attitudes scores for Case 2018, $N = 119$ (mean rank = 146.24) were statistically significantly higher than Case 2020, $N = 95$ (mean rank = 58.97), $U = 1042.500$, $z = -10.438$, $p = .000$. See Table 18 for medians, Table 19 for distributions, and Table 20 for Mann-Whitney U-Test pretest/posttest summaries for Case 2018, $N = 119$ and Case 2020, $N = 95$. See Appendix O, Figures O1 and O2 for Mann-Whitney U-Test distribution population pyramids for Case 2018, $N = 119$ and Case 2020, $N = 95$.

Table 18

Medians for Case 2018, N = 119 and Case 2020, N = 95

IPE experience (IPE intervention PLUS ecological factors; medians)	Overall participant pretest average	Overall participant posttest average
Hybrid interprofessional & no pandemic	6.493	6.467
Online, uniprofessional & COVID-19	5.992	.000
Total	6.300	6.267

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 19

Distributions for Case 2018, N = 119 and Case 2020, N = 95 (Hypothesis Test Summary)

Null hypothesis	Test	Sig.	Decision
The distribution of the overall participant *pretest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.000	Reject the null hypothesis.
The distribution of the overall participant *posttest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.000	Reject the null hypothesis.

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced

from IBM SPSS Statistics® software, Version 26.0 output.

Table 20

Mann-Whitney U-Test Summary for Case 2018, N = 119 and Case 2020, N = 95

	Pretest
Total N	214
Mann-Whitney U	2618.500
Wilcoxon W	7178.500
Test statistic	2618.500
Standard error	449.789
Standardized test statistic	-6.745
Asymptotic Sig. (2-sided test)	.000
	Posttest
Total N	214
Mann-Whitney U	1042.500
Wilcoxon W	5602.500
Test statistic	1042.500
Standard error	441.650
Standardized test statistic	-10.438
Asymptotic Sig. (2-sided test)	.000

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Based on results of the Mann-Whitney U-Test, there was a statistically significant difference in attitude changes about IPCP between students of the tri-alliance for Case 2018, $N = 119$ and Case 2020, $N = 95$ after their unique IPE-based learning experiences in the presence of differing ecological factors; therefore, the null hypothesis for Research Question #2 is rejected.

Case 2018, N = 119 and Case 2020, N = 24. While Research Question #2 has been informed, the available data for both Cases and the missing data management strategies for Case 2020 permitted further examination with nonparametric and parametric statistical tests. The Mann-Whitney U-Test was used again to examine the differences between the overall pretest and posttest scores for Case 2018, $N = 119$ and Case 2020, $N = 24$. However, this research design had imbalanced sample sizes, which was acknowledged in the overall interpretation of results.

Assumptions #1-3 were met, and assumption #4 had mixed results. Distributions of scores were different for the overall pretest scores but similar for the overall posttest scores. The overall pretest scores for Case 2018, $N = 119$ (mean rank = 75.79) were higher than Case 2020, $N = 24$ (mean rank = 53.19) with statistical significance, $U = 976.500$, $z = -2.440$, $p = .015$. Because the overall posttest results for both Cases had similar distributions, their medians were examined. Overall posttest scores were not statistically significantly different between Case 2018, $N = 119$ (median = 6.47) and Case 2020, $N = 24$ (median = 6.42), $U = 1106.500$, $z = -1.738$, $p = .082$. See Table 21 for medians, Table 22 for distribution, and Table 23 for Mann-Whitney U-Test Summaries for Case 2018, $N = 119$ and Case 2020, $N = 24$. See Appendix P, Figures P1 and P2 for Mann-Whitney U-Test distribution population pyramids for Case 2018, $N = 119$ and Case 2020, $N = 24$.

Table 21

Medians for Case 2018, N = 119 and Case 2020, N = 24

IPE experience (IPE intervention PLUS ecological factors; medians)	Overall participant pretest average	Overall participant posttest average
Hybrid interprofessional & no pandemic	6.493	6.467
Online, uniprofessional & COVID-19	6.233	6.417
Total	6.433	6.467

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 22

Distributions for Case 2018, N = 119 and Case 2020, N = 24 (Hypothesis Test Summary)

Null hypothesis	Test	Sig.	Decision
The distribution of the overall participant *pretest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.015	Reject the null hypothesis.
The distribution of the overall participant *posttest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.082	Retain the null hypothesis.

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced

from IBM SPSS Statistics® software, Version 26.0 output.

Table 23

Overall Participant Pretest and Posttest Averages Across IPE Experiences for Case 2018, N =
119 and Case 2020, N = 24 (Mann-Whitney U-Test Summary)

	Pretest
Total N	143
Mann-Whitney U	976.500
Wilcoxon W	1276.500
Test statistic	976.500
Standard error	185.069
Standardized test statistic	-2.440
Asymptotic Sig. (2-sided test)	.015
	Posttest
Total N	143
Mann-Whitney U	1106.500
Wilcoxon W	1406.500
Test statistic	1106.500
Standard error	184.977
Standardized test statistic	-1.738
Asymptotic Sig. (2-sided test)	.082

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Based on the results of this Mann-Whitney U-Test, there was no statistically significant difference in attitude changes about IPCP at posttest between students of the tri-alliance from Case 2018, $N = 119$ and Case 2020, $N = 24$. The student cohort sizes were unbalanced, and generalizing these results to all students in Case 2020 was unsupported by the guiding theories of this study because of their appreciation of the Person. Despite the unbalanced design, there is argument that the IPE-based learning experiences unique to the students of tri-alliance (who completed the pretest and posttest surveys) in Case 2020, $N = 24$ had the same effect on student attitudes as the IPE experiences in Case 2018, $N = 119$.

Based on the characteristics of posttest data previously described, the selected parametric statistical test was the independent samples *t* test for comparing the overall posttest-only survey means of Case 2018, $N = 119$ and Case 2020, $N = 24$. This test was selected to analyze the means of the dependent variable, attitude changes, and to calculate the effect size for additional insight. To ensure the appropriateness of the independent samples *t* test, the following assumptions were addressed:

- Assumption #1 requires that one dependent variable is measured at the continuous level. The dependent variable for this study, "attitude changes," was measured at summative response level: Assumption #1 was met.

- Assumption #2 requires that one independent variable consists of two categorical/independent groups (i.e., dichotomous). The IPE learning experiences were dichotomous ([interprofessional, hybrid intervention during typical curricular flow] and [uniprofessional, online intervention during atypical curricular flow due to pandemic]): Assumption #2 was met.

- Assumption #3 requires an independence of observations. The IPE experiences occurred in April 2018 and April 2020 involving different groups of students: Assumption #3 was met.

- Assumption #4 requires that there are no significant outliers. With the exception of participant #59 in Case 2018, $N = 119$, there were no significant outliers in the data per boxplot assessment (see Appendix R, Figure R3). The results of the test were not expected to be significantly affected by the outlier: Assumption #4 was satisfied.

- Assumption #5 requires that the dependent variable is approximately normally distributed: Assumption #5 was met per results in previous section.

- Assumption #6 requires homogeneity of variances. There was homogeneity of variances as assessed by Levene's test for equality of variances (p = .676): Assumption #6 was met.

The independent-samples t test was run to determine if there were differences in means of overall posttest-only attitudes about IPCP between students of the tri-alliance from Case 2018, N = 119 and Case 2020, N = 24. Overall, posttest-only attitudes were similar between Case 2018, N = 119 (M = 6.50, SD = 0.33) and Case 2020, N = 24 (M = 6.36, SD = 0.35) resulting in no statistically significant difference, M = 0.13, 95% CI [-0.01, 0.28], $t(141)$ = 1.82, p = .071, with a small to medium effect size (d = 0.41). See Tables 24 and for summaries of the independent-samples t test. See Appendix R, Figure R4 for a simple bar graph of means. This result continues to support the argument that the IPE-based learning experiences had no significantly different effect on student attitude changes toward IPCP in Case 2018, N = 119 and Case 2020, N = 24.

Table 24

*Overall Participant Posttest Average Group Statistics for Case 2018, N = 119
and Case 2020, N = 24*

IPE experiences (IPE intervention PLUS ecological factors)	N	Mean	Std. deviation	Std. error mean
Hybrid interprofessional & no pandemic	119	6.499	0.328	0.030
Online uniprofessional COVID-19	24	6.364	0.346	0.071

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 25

Independent Samples t Test Overall Posttest-Only Averages of Attitudes for Case 2018, N =
119 and Case 2020, N = 24

Levene's test for equality of variances			t test for equality of means						
								95% CI of the difference	
Variance assumptions	*F*	Sig.	*t*	*df*	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
Equal variances assumed	0.175	.676	1.818	141	.071	0.135	0.074	-0.012	0.281
Equal variances not assumed	—	—	1.755	31.895	.089	0.135	0.077	-0.022	0.291

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Case 2018, N = 24 and Case 2020, N = 24. The last attempt to analyze available data

from another relevant angle was to balance the design with equal sample sizes for comparison.

Using the random selection function in Microsoft Excel®, a random sample of OT, PT, and SLP

students was selected from Case 2018 that equaled the same proportions of students in Case

2020: 13 OT, four PT, and seven SLP students in Cases 2018 and 2020. The Mann-Whitney *U*-

Test was used for a final time to examine the differences between the overall pretest and posttest

scores for Case 2018, $N = 24$ and Case 2020, $N = 24$.

Like the previously described analysis, distributions of scores were different for the

overall pretest scores but similar for the overall posttest scores. The overall pretest scores for

Case 2018, $N = 24$ (mean rank = 30.56) were higher than Case 2020, $N = 24$ (mean rank = 18.44)

with statistical significance, $U = 142.500$, $z = -3.001$, $p = .003$. Because the overall posttest

results for both Cases had similar distributions, their medians were examined. Overall posttest scores were not statistically significantly different between Case 2018, $N = 24$ (median = 6.45) and Case 2020, $N = 24$ (median = 6.42), $U = 230.000$, $z = -1.197$, $p = .231$. See Table 26 for medians, Table 27 for distributions, and Table 28 for Mann-Whitney U-Test summaries for Case 2018, $N = 24$ and Case 2020, $N = 24$. See Appendix Q, Figures Q1 and Q2 for Mann-Whitney U-Test distribution population pyramids for Case 2018, $N = 24$ and Case 2020, $N = 24$.

Table 26

Medians for Case 2018, N = 24 and Case 2020, N = 24

IPE experience (IPE intervention PLUS ecological factors; medians)	Overall participant pretest average	Overall participant posttest average
Hybrid interprofessional & no pandemic	6.558	6.452
Online, uniprofessional & COVID-19	6.233	6.417
Total	6.417	6.449

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 27

Distributions for Case 2018, N = 24 and Case 2020, N = 24 (Hypothesis Test Summary)

Null hypothesis	Test	Sig.	Decision
The distribution of the overall participant *pretest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.003	Reject the null hypothesis.
The distribution of the overall participant *posttest* average is the same across categories of IPE experience (IPE intervention PLUS ecological factors).	Independent-Samples Mann-Whitney *U*-Test	.231	Retain the null hypothesis.

Note. Asymptotic significances are displayed. The significance level is .050. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 28

Mann-Whitney U-Test Summary for Case 2018, N = 24 and Case 2020, N = 24

	Pretest
Total *N*	48
Mann-Whitney *U*	142.500
Wilcoxon *W*	442.500
Test statistic	142.500
Standard error	48.480
Standardized test statistic	-3.001
Asymptotic Sig. (2-sided test)	.003
	Posttest
Total *N*	48
Mann-Whitney *U*	230.00
Wilcoxon *W*	530.00
Test statistic	230.00
Standard error	48.459
Standardized test statistic	-1.197
Asymptotic Sig. (2-sided test)	.231

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Based on results of the final Mann-Whitney *U*-Test, there was no significant difference in attitude changes about IPCP at posttest between the unique IPE experiences of the students of the tri-alliance from Case 2018, $N = 24$ and Case 2020, $N = 24$, which continued to support the previous statement that the IPE-based learning experiences unique to the students of tri-alliance (who completed the pretest and posttest surveys) in Case 2020 had the same effect on attitude changes as the IPE learning experiences in Case 2018.

Like the previous *t* test but with the balanced study design, a final independent-samples *t* test was run to determine if there was a difference in overall posttest-only attitude means about IPCP between students of the tri-alliance from Case 2018, $N = 24$ and Case 2020, $N = 24$. With the modified sample size for Case 2018, $N = 24$, normal distribution and homogeneity of variance were reassessed for certainty. There were no significant outliers in the data, as assessed by inspection of a boxplot (see Appendix S, Figure S3). Modified IPAS attitude scores for Case 2018, $N = 24$ were normally distributed, as assessed by Shapiro-Wilk's test ($p = .108$), and there was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .699$). Overall posttest-only attitude means were similar between Case 2018, $N = 24$ ($M = 6.50$, $SD = 0.36$) and Case 2020, $N = 24$ ($M = 6.36$, $SD = 0.35$) resulting in no statistically significant difference, $M = 0.13$, 95% CI [-0.07, 0.34], $t(46) = 1.29$, $p = .204$, with a small effect size ($d = 0.39$).

Based on this effect size, the results may be interpreted to mean that the IPE experience in Case 2018 was minimally more effective than in Case 2020. However, a post-hoc power analysis indicated the power level was .26 because of Ns for both Cases were 24 and not 64 as indicated by the *a priori* power analysis in Chapter 3. Therefore, this analysis provided an

underpowered interpretation of the *t* test results, and there would be a 74% chance of making a

Type II error. With respect to the post-hoc power analysis, these results provided the final

supporting statement for the argument that the IPE learning experiences within their unique

ecological circumstances appeared to have no significantly different effect on attitude changes in

Cases 2018 and 2020 when sample sizes were balanced. See Table 29 for tests of normality,

Table 30 for group statistics, and Table 31 for summary of the independent-samples *t* test. See

Appendix S, Figure S4 for a simple bar graph of means.

Table 29

Test of Normal Distribution for Overall Posttest Average in Case 2018, N = 24 and Case
2020, N = 24 (Tests of Normality)

IPE experience (IPE intervention PLUS ecological factors)	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Hybrid interprofessional & no pandemic	.137	24	.200*	.932	24	.108
Online uniprofessional & COVID-19	.092	24	.200*	.971	24	.697

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

[a] Lilliefors Significance Correction

* This is lower bound of the true significance.

Table 30

Overall Posttest Avg Group Statistics for Case 2018, N = 24 and Case 2020, N = 24

IPE experiences (IPE intervention PLUS ecological factors)	N	Mean	Std. deviation	Std. error mean
Hybrid interprofessional & no pandemic	24	6.496	0.362	0.074
Online uniprofessional & COVID-19	24	6.364	0.346	0.071

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Table 31

Independent Samples t Test Overall Posttest-Only Averages of Attitudes for Case 2018, N = 24 and Case 2020, N = 24

Levene's test for equality of variances			*t* test for equality of means					95% CI of the difference	
Variance assumptions	*F*	Sig.	*t*	*df*	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
Equal variances assumed	0.152	.699	1.289	46	.204	0.132	0.102	-0.074	0.338
Equal variances not assumed	__	__	1.289	45.912	.204	0.132	0.102	-0.074	0.338

Note. Table reproduced from IBM SPSS Statistics® software, Version 26.0 output.

Summary of Quantitative Results

The pretest/posttest survey results from the modified IPAS for Cases 2018 and 2020 were unequal in completion rate and required missing data management strategies for statistical

analysis. Based on the original and modified data from Cases 2018 and 2020, Research Question #2 was examined via three different sample size-based scenarios: (1) Case 2018, $N = 119$ and Case 2020, $N = 95$ (unmodified sample sizes); (2) Case 2018, $N = 119$ and Case 2020, $N = 24$ (modified sample size for Case 2020); (3) Case 2018, $N = 24$ and Case 2020, $N = 24$ (modified sample sizes for both Cases).

The nonparametric test, Mann-Whitney U-Test, analyzed the overall pretest/posttest results of the modified IPAS for each scenario. For the first scenario (Case 2018, $N = 119$ and Case 2020, $N = 95$), the results of the Mann-Whitney U-Test found a statistically significant difference in overall pretest attitudes and posttest attitude changes about IPCP between students of the tri-alliance for both Cases. This outcome is largely due to the high rate of survey nonresponses in Case 2020, which may be a product of the IPE-based learning experiences and ecological factors unique to this Case (i.e., uniprofessional, online teaching intervention during a pandemic). However, after adjusted sample sizes and simple conditional imputations, results from the Mann-Whitney U-Test for the remaining two scenarios produced results that indicated a statistically significant difference in attitudes at pretest between Cases but no statistically significant difference in attitude changes at posttest.

The parametric test, independent-samples t test, was implemented for the two modified scenarios to further examine overall posttest-only attitude scores. These scores met all assumptions for this statistical test, which permitted examination of means and effect sizes. Like the Mann-Whitney U-Test for these scenarios, the t test also produced results indicating no statistically significant differences in attitudes at posttest and relatively small effect sizes between Cases. Based on the results from the statistical tests employed for these scenarios with adjusted sample sizes, there is argument that the IPE-based learning experiences unique to the

students of tri-alliance (who completed the pretest and posttest surveys) in Case 2020 had the

same effect on attitude changes as the IPE experiences in Case 2018, with respect to their

differing ecological factors.

Although the results from all three scenarios inform Research Question #2, the response

rate and missing data management strategies must be appreciated when critically analyzing the

validity of the results for this study. The primary analysis comparing the overall pretest and

posttest attitude scores for Case 2018, $N = 119$ and Case 2020, $N = 95$ best informed Research

Question #2, and the null hypothesis is rejected. Therefore, the alternative hypothesis was

accepted indicating that there was a difference in attitude changes about IPCP between the

students of the tri-alliance from Cases 2018 and 2020 after their unique IPE-based learning

experiences in the presence of differing ecological factors. However, the results from the

statistical tests using modified sample sizes indicated that, ecological factors aside, the IPE-based

learning experiences from Cases 2018 and 2020 produced the same effects on attitude changes

within the students of tri-alliance.

Qualitative Findings

Qualitative Research Question 3, Propositions, and Rival Hypotheses

As previously defined, an attitude change is a Level 2a IPE outcome when (a) changes

occur in reciprocal attitudes or perceptions between participant groups or (b) changes occur in

perceptions or attitudes toward the value and/or use of team approaches to patient care (Barr et

al., 2005, p. 43). The third research question for this dissertation asked, "In Cases 2018 and

2020, how did the students of the tri-alliance perceive IPE-based learning experiences affected

their attitudes about IPCP?" A content analysis of the student responses to reflection questions

from Cases 2018 and 2020 and specific case study data analysis strategies influenced by Robert Yin (2018) informed the propositions and rival hypotheses to answer this qualitative question.

This question's first proposition posited that the ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections. However, the rival hypothesis stated that ecological factors did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020. The question's second proposition stated that student perceptions about IPCP after their respective IPE-based learning experiences will be more favorable from Case 2018 and less favorable from Case 2020. Its rival hypothesis stated that student perceptions about IPCP after their respective IPE-based learning experiences will be favorable from Cases 2018 and 2020. Finally, the third proposition for this question stated that the IPE-based teaching interventions selected for Cases 2018 and 2020 will be perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP. Its rival hypothesis stated that the IPE-based teaching interventions selected for Cases 2018 and 2020 will be perceived similarly about the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

Preparing the Data

Data preparation and analysis for the qualitative arm of this study occurred in three phases to enhance construct validity. The first phase began with careful data preparation and examination by the researcher; the second phase utilized a computer-assisted qualitative data analysis software, NVivo®, Release 1.3.1; and the third phase included critical appraisal of outcomes by a qualified peer reviewer. During each phase, qualitative analysis closely followed strategies described by Robert Yin (2018).

According to Yin (2018), case study analysis commonly begins by "playing" with the data to search for any themes and sub-themes, patterns, insights, or concepts through appropriate data analytic strategies (p. 167). The raw qualitative data consisted of student narrative responses to reflection questions from Cases 2018 and 2020 after their respective IPE-based learning experiences. To begin this first phase, data were transferred from their original sources into new Microsoft Word® documents for organization, consistency, and multiple-source analysis.

The starting analytic strategy for examining student narrative responses from Cases 2018 and 2020 included data familiarization processes like coding themes and subthemes, memoing, annotations, and frequency tabulation. For the beginning analysis, data from Cases 2018 and 2020 were analyzed separately to thoroughly understand the uniqueness of their responses. After separate analyses were completed, pattern matching, explanation building, and cross-case synthesis techniques were utilized for discovering deeper insights from both cases together to inform Research Question #3. Each of these data analysis techniques strengthened the internal validity of the qualitative case study's outcomes.

Outcomes Discovery

Case 2018, N = 119

Context. Case 2018 included 119 students who were assigned to one of 15 interprofessional groups. Thirty-four out of 41 OT students, 31 out of 44 PT students, and 18 out of 34 SLP students (n = 83) provided responses to the post-workshop reflection questions, which were required to be completed for their coursework within one week after the workshop concluded. The sequence of events began one week before the IPE workshop, and each student completed an individual electronic modified IPAS pretest using Qualtrics® survey software (including informed consent). Next, students were placed on interprofessional teams, and each

team completed individual and team-based hybrid prework. After completion of the prework, all

students in their respective teams participated in the half-day, on-campus IPE workshop. At the

immediate conclusion of the workshop, each student completed an individual, paper-based

modified IPAS posttest before leaving campus, which was later transferred to Microsoft Excel®

spreadsheets. Lastly, each student was required to complete an asynchronous, online, three-

question reflection and post responses to a shared web-based form, Google Docs®, for group-

specific peers to read and respond if desired.

Themes and Observations. For analysis of each reflection question, the emphasis was

on *interprofessional* themes as opposed to identifying profession-specific themes; this analysis

decision reflected the dissertation's research questions and purpose. Themes, subthemes, general

observations, and student statements were identified and provided for each specific reflection

question in following sections. See also Appendix T, Tables T1 through T3 for student

reflections and Appendix U, Tables U1 through U3 for detailed content analysis of Case 2018.

Reflection Question 1a: **What did you find beneficial or like the most from the IPE**

Workshop? The students reported that the use of case studies and related discussion during the

on-campus workshop were beneficial. They also appreciated the opportunity for structured and

unstructured dialogue during the on-campus workshop. The students enjoyed discussing roles

and responsibilities between OT, PT, and SLP. The students' responses either directly or

indirectly referenced the importance of patient/client-centeredness. Examples of two student

responses to this reflection question include the following:

The most beneficial aspect of the IPE workshop for me was the opportunity to complete a

case study together and discuss the different roles of each team member. I learned a lot

about the unique ways [that] other disciplines approach situations, but also discovered the

points of overlap between each field. Learning about these points of overlap is much more effective and "real" when it's not just a brief conversation in a class of students within the same discipline. My group had a great dynamic of asking each other a lot of questions which provided me with a lot of new insight! – *Student from Case 2018*

I found that working through the case studies helped me better understand what other professionals can bring to the team. I also enjoyed just talking to [other] students and learning about what they learn/do within their program and what their various specialties were within their profession. I also learned a lot about how communication can really affect a patient's outcome, especially when professions cannot work together/learn from each other. – *Student from Case 2018*

Reflection Question 2*: **How will your new knowledge of and experience with interprofessional collaboration affect your future practice?*** (Future-oriented responses were prioritized based on wording of the reflection question.) The students responded with a general appreciation for and indications of intent for future application of interprofessional collaboration. One student stated, "I believe this experience has provided me with a new feeling of excitement for the future of interprofessional collaboration. During the workshop it felt like there was an evident shift in the attitudes and opinions we all held of each other." This student also reported being more knowledgeable about when and how to refer to other health care professions. According to another student, "My knowledge of and experience with interprofessional collaboration will affect my future practice, because when appropriate, I will know when to refer to [other professions] based on a newfound understanding of their scopes of practice."

Lastly, the students reported an appreciation for and a likelihood to practice good communication between health care professions and patients. One student stated:

I also believe that this workshop has helped diminish the idea that certain disciplines can only work on certain parts of the body and has shown effective ways to work/communicate with each other. It proved how much different disciplines cross, and how we can learn a lot from each other. I have a better understanding of how other disciplines work, and how to advocate for them as well as our profession.

Reflection Question 3: How would you improve this IPE Workshop for future students? The students reported that the IPE workshop would be improved by including students from other health professions. According to one student, "I would improve the IPE workshop by including nursing, social work, and medical students to represent all professionals who will interact on a daily basis." Similarly, another student stated, "I would improve this IPE workshop by including more healthcare disciplines (nurses, doctors, social workers, etc.). I think it would [benefit] many disciplines to understand our role and for us to understand their role."

The other primary theme included a mix of opinions about the amount of time the four-hour workshop required. One student stated, "the workshop was a bit longer than it needed to be," while another student from a different team stated that IPE workshop could be improved by "allow[ing] more time in small groups for students to explain their future profession." Although not identified as a primary theme, many students also indicated that no changes were recommended for the workshop.

Lastly, there was only one potentially negative-sounding response related to skill development. One student commented about the missed opportunity to learn hands-on skills between the professions. Although the response appeared to express frustration, elements of this student's response could be interpreted constructively because of its appropriate reference to learning from other students. The student stated:

Additionally, I know transferring patients and toileting isn't in my scope of practice, but something I've learned from my practicum placements is that we're frequently expected to do things like that anyway. I really wanted some sort of quick lesson on safe transferring because I can't count the times [that] I've had to do it regardless of the fact that I've had absolutely no training on it. How can [we] be expected to step up and be an equal part of the team when we can't even reposition patients for swallowing or help them stand to complete ADLs for functional cognitive tasks?

General Observations. Overall, the students' responses had a very positive tone with thoughtful and/or appropriately constructive responses. Some interprofessional student groups appeared to respond similarly, and some students appeared to provide statements of self-interest versus team-oriented statements; however, the perceived intent of all these statements appeared to be positive in nature or aligned with teamwork. For instance, a student's response stated, "I think the IPE workshop helped me become aware of just how much I could use the other professions to help my patients." Also, "[the case study] also helped me think of how I can communicate what my goals are for the patient and how the other professionals could help me in their individual therapy sessions."

Several interesting observations were made while analyzing the responses from the students of Case 2018. The observations included (a) one student who indicated that they could lead an IPE session, (b) expressions of hope for the future, (c) observed shifts in attitudes, (d) how age of team members is an important consideration, and (e) referencing the financial considerations related to efficient service delivery. Additionally, when recommending other professions to include in IPE learning experiences, they specifically mentioned social work, nursing, and/or medical students but no others. Overall, the students' responses maintained a

positive tone and appeared to be in line with the 2016 Interprofessional Education Collaborative

(IPEC) competencies (see Appendix B).

Word Frequencies. Counting word frequencies is a content analysis strategy that

quantifies the number of times specific words appear in text: This strategy assisted with detecting

words that signified attitude changes, which specifically pertained to Research Question #3.

Words selected for analyzing student responses were based on the definition of attitude change

(i.e., Level 2a IPE outcome) and supplemented by words commonly used to signify that an

attitude change—or the intention to change—had occurred (i.e., "will," "future," "better"). Use

of these supplemental words about attitude changes aligned with an expectancy value theory, the

theory of reasoned action (TRA; Simons-Morton et al., 2012, p. 103). According to TRA,

behavior can be predicted by intentions; intentions are predicted by attitudes; and attitudes are

made up of beliefs (Simons-Morton et al., 2012, p. 103). Additionally, TRA includes

consideration of environmental conditions and their influence on attitudes and intentions, which

is complementary to the guiding theories of this dissertation (Simons-Morton et al., 2012, p.

105). Applying TRA to the supplemental words about attitude changes provided strength to the

decision for their use in the word frequency query.

Because of the future orientation of reflection question #2 and because the reflection

questions for Case 2018 did not include a specific question about attitude changes like Case

2020, reflection question #2 was identified as providing the best data for determining if attitude

changes occurred. Using these words from the definition of attitude change and the identified

supplemental words signifying change, a word frequency query for Case 2018 was performed in

NVivo®, Release 1.3.1. Table 32 provides detailed results about the top 25 words found

throughout all three reflection questions and specifically in question #2. Based on the word

frequency query results, the word, "will," was the most frequently occurring word for question #2 and the third most frequent for all three reflection questions. Additionally, 62 out of 83 students included this word in their responses to question #2 followed by words indicating intention of positive behavior or perception changes, which are indicative of attitude changes per TRA.

Table 32

Case 2018 Word Frequencies (Top 25 Words)

Word	Overall Frequency (# ranked from 1 to 25)	Total Frequency within Question #2 (# ranked from 1 to 25)
"attitude"	0	0
"perception"	0	0
"change"	0	0
"between"	0	0
"profession"	163 (#1)	53 (#4)
"professional"	63 (#23)	34 (#14)
"discipline"	96 (#6)	37 (#11)
"value"	0	0
"team"	0	0
"patient"	119 (#4)	72 (#2)
"client"	0	0
"will"	138 (#3)	117 (#1)
"future"	91 (#8)	58 (#3)
"better"	64 (#20)	43 (#6)

Case 2018 Summary of Qualitative Findings. The overarching themes present in the student responses from Case 2018 were (a) they enjoyed the interactive learning activities and associated discussion/dialogue; (b) they reported learning about, from, and with one another; (c) they reported emphasis on having effective communication and the importance of patient-centered care; (d) they recommended inviting students from other health care professions to join

the IPE workshop; and (e) their responses appeared to be in line with the 2016 IPEC competencies.

Their responses were thoughtful, positive, and appropriately constructive throughout each reflection. Only one response appeared to have a negative yet constructive undertone, and a few responses appeared to have a focus of self-interest as opposed to team-orientation. The word frequencies provided support to the themes, subthemes, and observations identified in Case 2018 and about the intention to change behaviors and perceptions after their IPE learning experiences, which signified attitude changes. Based on the themes, subthemes, observations, and word frequency queries from the content analysis, the data suggests the students perceived their IPE experiences positively; they perceived IPCP positively; and they indicated attitude changes and modification of behaviors in future practice.

Case 2020, N = 95

Context. Case 2020 included 95 students, and each program did primarily online, uniprofessional education with no interprofessional groups due to COVID-19. Specifically,

- OT students completed asynchronous online modules with interactive video case studies with OT faculty available for consultation as needed,

- PT students completed asynchronous online modules with interactive video case studies and engaged in one uniprofessional, virtual meeting facilitated by faculty and community clinicians of the same profession, and

- SLP students engaged in one in-person learning experience on campus facilitated by SLP faculty before COVID-19 restrictions began and then completed individual computer-based simulations after COVID-19 restrictions began with SLP faculty available as needed.

Ten out of 42 OT students, one out of 38 PT students, and four out of 15 SLP students (n = 15) completed the reflection questions at the end of the modified IPAS posttest, and the modified IPAS posttest was requested to be completed within one week after the programs' learning experiences concluded.

The sequence of events began with COVID-19 restrictions that closed university campuses approximately two weeks before the originally scheduled workshop in April 2020. Over the course of two to three weeks after university closures, students completed their uni-professional IPE-based learning experiences, beginning with voluntary completion of the electronic modified IPAS pretest. After the modified IPAS pretest, students completed their programs' learning experiences about IPCP. Finally, students were encouraged to complete the voluntary electronic modified IPAS posttest, which included four open-ended reflection questions at the end of the survey, after their programs' learning experiences concluded.

Themes and Observations. Just like for Case 2018, the emphasis of analysis was on interprofessional themes and sub-themes as opposed to identifying profession-specific themes (except for question 1a; see below). There were unbalanced perspectives for each reflection question due to each program having unequal and imbalanced quantity of responses per program; therefore, a high quantity of responses did not automatically indicate that a theme was present. Due to the imbalance, themes were identified by those responses having the highest mix of interprofessional input. Themes, subthemes, observations, and student statements for each specific reflection question were identified and provided in the following sections. See also Appendix V, Tables V1 through V4 for student reflections of Case 2020 and Appendix W, Tables W1 through W4 for detailed content analysis of Case 2020.

Reflection Question 1a: What did you find beneficial or like the most from this IPE learning experience? The students reported that learning about collaboration, how to effectively collaborate to gain others' perspectives, and how to navigate collaboration challenges were beneficial. To reflect the different programs' uniprofessional learning experiences, the following three comments were provided by a student from each profession within this study. An SLP student stated the most beneficial element was "learning the true benefits of using IPE and seeing the negative impact that can be caused by not participating in IPE." An OT student stated, "I liked the videos and the reflection questions that went along with them. I felt like I was able to see the scenario and actually think through what I would do." The PT student stated, "I thought it was interesting to hear everyone's point of view on how they work hand in hand with other health care professionals." Lastly, unlike Case 2018, there were no comments about learning *with* other professions, which was likely due to the uniprofessional delivery of content.

Reflection Question 1b: How has your attitude changed about interprofessional collaboration after this IPE learning experience? The students' replied with mixed responses about attitude changes: Three students specifically reported improved attitudes; two reported no change due to having positive attitude in the beginning and at the end; two reported some or no change; five reported how IPE has helped them now and will help in future practice; and three commented more about general changes or their learning outcomes as opposed to attitude changes. For those who specifically reported attitude changes, the changes were mostly about collaboration and its variety of components to include communication, teams/teamwork, preparedness for challenges, and collaboration in general.

According to a student who reported a positive change, "It changed my attitude showing how important working as a team is for the patient's health." From another student's perspective,

"This course has motivated me to do my best to be part of the solution in interprofessional collaboration and to communicate better with other professionals to help alleviate any collaborative difficulties." From a differing perspective, one student reported, "It's about the same. Just need to be more aware to hide my [biases] when it comes to working with others as everyone has something to bring to the table."

Reflection Question 2: How will your new knowledge of interprofessional collaboration affect your future practice? The students' responses indicated that their new knowledge would help them with future teamwork by understanding the importance of collaboration and patient-centered care. In response to this reflection question, a student stated, "This new knowledge will give me the ability to put my best foot forward. It will also allow me to have accurate and informative communication skills. This is beneficial for my healthcare team and future patients." Similarly, a student from a different profession stated, "It will allow me to work closely with other health professionals, to provide the best care possible."

Reflection Question 3: How would you improve this IPE learning experience for future students? Most students reported the learning experiences would be improved by including interaction or collaboration with students from other health care professions. One student stated, "I would have an interactive portion where we actually work with other disciplines to complete an activity," which was also reported by a student from a different profession who stated, "More interaction with other healthcare students! (I know this was difficult with the COVID-19 situation)."

General Observations. The students' responses were neutral or positive in tone and were appropriately constructive. There was a blend of thoughtful and very brief responses for each reflection question. Although themes were identified by the items that had at least one

response from each profession, other elements that appeared to be important based on quantity of

responses were communication and patient-centeredness. Overall, their responses also appeared

to be in line with the 2016 IPEC competencies; although, the outcomes were less robust and rich

in Case 2020 than in Case 2018.

Several unexpected observations were made. The first was how many students indicated

that their uniprofessional learning experiences were good and had no suggestions for change.

Next, only two references were made about COVID-19. Lastly, there were no overt negative

responses. Although one student provided a response that could be perceived as negative (i.e.,

hiding biases), the student's responses to other questions were supportive of IPCP.

Word Frequencies. Case 2020 included a specific question about students' perceived

attitude changes: reflection question #1b. Using the same words for Case 2018, a word frequency

query for Case 2020 was performed in NVivo®, Release 1.3.1. The results in the word frequency

query provided applicable data, but student responses about attitude changes in question #1b

were not consistently nor clearly indicated.

To determine if more meaningful data could be procured from a word frequency query

about attitude changes, the same strategy from Case 2018 regarding question #2 was applied to

Case 2020. Like Case 2018, the top 25 most frequent words for Case 2020 from all reflection

questions showed that the word, "will," had the most frequency. After doing another word search

in the responses for question #2, the word, "will," was used by 13 out of 15 students about how

they intend use their new knowledge about IPE and IPCP in their future practices. Table 33

provides detailed results about the top 25 words found throughout all reflection questions and

question #1b and question #2 separately.

Table 33

Case 2020 Word Frequencies

Word	Overall Frequency for all Reflection Questions (# ranked from 1 to 25)	Frequency for Reflection Question 1b (# ranked from 1 to 25)	Frequency for Reflection Question 2 (# ranked from 1 to 25)
"attitude"	0	5 (#2)	0
"perception"	0	0	0
"change"	7 (#16)	4 (#7)	0
"between"	0	0	0
"profession"	0	0	0
"professional"	20 (#2)	4 (#10)	5 (#4)
"discipline"	8 (#12)	2 (#24)	2 (#16)
"value"	0	0	0
"team"	10 (#9)	0	7 (#3)
"patient"	7 (#22)	4 (#9)	3 (#15)
"client"	0	0	0
"will"	24 (#1)	3 (#15)	20 (#1)
"future"	8 (#13)	0	3 (#11)
"better"	0	2 (#21)	2 (#16)

Case 2020 Summary of Qualitative Findings. Although good data were gathered from the 15 students who provided responses to reflection questions, 80 students from Case 2020 did not participate in this component; therefore, the reflections provided were not assumed to be representative of those who did not respond in Case 2020. However, for those who responded, the overarching themes present in the student responses from Case 2020 were (a) their attitudes about collaboration improved, specifically communication, team-orientation, and preparedness for navigating collaboration challenges; (b) they valued learning about collaboration and the importance of patient-centeredness; (c) they recommended interprofessional interactions to be included in future learning experiences; and (d) their responses also appeared to be in line with the 2016 IPEC competencies. Like Case 2018, their responses were mostly positive and

appropriately constructive; however, many responses were much briefer with less detail in some of their reflections. Also, some of their responses were similar in groups, but this time between students of the same profession as opposed to interprofessional groups like Case 2018.

The word frequencies provided supplemental data to reflection question #1b that directly asked about attitudes; however, the students' words selected for their responses to all reflection questions, specifically question #2, appeared to better indicate changes in attitude by their expressed desires to apply their new knowledge to future practice. Therefore, the themes, subthemes, observations, and specific words analyzed in the content analysis indicated positive attitude changes about IPCP after their uniprofessional learning experiences for the students of Case 2020 who responded to the reflection questions.

Synthesizing the Cases

Pattern Matching. This case study assumed an explanatory perspective for qualitative research, and from an explanatory perspective, patterns in the data may be related to the "how's" and "why's" of the case study (Edmonds & Kennedy, 2017; Yin, 2018, p. 175). Pattern matching is a data analysis technique used in case study research to "compare an empirically based pattern with a predicted one (or with several alternative predictions, including rivals)," which strengthens internal validity (Yin, 2018, p. 175). When using pattern matching logic, replication is a strategy that attempts to find support for propositions within a multiple case study design, which also attempts to inform the correctness of a claim (Mills et al., 2012b). Cases are selected to either predict similar results (i.e., literal replication) or predict contrasting results for theoretical reasons (i.e., theoretical replication; Ridder, 2017, p. 287).

Cases 2018 and 2020 were selected for this study anticipating theoretical replication based on the influence that ecological factors were predicted to have on attitude changes about

IPCP for the students in both cases. The primary ecological factors for Case 2018 were (a) the hybrid structure of the IPE experience with an emphasis on the in-person workshop, (b) the engagement with interprofessional students and faculty, and (c) presence of a typical curricular progression and presumed typical experiences outside of school. The primary ecological factors for Case 2020 were opposite: The factors included (a) the uni-professional, primarily online, program-specific teaching interventions about IPCP; (b) the engagement with either no other student or briefly with intraprofessional students and faculty; and (c) presence of an atypical, disrupted curricular progression, as well as experiences outside of school, due to COVID-19. Additionally, an absence of literature to inform how the unique phenomenon of a pandemic affects IPE led to formulation of hypotheses (i.e., predictions) that appeared to be representative of student and university administration reactions from the Swine Flu in 2009 (Davis et al., 2019; Guh et al., 2011; Mitchell et al., 2011).

As such, the anticipated outcome was that the students' learning experiences and attitude changes about IPCP for Case 2020 were hypothesized to be less positive than for Case 2018. The Bioecological Theory of Human Development (BTHD) and the Ecology of Human Performance (EHP) theories were used to guide the research due to their emphasis on the reciprocal interactions of Context-related factors and the Person and these constructs' collective influence on Development and Performance. Based on this hypothesis and use of theory, theoretical replication was expected because of extreme ecological differences between the two Cases with anticipated effects on Development and Performance as reported by the students. To this end, the propositions for the case study and their rationales were

- Proposition 1: The ecological factors present in Cases 2018 and 2020 affected the
  likelihood of participation in full IPE-based learning experiences from pretest to posttest

assessment. This proposition was based on the hypothesis that the presence of COVID-19 affected a student's likelihood from Case 2020 to engage in voluntary components of their coursework due to the significance of academic and societal disruption caused by the pandemic; therefore, this proposition indicated that comparing perspectives about attitude changes between Cases 2018 and 2020 would be limited based on differing response rates due to influences from ecological factors.

- Proposition 2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020. This proposition was based on the anticipated challenges to students' health and wellbeing during their IPE-based learning experiences in Case 2020, which occurred in the early stages of the pandemic, and was anticipated to result in less favorable perceptions about IPCP in comparison to the students of Case 2018.

- Proposition 3: The IPE-based teaching interventions selected for Cases 2018 and 2020 were perceived differently about the value and effectiveness of their unique experiences on attitude changes regarding IPCP. This proposition was based on the assumption that the hybrid experience with emphasis on the in-person workshop in Case 2018 would be more highly favored than the uniprofessional, on-line IPE-based learning experience in Case 2020, especially during COVID-19.

To begin pattern matching logic through replication, empirically based patterns are identified in all cases, which are based on the findings of a case study (Yin, 2018). The empirical findings for Cases 2018 and 2020 were their respective themes, subthemes, observations, and word frequency findings from content analyses of the students' responses to their reflection questions. Although very different ecological factors were present for Cases 2018 and 2020,

students who completed the reflection questions from both Cases provided qualitative data that indicated overall positive perceptions, attitudes, and attitude changes about IPCP after their unique IPE-based learning experiences. Because the qualitative findings in Cases 2018 and 2020 were similar, theoretical and literal replication of patterns between Cases occurred; however, the propositions and rival hypotheses were identified based on the expectation of theoretical replication of all empirical results from the two student groups in Cases 2018 and 2020. As such, the following provides the outcomes of the pattern matching analysis according to replication logic applied to the propositions and outcomes:

- Proposition 1: Based on the qualitative findings of the content analysis of this case study, this proposition was correct: The results between the whole cohorts of students in Case 2018 and Case 2020 contrasted, and theoretical replication was confirmed. Ecological factors appeared to affect the likelihood of completing full IPE-based learning experiences from pretest through posttest and reflection: Case 2018 had 69.7% response rate to reflection questions (83 responses/119 students), and Case 2020 had 15.8% response rate (15 responses/95 students). The difference in response rates limited full comparisons between Cases about IPCP due to what appears to be the influence of respective ecological factors on student Performance.

- Proposition 2: This proposition was incorrect based on the qualitative content analysis, whereby student responses to reflection questions from both Cases were favorable from those who provided input. Theoretical replication was disconfirmed, and the rival hypothesis was accepted, which stated that student perceptions about IPCP after their respective IPE-based learning experiences will be favorable from Cases 2018 and 2020.

- Proposition 3: This proposition was also incorrect. Students from both Cases spoke positively and were appropriately constructive about their learning experiences, and some students from both Cases indicated that no changes to the teaching interventions were necessary. Like the previous proposition, theoretical replication was disconfirmed, and the rival hypothesis was accepted, which stated the IPE-based teaching interventions selected for Cases 2018 and 2020 were perceived similarly regarding the value and effectiveness of their unique experiences on attitude changes regarding IPCP.

Building Explanations. A benefit of qualitative data analysis in case study research is to continue analysis for understanding the phenomenon as opposed to aim for falsification like in other worldviews (Ye, 2019). Explanation building is a special type of pattern matching logic that is most relevant to explanatory case studies, especially when theoretical replication is disconfirmed (Yin, 201, pp. 179). This technique is iterative in nature because it allows the researcher to re-examine the evidence, revise earlier propositions, and refine previous ideas from a new perspective (Yin, 2018, pp. 180-181). Because Proposition 2 and Proposition 3 had disconfirmed theoretical replications, building an explanation for modified versions of their rival hypotheses as revised propositions was a strategy within explanation building that aimed to provide a clearer understanding of the phenomenon. As such, the revised propositions, their outcomes, and explanations are provided below:

- Revised Proposition 2: For students who responded to reflection questions, student perceptions about IPCP were favorable from Cases 2018 and 2020. Based on the outcomes of the content analysis, the revised proposition produced a literal replication— as opposed to a theoretical replication—because the Cases produced similar results after reexamination of their content analyses.

- Revised Proposition 3: For the students who responded to reflection questions, the IPE-

  based teaching interventions selected for Cases 2018 and 2020 were perceived similarly

  regarding the value and effectiveness of their unique experiences on attitude changes

  regarding IPCP. Like Revised Proposition 2, this Revised Proposition 3 also produced a

  literal replication, because the Cases produced similar results based on reexamination of

  their content analyses.

Explanations for the theoretical replication of Proposition 1 and literal replications in

Revised Propositions 2 and 3 align with the two guiding theories used for this study: BTHD and

the EHP. Although these theories were selected because of their emphasis on ecology,

specifically, the influence of Context on Person, and its influence on Development and

Performance, these theories were also selected because of their holistic perspectives and systems

theory orientation, which honors the influence of the Person's effect on Context. Recognizing the

dynamic and reciprocal interactions between Person and Context and based on outcomes of the

15 students' responses to reflection questions in Case 2020, the Context factors appeared to be

less influential on their likelihood to complete the full IPE-based experience from pretest through

posttest and reflection, as compared to Person factors. This explanation adds complexity to the

ecology of IPE.

Emphasizing the ecology of IPE was a logical strategy for this study due to the

significant differences in ecological factors between Cases 2018 and 2020. This assumption

confirmed theoretical replication for Proposition 1 based on how ecological factors affected

students in Cases 2018 and 2020 as reflected through their differing response rates to reflection

questions. For Case 2018, the presence of typical ecological factors facilitated a higher response

rate to reflection questions. For Case 2020, the presence of atypical ecological factors during the pandemic inhibited student response rates.

However, emphasis on the influence of ecology, specifically Context, for all propositions resulted in the disconfirmation of theoretical replication for Propositions 2 and 3, which created opportunity for revisions that resulted in confirmation of literal replication. The Process-Person-Context-Time (PPCT) model of the BTHD and the elements of the EHP all include the important Person construct, which is its own separate construct that dynamically and reciprocally interacts with other constructs in the models. Although ecological factors were very different between both Cases and were the basis for Proposition 1's theoretical replication, Person factors might have been a stronger influence (for those who responded) than previously hypothesized.

For those who responded to the reflection questions in Case 2020, each student's Person factors influenced their individual perceptions and attitudes about their IPE-based learning experiences, which produced overall (and unexpected) positive changes about IPCP through uniprofessional learning experiences during a pandemic. However, this explanation included the understanding that each student in Case 2020 and their individual Person factors were challenged by their unique and collective Context factors creating their own unique ecological exchanges. These exchanges facilitated or inhibited their likelihood of response to reflection questions. As such, the qualitative outcomes from Case 2020 were only representative of the 15 students who provided responses, and assumptions about perceptions or attitude changes were not made about the 80 students who did not respond to reflection questions.

Cross-Case Synthesis. The final analysis technique from the Yin perspective is cross-case synthesis, which is specific to multiple-case studies. Unlike cross-case *analysis* which drills down to key variables within cases, cross-case *synthesis* preserves the integrity of each case and

assumes a case-based approach—as opposed to a variable-based approach—to "compare or synthesize within-case patterns across cases" (Yin, 2018, p. 196). Cross-case synthesis begins with an awareness of the commonalities and differences between cases to ensure they compare well enough along important dimensions to warrant common findings between them and to show that the differences do not undermine the multiple-case findings (Yin, 2018, p. 198). Based on the essential commonalities between Cases 2018 and 2020, specifically, the student mix and the IPE-based courses occurring at the same point in the academic year and within professional programs, the major differences between Cases were the elements that changed due to unexpected ecological factors, which created opportunity for study. See Appendix X, Table X1 for a summary of important characteristics for Cases 2018 and 2020.

Qualitative Findings for Research Question #3

The cross-case synthesis indicated that students from Cases 2018 and 2020 identified benefits from engaging in their IPE-based learning experiences; the majority either explicitly or implicitly identified that their attitudes positively changed due to their IPE-based learning experiences; and the majority provided constructive suggestions for future learning experiences, to include inviting students from other health professions to participate. While several unexpected observations were made, specifically how several students from Case 2020 recommended no changes to the IPE-based learning experience and made minimal references to the pandemic, almost all student responses were positive and appropriately constructive. Only a few from both Cases combined had the potential for a negative-sounding tone or included statements of self-interest as opposed to a team-orientation, and only a few responses from Case 2020 appeared neutral. Therefore, this full qualitative data analysis has informed Research Question #3.

The third research question asked, "In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?" The results of the analysis supported by theory provided several answers. First, the analysis indicated that a variety of ecological factors for both Cases influenced the response rates to the reflection questions. Ecological factors for students from Case 2018 included not only typical academic occurrences, but it also included the influence of faculty and peers, which may have encouraged pretest, posttest, and reflection question completion. Ecological factors for students from Case 2020 had atypical academic and social occurrences due to the pandemic, which resulted in less peer and faculty interaction and may have influenced the likelihood to complete all requested components of their uniprofessional learning experiences from pretest though posttest and reflection.

However, for those who provided responses, students from both Cases reported positive perceptions and attitudes (to include attitude changes) about IPCP after their IPE-based learning experiences through implicit and/or theoretically supported words—even under extenuating circumstances due to the differing ecological factors in Case 2020—and less with explicit statements about attitude change. The synthesized outcomes from both Cases specifically identified the importance of patient-centered, interprofessional collaboration and their intent to practice IPCP in the future. Table 34 provides summary of this synthesis and outcomes.

Table 34

Cross-Case Synthesis Results

Case	Within-case patterns based on results of content analysis	Outcomes of cross-case synthesis
Case 2018 (n = 83 out of N = 119)	• Enjoyed learning about, from, with each other through case studies and discussion/dialogue • Acknowledgement of or general appreciation for collaboration, communication, and patient-centeredness • Recommendations for students from other professions to engage in IPE workshop • Most frequently used was "will" followed by positive intentions signifying futuristic intentions related to change and/or practice • No negative themes	• Learning about collaboration and how to collaborate • Remembering the importance of patient-centered care • Include students from other health care professions • "Will" was the most frequently used word followed by positive statements • No negative themes
Case 2020 (n = 15 out of N = 95)	• Learning how to collaborate • Mixed explicit responses about attitude changes implicit responses were better indicators of positive perceptions and/or changes about attitudes pertaining to IPCP • Enhanced understanding about the importance of collaboration and patient-centered care • Recommendations included interactions/collaborations with students from other health care professions • Most frequently used was "will" followed by positive intentions signifying futuristic intentions related to change and/or practice • No negative themes	

Summary of Qualitative Findings

According to Yin (2018), "the purpose of [an] analytic strategy is to link your case study data to the important concepts of interest, and then to have the concepts give you a sense of direction in analyzing the data" (p. 174). Following Yin's method to case study methodology, Case 2018 and Case 2020 were first analyzed separately through content analysis by identifying themes, subthemes, observations, and word frequencies; all were supported by applicable student statements. Although the content analysis for both Cases produced positive results that were

similar about IPE and IPCP, Case 2020 had a low response rate to reflection questions—

specifically, 15 out of 95 students provided responses compared to 83 out of 119 for Case 2018.

Next, the results from both Cases were analyzed together through pattern matching,

explanation building, and cross-case synthesis to inform the Research Question #3. The results

produced theoretical replication to Proposition 1 and literal replications to Revised Propositions

2 and 3. Ultimately, the qualitative outcomes produced answers to Research Question #3, which

indicated that a variety of ecological factors for both Cases influenced the response rates to the

reflection questions; however, for those who provided responses, students from both Cases

reported positively changed perceptions and attitudes about IPCP after their IPE-based learning

experiences. The synthesized outcomes from both Cases specifically identified the importance of

patient-centered interprofessional collaboration and their intent to perform IPCP in the future.

Merged Outcomes

The intent of this comparative mixed methods case study design was to merge the

quantitative data from the natural experiment and the qualitative data from the case study into an

integrated analysis of outcomes that informed Research Question #1 and was supported by

theory. Research Question #1 asked "For students of the tri-alliance in Case 2018 and Case 2020,

how did the survey-based, self-reported attitude changes about interprofessional collaborative

practice (IPCP) converge with their individual narrative perspectives about IPCP after their

respective interprofessional education (IPE)-based learning experiences in the presence of

differing ecological factors?"

This question's first null hypothesis stated that survey-based, self-reported attitude

changes about IPCP and individual narrative perspectives about IPCP will show no significant

nor meaningful evidence of convergence among OT, PT, and SLP students in the presence of

their unique ecological factors from Cases 2018 and 2020. Its first alternate hypothesis stated that survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP will show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020. Its second null hypothesis stated that the merged quantitative results and qualitative findings will show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020. Its second alternate hypothesis stated that the merged quantitative results and qualitative findings will show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

Merging outcomes began with comparing common concepts across the quantitative and qualitative findings to identify the degree to which they converged, diverged, or expanded each other (Creswell & Plano Clark, 2018, p. 224). The Process-Person-Context-Time (PPCT) model of the Bioecological Theory of Human Development (BTHD) and the Ecology of Human Performance (EHP) were tested for fit with the merged outcomes of this study and then used to explain the findings of the integration. The following sections will describe how the outcomes were merged and supported by theory to inform the overall mixed methods question, Research Question #1.

Data Integration and Theory Application

Case 2018, N = 119 and Case 2020, N = 95

Research Question #2 asked "For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow due to pandemic)?" Its null

hypothesis was rejected, and its alternative hypothesis was accepted because the results of the Mann-Whitney U-Test showed that there was a statistically significant difference in attitude changes about IPCP between the students of the tri-alliance for Case 2018, $N = 119$ and Case 2020, $N = 95$ after their unique IPE-based learning experiences in the presence of differing ecological factors. By analyzing the overall modified IPAS pretest and posttest scores, Case 2018, $N = 119$ attitudes about IPCP were statistically significantly higher than Case 2020, $N = 95$ before and after their respective IPE-based learning experiences (Pretest: $U = 2618.500$, $z = -6.745$, $p = .000$; posttest: $U = 1042.500$, $z = -10.438$, $p = .000$).

Research Question #3 asked "In Cases 2018 and 2020, how did the students of the tri-alliance perceive IPE-based learning experiences affected their attitudes about IPCP?" Based on the application of case study data analysis techniques described by Robert Yin (2018) to student responses to reflection questions, the findings produced theoretical replication for one of this question's three propositions. Proposition 1 correctly stated the ecological factors unique to Cases 2018, $N = 119$ and Case 2020, $N = 95$ affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflection responses, confirming theoretical replication. Case 2018 had 69.7% response rate to reflection questions ($n = 83$ responses/$N = 119$ students), and Case 2020 had 15.8% response rate ($n = 15$ responses/$N = 95$ students). Although the content analysis for Case 2018, $n = 83$ and Case 2020, $n = 15$ produced similar results indicating overall positive experiences and good outcomes related to attitude changes, this proposition also indicated that comparing perspectives about attitude changes between Cases was limited based on differing response rates due to influences from ecological factors on student Performance.

For Case 2018, $N = 119$ and Case 2020, $N = 95$, the main quantitative and qualitative findings that informed Research Questions #2 and #3 also informed Research Question #1. The scores from the modified IPAS and the responses to reflection questions indicated that Case 2018, $N = 119$ showed evidence of greater attitude changes about IPCP and diverged from the evidence from Case 2020, $N = 95$ due to the differences in response rates for both outcome measures. Response rates appear to have been influenced by the ecological factors present for both Cases from pretest through posttest and reflection, and the low response rate from Case 2020, specifically at posttest and reflection, affected the ability to effectively compare quantitative and qualitative responses for fully understanding attitude changes in both Cases.

To complete the analysis of merged outcomes for this scenario (Case 2018, $N = 119$ and Case 2020, $N = 95$), the BTHD was tested using its PPCT model to determine the theory's ability to support these results that inform Research Question #1 (see Appendix C for PPCT definitions). The BTHD emphasizes the interrelatedness and dynamic exchanges between the developing Person and other persons, objects, and symbols within their immediate environment over time. Proximal Processes are these reciprocal interactions occurring within immediate environments and are considered the engines of human development (Bronfenbrenner & Morris, 2006). Extrapolating from Tudge (2008) and applying to the ecology of IPE, engaging in IPE learning experiences and interacting with students from other professions are the engines of development for students to make sense of their worlds in the health and social care industry and to understand their roles as team members in these environments (p. 68). See Appendix D for a schema of the PPCT model applied to the ecology of IPE.

The PPCT model operationalized each important concept that was analyzed throughout this study. First, students' Proximal Processes were the interactions between the Person and

students and faculty of the tri-alliance and with other elements IPE-based learning experiences within the immediate environment. Next, the Person characteristic that was closely studied was student attitudes, which is a Force characteristic per the BTHD, as well as the outcome of interest for this study. Then, the Contexts of interest included the (a) interprofessional, hybrid learning experiences with emphasis on the classroom-based workshop for Case 2018 and (b) uniprofessional, online IPE-based learning experiences completed at home for Case 2020. Lastly, Time was represented by attitude changes from pretest through posttest and reflection, which occurred between two to three weeks from beginning to end and were situated in a period of time, which represented historical context. The historical context for Case 2018 was typical curricular progression (absence of a pandemic) and for Case 2020 was an atypical, disrupted curricular progression (presence of COVID-19 pandemic).

With careful application of the operationalized constructs of the PPCT to the modified BTHD formula, $\mathbf{D_t} = \mathit{f}_{\mathbf{(t-p)}}\mathbf{PE_{(t-p)}}$, this theory was appropriately tested, which provided essential support to the outcomes of this study (Bronfenbrenner, 1989; Johnson, 2008, p. 4; Merçon-Vargas et al., 2020). The formula's variables mean that (human) Development (**D**) is a joint function of the Person (**P**) and their Environment (**E**; Merçon-Vargas et al., 2020). The variables **"t-p"** appear twice in the equation to indicate that "the process producing developmental change is not instantaneous, but one that takes place over time, and, like the other terms in the equation, can change over time" (Bronfenbrenner, 1989, p. 190; Merçon-Vargas et al., 2020). Table 35 provides the BTHD formula with interpretation of the variables within it.

Table 35

The Full Bioecological Theory of Human Development (BTHD) Formula

Human **D**evelopmental outcome (time that a given developmental outcome is observed) = Joint **F**unction (the period during which person and environment were jointly operating to produce the developmental outcome observed) (**P**erson characteristics multiplied by **E**nvironment [i.e., ecological factors of Context] [the period during which person and environment were jointly operating to produce the developmental outcome observed])

Applying $D_t = f_{(t-p)}PE_{(t-p)}$ to Case 2018, the variables being tested are defined as

- **D**: Attitude changes about IPCP assessed at the completion of the IPE learning experience in April 2018,

- $f_{(t-p)}$: Function of **P*E** from pretest through reflections,

- **P**: Person characteristics (attitudes about IPCP [Force characteristic]), and

- **E**: The hybrid IPE learning experience with emphasis on the classroom-based workshop in the presence of interprofessional students and faculty during typical curricular progression (see Table 36 for the BTHD formula applied to Case 2018).

Table 36

Case 2018, N = 119 BTHD Formula

Positive attitude changes about IPCP (April 2018) = Joint function [from pretest through reflection] of (Person attitudes about IPCP *multiplied by* hybrid IPE learning experiences with a classroom workshop [during typical curricular progression])

The students' Proximal Processes in Case 2018 included learning in a physical setting that was designed to promote purposeful and guided interactions with interprofessional students and faculty in their immediate environments. All elements in this educational Context during a

period of Time with typical, predictable curricular progression influenced completion of the full

IPE learning experience from beginning to end, which produced a well-represented assessment

of attitude changes. Because of the 100% pretest/posttest response rate to the modified IPAS and

a 69.7% response rate to reflection questions, the outcome measures showed evidence of positive

attitude changes in students of Case 2018.

Applying the BTHD formula to Case 2020, the variables being tested are defined as

- **D**: Attitude changes about IPCP assessed at the completion of the IPE-based learning
  experiences in April 2020,

- $f_{(t-p)}$: Function of **P*E** from pretest through reflections,

- **P**: Person characteristics (attitudes about IPCP [Force characteristic]), and

- **E**: The asynchronous (and some synchronous) uniprofessional, online IPE-based learning
  experiences with students and faculty from own profession during disrupted curricular
  progression due to pandemic (see Table 37 for the BTHD formula applied to Case 2020).

Table 37

Case 2020, N = 95 BTHD Formula

Less positive attitude changes about IPCP (April 2020) = Joint function (from pretest through reflection) of (Person attitudes about IPCP *multiplied by* the uniprofessional, online modules from home [during disrupted curricular progression due to COVID-19 pandemic])

Using the variables specific to Case 2020, the Proximal Processes included students

engaging in uniprofessional, primarily asynchronous online learning in their home environments,

which was the most likely setting due to abrupt university closures and shelter-in-place social

mandates during COVID-19 (excluding students whose settings might have included the

workplace due to being considered essential workers). Because each student's immediate

environment included multiple elements outside of the influence of education, the persons,

objects, and symbols with which the student interacted did not include the direct, guided support

of interprofessional student peers nor faculty for an IPE experience like for Case 2018.

The academically unstructured Microsystems in which these Proximal Processes

occurred, coupled with the unfamiliar and unpredictable circumstances in the Mesosystems and

Exosystems during this period of Time, produced challenges to the Person characteristics of the

student (specifically, Resource and Force characteristics), as well as the Macrosystems with

which the student affiliated or was affected by (see Appendix C for definition of each construct

of the PPCT). These ecological factors influenced the student's likelihood to complete the full

IPE-based learning experiences through the ending components of the voluntary posttest and

reflections. Because of this combination of the ecological factors present in Case 2020, the

student response rates to the modified IPAS pretest and posttest and narrative reflections were

much lower, which, from the gestalt, produced measurable outcomes that indicated unfavorable

results pertaining to attitude changes about IPCP.

Therefore, in this scenario with Case 2018, $N = 119$ and Case 2020, $N = 95$, the first

alternate hypothesis for Research Question #1 was not supported because the merged results

from both Cases diverge, and its first null hypothesis was accepted: Survey-based, self-reported

attitude changes about IPCP and qualitative individual perspectives showed no significant or

meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and

2020. Based on the support from BTHD and its PPCT model, this outcome was due to how the

ecological factors present during both Cases appeared to facilitate or inhibit student participation

in voluntary outcome measures about attitude changes. Additionally, the PPCT model of the

BTHD was tested using its formula, which appeared to provide an accurate representation and interpretation of the merged outcomes. Therefore, the second null hypothesis was rejected, and the second alternate hypothesis was accepted: Merged quantitative results and qualitative findings showed evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

Case 2018, N = 24 and Case 2020, N = 24

Continuing the analysis by studying a different scenario, available quantitative data provided opportunity to compare Cases 2018 and 2020 with different sample sizes. The new sample for Case 2020 included 24 students of the tri-alliance whose modified IPAS pretest/posttest responses were 100% complete after missing data management strategies. Case 2018 underwent randomization of its students to match the new sample for Case 2020; therefore, both Cases had new Ns of 24 students with matching representation of professions between both Cases for further quantitative analysis with balanced samples. As such, the Mann-Whitney U-Test results of posttest modified IPAS scores were $U = 230.000$, $z = -1.197$, $p = .231$. Additionally, because the posttest data from both Cases met assumptions for parametric testing, the independent-samples t test results were $M = 0.13$, 95% CI [-0.07, 0.34], $t(46) = 1.29$, $p = .204$, with a small effect size ($d = 0.39$). The outcomes of both statistical tests provided evidence of no statistically significant differences in attitude changes at posttest between the students of Case 2018, $N = 24$ and Case 2020, $N = 24$ after their unique IPE-based learning experiences and in the presence of differing ecological factors.

These quantitative results were merged with qualitative findings in the same way described for Case 2018, N = 119 and Case 2020, N = 95 because the qualitative responses from Case 2018 were unable to be matched with survey results for the 24 students who were randomly

selected due to its student deidentification process. As such, the literal replications for Revised

Propositions 2 and 3 concluded that student perceptions about IPCP were favorable and similar

between Case 2018 ($n = 83$) and Case 2020, ($n = 15$). Therefore, the merged results from posttest

assessment (modified IPAS and reflections) indicated convergence of quantitative and qualitative

data within and between both Cases in this scenario because the students reported positive

perceptions and attitudes about IPCP after their IPE-based learning experiences.

   With survey nonresponses managed and samples balanced for Case 2018, $N = 24$ and

Case 2020, $N = 24$, the merged outcomes from posttest assessment may indicate that Person

factors had a greater influence on outcomes than ecological factors as described in the BTHD.

However, because the BTHD includes development over time and this scenario's analysis was

focused on posttest assessment, the Ecology of Human Performance (EHP) was tested for its fit

to explain and support these outcomes at a single point in time: posttest (including reflections).

Although the EHP includes "time" as an important construct, it is considered a Context variable,

specifically temporal context. As such, the EHP primarily focuses on Performance, which is

when the Person engages in Tasks within a Context. Additionally, Performance cannot be

understood outside of Context; thus, this theory is aptly named the *Ecology* of Human

Performance (Dunn et al., 1994, p. 598).

   Per the EHP, the Person's skills and abilities are required to select and engage in the

Tasks they want or need to do, and the interrelationship of Person factors and Context variables

determines the number and types of Tasks available to the Person within their Performance range

(See Appendix F for definitions of the EHP and Appendix G for the schema of EHP applied to

the ecology of IPE; Dunn et al, 1994, Dunn, 2017). Like the application of the BTHD and its

PPCT model, the formula for the EHP is **PC + T = Pf**: Specifically, the constructs are (Person *

Context) + Task = Performance. Applied to the ecology of IPE, the *product* of the student's

unique Person factors and their surrounding Contexts *added to* the IPE-based learning Task

equals the student's Performance. In other words, a Task is a specific activity in which the

Person engages within their Context, and the Task's meaning and Performance will be different

between different Persons based on their unique Person factors and cultural influences (Dunn et

al., 1994).

Applying **PC + T = Pf** to Case 2018 the variables being tested are defined as

- **P**: Students of the tri-alliance and their unique Person factors (to include Personal Values
  and Interests [e.g., attitudes]),

- **C**: Hybrid IPE emphasizing the classroom-based workshop with graduate-level
  interprofessional students and faculty during typical curricular progression,

- **T**: Each educational activity (intervention) from all three phases including (a) pre-
  workshop individual Tasks (pretest) and group Tasks, (b) workshop group Tasks and an
  individual Task (posttest), and (c) post-workshop reflections (individual Task but
  accessible by group), and

- **Pf**: The completion of all IPE learning Tasks resulting in positive attitude changes about
  IPCP as measured by the pretest/posttest modified IPAS and narrative responses to
  reflection questions (see Table 38 for the EHP formula applied to Case 2018).

Table 38

Case 2018, Ecology of Human Performance (EHP) Formula

(Students of the tri-alliance * Hybrid IPE with interprofessional students and faculty during typical semester) + Three-phases of individual and group IPE interventions = Positive attitude changes about IPCP as the measured output of Performance at posttest

As expected, the students from Case 2018, $N = 24$ showed positive attitude changes about IPCP like its full $N = 119$. The students' unique Person factors and the interprofessional, supportive, and typical Context in which the hybrid IPE experience occurred positioned these students to successfully participate in and complete individual and group Tasks during all three phases of their learning experience. As such, positive attitude changes about IPCP were reported through converging quantitative and qualitative outcomes.

Applied to Case 2020, the variables being tested are defined as

- **P**: Students of the tri-alliance and their unique Person factors (to include Personal Values and Interests [e.g., attitudes]),

- **C**: Home environments (unless required otherwise) in the presence of co-inhabitants (if any); occasional engagement with graduate-level student peers and faculty from the same profession via virtual context; an atypical, disrupted semester due to COVID-19,

- **T**: Independent, asynchronous online modules, video simulations, and/or occasional synchronous online class meeting, which included pretest before and posttest after the program-specific educational interventions, and

- **Pf**: The completion of all IPE learning Tasks resulting in positive attitude changes about IPCP as measured by the pretest/posttest modified IPAS and narrative responses to reflection questions (see Table 39 for the EHP formula applied to Case 2020).

Table 39

Case 2020, Ecology of Human Performance (EHP) Formula

(Students of the tri-alliance * Online IPE-based interventions; peers and faculty from same profession; disrupted, atypical semester; pandemic) + Individual completion of pretest, program-specific education interventions, and posttest = **Positive attitude changes** about IPCP as the measured output of Performance at posttest

Unlike Case 2018, the Context and Task constructs were different in this formula, and having a different outcome than Case 2018 would have been understood. However, Case 2020 also showed positive attitude changes about IPCP. Based on the previous statement, "… a Task's meaning and Performance will be different between different Persons *based on their unique Person factors*…," Person factors of the students who responded within Case 2020 appeared to have individually-facilitated behaviors that produced Task participation within their challenging Contexts, and still resulted in positive attitude changes about IPCP, which were also reported through converging quantitative and qualitative outcomes.

Therefore, in this scenario with Case 2018 and Case 2020, the first alternate hypothesis for Research Question #1 was accepted because the merged results from both Cases converged, and its null was rejected. However, the second alternate hypothesis was less supported if the Person factor was more influential than ecological factors for Case 2020. Therefore, in this scenario, the second alternate hypothesis was rejected and null accepted because evidence did not clearly indicate that ecological factors were the primary influences on attitudes about IPCP among students of the tri-alliance in Case 2020. The EHP theory provided support for these interpretations; however, results from testing the piloted formula presented opportunity for revision, if attempted in future studies.

Bottomline Between Scenarios

Although merged outcomes from both scenarios informed Research Question #1, and both were supported by theory, the most appropriate outcome for this study was described for Case 2018, $N = 119$ and Case 2020, $N = 95$. The merged outcomes from both Cases diverge, and based on the tested use of the BTHD, ecological factors influenced student participation from

pretest through posttest and reflection, which facilitated responses in Case 2018 and inhibited responses in Case 2020. Therefore, student attitude changes, as measured by the pretest/posttest modified IPAS and responses to reflection questions, indicated positive outcomes about IPCP for Case 2018 and unfavorable outcomes for Case 2020. Its first null hypothesis was accepted indicating that the merged outcomes from both Cases did not converge, but its second null was rejected because evidence supported that ecological factors had influence on attitude changes within the students of tri-alliance (albeit different kinds of influence) from Cases 2018 and 2020.

Summary of Merged Outcomes

The results of the integration expanded the understanding about attitude changes reported by the students of the tri-alliance with respect to their unique ecological influences during two points in time. Based on the merged outcomes from quantitative results and qualitative findings, the integrated results showed evidence of data convergence and divergence. Case 2018, $N = 119$ and Case 2020, $N = 95$ diverge: The merged outcomes for Case 2018, $N = 119$ indicated positive attitude changes; yet the merged outcomes for Case 2020, $N = 95$ indicated unfavorable outcomes due to the effect of low response rates on assessment and analysis of attitude changes. For Case 2018, $N = 24$ and Case 2020, $N = 24$, their students' quantitative results converged with their qualitative findings between and within the two Cases. An integrated results matrix in Appendix X, Table X1 provides a side-by-side comparison of the key quantitative and qualitative findings and their merged outcomes that were supported by theory.

Summary

Although separate and integrated analyses, interpretation, and theory testing of two scenarios (based on original sample sizes [Case 2018, $N = 119$ and Case 2020, $N = 95$] versus modified sample sizes [Case 2018, $N = 24$ and Case 2020, $N = 24$]) resulted in opposite findings,

the merged outcomes from Case 2018, $N = 119$ and Case 2020, $N = 95$ best informed Research

Question #1. The first null hypothesis was accepted, and the second null hypothesis was rejected.

However, the influence of unique Person factors during unfavorable Contexts appeared to

positively influence attitude changes among some students of the tri-alliance in Case 2020. These

outcomes are further discussed and expanded in Chapter 5 about their present meanings and

future applications to the ecology of IPE.

Chapter 5: Discussion

The purpose of this dissertation study was to compare and understand attitude changes about interprofessional collaborative practice (IPCP) in two groups of students of the tri-alliance—specifically, occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP)—after participating in different interprofessional education (IPE)-based learning experiences. These IPE-based learning experiences involved different teaching interventions that occurred in the presence of very different ecological factors at different points in time—specifically, April 2018 and April 2020.

The two tri-alliance student cohorts and their unique IPE-based learning experiences were identified as Case 2018 and Case 2020 and were studied through a comparative mixed methods case study design. Case 2018 included 119 OT, PT, and SLP students who engaged in interprofessional, hybrid IPE—with an emphasis on an in-person, on campus workshop—during typical curricular progression in April 2018. Case 2020 included 95 OT, PT, and SLP students who engaged in uniprofessional, primarily online IPE-based learning experiences in April 2020, which was during atypical and disrupted curricular progression due to the coronavirus pandemic (COVID-19).

Bronfenbrenner's Bioecological Theory of Human Development (BTHD) was the guiding theory for this dissertation study, and its Process-Person-Context-Time (PPCT) model operationalized the BTHD within this dissertation study's research design (Bronfenbrenner & Morris, 2006). Additionally, Ecology of Human Performance (EHP) was the supporting theory for interpreting outcomes of this dissertation study (Dunn et al., 1994; Dunn, 2017). Theoretical constructs within the BTHD, its PPCT model, and the EHP were written as proper nouns to identify when these constructs were being applied to concepts within each chapter. Use of the

BTHD, its PPCT model, and the EHP guided this dissertation study, aided in interpretation of results, and allowed the theories themselves to be tested (J. Tudge, personal communication, December 9, 2020). See Appendices C, D, F, and G for full definitions of these theories, their constructs, and supporting schemas.

Research Questions

The results of this dissertation study addressed its purpose of research and informed the following primary research question and two sub-questions:

1. For students of the tri-alliance in Case 2018 and Case 2020, how did the survey-based, self-reported attitude changes about IPCP converge with their individual narrative perspectives about IPCP after their respective IPE-based learning experiences in the presence of differing ecological factors?

   - H_{O1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show no significant nor meaningful evidence of convergence among OT, PT, and SLP students from Cases 2018 and 2020.

   - H_{A1}: Survey-based, self-reported attitude changes about IPCP and individual narrative perspectives about IPCP show evidence of convergence among OT, PT, and SLP students in Cases 2018 and 2020.

   - H_{O2}: The merged quantitative results and qualitative findings show no significant nor meaningful evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

   - H_{A2}: The merged quantitative results and qualitative findings show evidence of influence from ecological factors on attitude changes about IPCP among students of the tri-alliance in Cases 2018 and 2020.

2. For students of the tri-alliance, is there a difference in attitude changes about IPCP between the unique IPE-based learning experiences from Case 2018 (interprofessional learning, hybrid model, typical curricular flow) and Case 2020 (uniprofessional learning, online model, atypical curricular flow) in the presence of differing ecological factors?

- H_O: There is no difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

- H_A: There is a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 with respect to their unique IPE-based learning experiences and differing ecological factors.

3. In Cases 2018 and 2020, how did the students of the tri-alliance perceive their IPE-based learning experiences affected their attitudes about IPCP?

- Proposition 3.1: The ecological factors present in Cases 2018 and 2020 affected the likelihood of participation in full IPE-based learning experiences from pretest through posttest assessment and reflections.

- Rival hypothesis 3.1: Ecological factors present in Cases 2018 and 2020 did not affect the likelihood of participation by students fulfilling their entire IPE-based learning experiences for Cases 2018 and 2020.

- Proposition 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were more favorable from Case 2018 and less favorable from Case 2020.

- Rival hypothesis 3.2: Student perceptions about IPCP after their respective IPE-based learning experiences were favorable from Cases 2018 and 2020.

- Proposition 3.3: The IPE-based teaching interventions implemented for Cases

  2018 and 2020 were perceived differently about the value and effectiveness of

  their unique experiences on attitude changes regarding IPCP.

- Rival hypothesis 3.3: The IPE-based teaching interventions implemented for

  Cases 2018 and 2020 were perceived similarly about the value and effectiveness

  of their unique experiences on attitude changes regarding IPCP.

Summary of Study

The three research questions were measured using quantitative and qualitative procedures

that supported the overarching comparative mixed methods case study about student attitude

changes related to IPCP. "Attitude changes" is a Level 2a outcome according to the Joint

Evaluation Team (JET) classification of IPE outcomes (Barr et al., 2005). A natural experiment

design was the method for quantitative data collection using a modified version of the validated

Interprofessional Attitude Scale (IPAS). The modified IPAS was a 27-item survey that measured

self-reported student attitudes about IPCP using a 7-point Likert scale. A case study

methodology influenced by Robert Yin's holistic multiple-case design was used to collect and

understand qualitative student data in the form of written responses to reflection questions about

perceptions and attitudes related to IPCP. The results from the natural experiment and case study

were analyzed separately and then merged to provide a deeper understanding of attitude changes

and the Ecology of IPE[3] for the students of the tri-alliance from Cases 2018 and 2020.

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[3] The Ecology of IPE is a budding conceptual framework introduced by this investigator that is a product of this dissertation study and combines constructs from the BTHD and EHP. The Ecology of IPE is written in title case henceforth to signify potential for exploration through further research as a new IPE framework.

Quantitative Results

The pretest/posttest survey results from the modified IPAS for Cases 2018 and 2020 were unequal in completion rate and required missing data management strategies for statistical analysis. Case 2018 had 100% completion for the pretest and posttest modified IPAS. Case 2020 had 75.8% pretest completion and 22.1% posttest completion, using a $\geq$70% cut point. Based on the original and modified data from Cases 2018 and 2020, Research Question #2 was examined via different sample size-based scenarios, and two of these scenarios were most relevant for informing this question. Scenario 1 represented Case 2018, $N = 119$ and Case 2020, $N = 95$ (unmodified sample sizes); scenario 2 represented Case 2018, $N = 24$ and Case 2020, $N = 24$ (modified sample sizes for both Cases).

The nonparametric Mann-Whitney U-Test was used to analyze the overall pretest/posttest results of the modified IPAS for both scenarios. For the first scenario (Case 2018, $N = 119$ and Case 2020, $N = 95$), simple imputations were performed for the missing responses in Case 2020. The results of the Mann-Whitney U-Test found a statistically significant difference in overall pretest attitudes and posttest attitude changes about IPCP between students of the tri-alliance for both Cases, largely due to the high rate of nonresponses in Case 2020.

For the second scenario (Case 2018, $N = 24$ and Case 2020, $N = 24$), data management strategies also allowed for statistical analysis. Through listwise deletion and conditional mean substitution for Case 2020 and random selection for Case 2018, results from the Mann-Whitney U-Test for the second scenario produced results that indicated a statistically significant difference in attitudes at pretest between Cases but no statistically significant difference in attitude changes at posttest. The parametric independent-samples t test was also implemented for the second scenario with modified sample sizes to further examine overall posttest-only attitude

scores. Like the Mann-Whitney *U*-Test, the *t* test also produced results indicating no statistically significant differences in attitudes at posttest and relatively small effect sizes between Cases.

Although the results from both scenarios informed the quantitative research question, the primary analysis that compared the overall pretest and posttest attitude scores for Case 2018, $N = 119$ and Case 2020, $N = 95$ best informed Research Question #2 because this scenario reflected all elements of the bound Cases. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted indicating that there was a difference in attitude changes about IPCP between the students of the tri-alliance from Cases 2018 and 2020 after their unique IPE-based learning experiences in the presence of differing ecological factors. These results imply that ecological factors either facilitated (Case 2018) or inhibited (Case 2020) student attitude changes as measured by the modified IPAS from pretest through posttest.

Qualitative Findings

Following Robert Yin's method to case study methodology, Case 2018 and Case 2020 were first analyzed separately through content analysis by identifying themes, subthemes, observations, and word frequencies; all were supported by applicable student statements. Responses from both Cases were positive and appropriately constructive; however, the number of responses and the amount of detail within responses differed between Cases. The overarching themes present in the student responses from Case 2018 were (a) they enjoyed the interactive learning activities and associated discussion/dialogue; (b) they reported learning about, from, and with one another; (c) they reported emphasis on having effective communication and the importance of patient-centered care; (d) they recommended inviting students from other health care professions to join the IPE workshop; and (e) their responses appeared to be in line with the

2016 Interprofessional Education Collaborative (IPEC) competencies. Eighty-three students out of 119 provided narrative responses from Case 2018.

From Case 2020, 15 out of 95 students provided narrative responses. This cohort of students engaged in IPE-based learning experiences that were completed online at home and without interprofessional peer nor faculty engagement due to COVID-19 mandatory public health restrictions. For the students who responded, the overarching themes present in their responses from Case 2020 were (a) their attitudes about collaboration improved, specifically communication, team-orientation, and preparedness for navigating collaboration challenges; (b) they valued learning about collaboration and the importance of patient-centeredness; (c) they recommended interprofessional interactions to be included in future learning experiences; and (d) their responses also appeared to be in line with the 2016 IPEC competencies.

The final step in multiple-case study analysis required the findings from both Cases to be analyzed together. This collective analysis occurred through pattern matching, explanation building, and cross-case synthesis to inform the Research Question #3. The results produced theoretical replication with Proposition 1 and literal replications with Propositions 2 and 3 (with revisions; see Chapter 4). Ultimately, the qualitative findings informed Research Question #3 by indicating that a variety of ecological factors from both Cases influenced the presence or absence of student responses to reflection questions. However, for those who provided responses, students from both Cases reported positively changed perceptions and attitudes about IPCP after their IPE-based learning experiences, which is a commonly reported outcome in other studies about attitude changes (to be discussed later in the chapter). The synthesized outcomes from both Cases specifically identified the importance of patient-centered, interprofessional collaboration and their intent to perform IPCP in the future.

Merged Outcomes

Based on the merged outcomes from quantitative results and qualitative findings, the integrated results showed evidence of data convergence *and* divergence. For the scenario with Case 2018, $N = 119$ and Case 2020, $N = 95$, their overall outcomes diverged. The merged outcomes for Case 2018 indicated positive attitude changes; yet the merged outcomes for Case 2020 indicated unfavorable findings due to the effect of low response rates on assessment and analysis of attitude changes. When the outcomes from both Cases were integrated, they diverged from one another. Based on the Bioecological Theory of Human Development (BTHD) and its Process-Person-Context-Time (PPCT) model, this outcome was interpreted as being due to the effect of ecological factors (Context) present during both Cases. The effects of ecological factors appeared to facilitate or inhibit student attitude changes assessed by completion of voluntary outcome measures as a part of their full IPE-based learning experiences from pretest through posttest IPAS and narrative reflection. Additionally, the formula for testing the PPCT model of the BTHD successfully aligned with these merged outcomes.

For the scenarios with Case 2018, $N = 24$ and Case 2020, $N = 24$, the students' quantitative results converged with their qualitative findings between and within the two Cases, and Case 2018 and Case 2020 showed similarly positive attitude changes about IPCP. Based on the Ecology of Human Performance (EHP), it acknowledges that "a Task's meaning and Performance will be different between different Persons *based on their unique Person factors*" (Dunn et al., 1994). Person factors within the students who responded from Case 2020 appeared to have facilitated behaviors that produced Task Performance within their challenging Contexts, which still resulted in positive attitude changes about IPCP. Therefore, the merged outcomes

from both scenarios technically informed Research Question #1 and were supported by theory; however, the piloted formula for the EHP has opportunity for revision.

Discussion and Interpretation of Merged Outcomes

As previously stated, the merged outcomes from both scenarios technically informed Research Question #1, and both were supported by theory. Because of the flexibility of this dissertation study's research design, which allowed analysis of two scenarios, it built in assurances to reduce the likelihood of Type I and Type II errors. However, the most appropriate outcome for this dissertation study as a whole was described for Case 2018, $N = 119$ and Case 2020, $N = 95$.

The merged outcomes from Case 2018, $N = 119$ and Case 2020, $N = 95$ diverged, and based on the use of the BTHD, ecological factors appeared to influence student attitude changes about IPCP based on the use of quantitative and qualitative outcome measures. Therefore, student attitude changes, as measured by the pretest/posttest modified IPAS and responses to reflection questions, indicated positive outcomes about IPCP for Case 2018 and unfavorable outcomes for Case 2020. The first null hypothesis for Research Question #1 was accepted indicating that the merged outcomes from both Cases did not converge, but its second null was rejected because evidence supported that ecological factors had influence on attitude changes within the students of tri-alliance (albeit different kinds of influence) from Cases 2018 and 2020.

The merged outcomes were supported by theory, which also provided interpretation of meaning. Separate from this dissertation study, the BTHD, its PPCT model, and the EHP each emphasize the interrelatedness and dynamic exchanges between the Person and their Context and how these exchanges produce Task Performance or Development. The Person construct includes elements and factors that are innate or unique to the individual (e.g., gender, life experiences,

personality, attitudes, motivation). Blending the BTHD and EHP, Context includes multiple

systems that are proximal and distal to the Person (e.g., Micro -, Meso-, Exo-, and

Macrosystems) that also influence and are influenced by the Person for Task Performance and

Development through Proximal Processes.

Because the BTHD includes the passage of Time as an important aspect of development,

the BTHD was the best theory for understanding Case 2018, $N = 119$ and Case 2020, $N = 95$.

This scenario analyzed attitude changes from pretest through posttest and reflection for both

Cases. The outcome of this scenario was largely due to the high rate of survey and reflection

nonresponses in Case 2020. As described through the BTHD, the multi-system Contextual

influencers between Cases either facilitated or inhibited Proximal Processes (to include attitude

changes about IPCP) in the form of student engagement in their full IPE-based learning

experiences. For Case 2020, these Contextual influences appeared to affect the students by

inhibiting engagement, which resulted in low response rates and produced unfavorable outcomes

about attitudes when data were analyzed from all students in both Cases.

However, based on the results from the statistical tests employed for the second scenario

with adjusted sample sizes—Case 2018, $N = 24$ and Case 2020, $N = 24$—there is argument that

the IPE-based learning experiences unique to the students of tri-alliance (who completed the

pretest and posttest surveys) in Case 2020 had the same effect on attitude changes as the IPE

experiences in Case 2018, with respect to their differing ecological factors. This interpretation

was based on the constructs of the EHP because of how Performance was assessed at posttest

only, a single point in time. The quantitative results using modified sample sizes indicated that,

ecological factors aside, the IPE-based learning experiences from Cases 2018 and 2020 produced

the same effects on attitude changes within the students of tri-alliance. Because the qualitative

outcomes for this scenario excluded nonresponses in interpretation, the quantitative results

converged with qualitative findings within and between both Cases. Because merged outcomes

indicated favorable results for both Cases with adjusted sample sizes, the EHP supports how the

unique Person factors within the students appeared to strongly influence their engagement in the

full IPE-based learning experiences, despite differing Contexts between Cases.

Integration with Previous Literature

The methodology and merged outcomes of this comparative mixed methods case study

included similarities with other studies. In the literature, the Level 2a IPE outcome, student

attitude changes, has been commonly assessed and reported. Per Olson and Bialocerkowski

(2014) and Reeves et al. (2016), student attitudes have become more positive about IPCP, and

attitudes have been commonly obtained through self-reported data. Additionally, Byrne and

Connor (2020) and Fusco et al. (2019) reported how student attitudes commonly score high at

pretest. The quantitative results of this dissertation study aligned with the findings from these

studies. For Case 2018, $N = 119$ and Case 2020, $N = 24$ separately, the modified IPAS scores

increased from pretest to posttest; however, student attitudes were scored positively at both

testing times.

As described throughout this dissertation study, a modified self-reported attitude survey

was used, which was consistent with Marshall et al. (2020). These authors modified the IPAS for

similar reasons as the tri-alliance IPE faculty and reported the "combination of quantitative and

qualitative data provided complementary and corroborative evidence" about learning outcomes

(Marshal et al., 2020, p. 226). Their use of quantitative and qualitative data about student

attitudes also aligned with this dissertation study.

In keeping with other studies, the merged outcomes of this dissertation study were unable to inform the literature about optimal IPE teaching strategies based on the positive self-reports and narrative reflections from the students who responded in both Cases. The outcomes from other studies also reported favorable outcomes using a variety of interprofessional and uniprofessional teaching/learning methods. However, IPE has been reported to make more conceptual sense to students when learning in interprofessional contexts (Brewer & Flavell, 2020). The qualitative data from students in Cases 2018 and 2020 indicated that learning with and from students of other health professions would have enhanced their IPE learning experiences, which aligned with the findings reported by Brewer and Flavell (2020).

Also, according to previous literature, classroom-based IPE has been reported to be no better than online-based IPE and vice versa (Beverly & Wooster, 2018; Black et al., 2016; Jernigan et al., 2016; Sincak et al., 2017). The merged outcomes from Case 2018, $N = 24$ and Case 2020, $N = 24$ produced similar results about attitude changes, which aligned with previous literature. Additionally, classroom-based IPE was more commonly reported as a teaching strategy; online technologies appeared mostly to be a means to an end for either preparing students in an early phase of IPE, gathering evaluative data, or because in-person IPE was not feasible (Beverly & Wooster, 2018; Black et al., 2016; Jernigan et al., 2016; Sincak et al., 2017). The online IPE-based teaching intervention for Case 2020 was utilized because of COVID-19 public health mandates that prohibited in-person learning experiences, which also aligned with previous literature (i.e., online IPE selected because in-person IPE was not feasible).

Contributions and Implications of Merged Outcomes

Contributions to Scholarship

At the beginning of this dissertation study, IPE challenges (i.e., research problems) were identified from two perspectives. One perspective was related to the students of the tri-alliance and their learning outcomes about IPCP in the presence of highly complex ecological factors. The other perspective was related to the IPE knowledge base. A gap in IPE literature was identified about the effects of ecological factors, their implications on higher education (specifically, IPE and student learning outcomes), and a common theoretical base that links the two.

Contributions to Scholarship: The Student Perspective

Contributions to scholarship that address the IPE challenge related to the student perspective are structured according to BTHD- and EHP-influenced constructs that contribute to the new notion of the Ecology of IPE: Person, Context, Task Performance, and Development over Time. Contributing to the Person construct, this dissertation study is only the second about IPE specifically within the students of the tri-alliance who were identified as such. Presently, Eidson et al. (2018) is the only other published study specifically about IPE and students of the tri-alliance. Therefore, a dearth of knowledge exists about learning outcomes, specifically attitudes, related to the students of the tri-alliance, and the results of this dissertation study help contribute to this IPE challenge.

The constructs of Context, Task Performance, and Time are addressed by this dissertation study by being one of the first to report about the repercussions of a pandemic on student learning outcomes in IPE. A mixed methods study was published in late 2020 about student learning outcomes after transitioning from in-person to online IPE, and their results indicated

that students learned as much between settings and that socialization was key (Jones et al., 2020).

These findings are aligned with some of the findings from this dissertation study.

Other literature prior to COVID-19 reported on responses and reactions to the Swine Flu

in 2009, but none reported on student learning outcomes during a pandemic. The information

gleaned from the results of this dissertation study indicate that Context (e.g., classroom, online,

alone, with people, sources of sensory input and human influence, etc.) and Time (e.g., point in

time [phase of curriculum]; over a period of time [pretest to posttest]; historical period

[presence/absence of a pandemic]) influence student Task Performance as evidenced by the high

response rate from Case 2018 and low response rate from Case 2020. Evidence from this

dissertation study appears to suggest that a structured IPE event in the presence of

interprofessional peers and faculty enhance Task Performance.

Because Task Performance appears to be influenced by Context and Time, as well as by

Person factors, an assumption within andragogy that may be applied to IPE suggests that

Development (i.e., Level 2a: attitude changes) may be facilitated through Task Performance (i.e.,

engagement and participation in full IPE-based learning experiences; see also Malcolm Knowles

adult learning theory). For this dissertation study, the measure of Development, the modified

IPAS, quantified pretest and posttest attitude changes based on responses from Cases 2018 and

2020. Because overall posttest response rates diverged between Cases, the accuracy of the

measurement of Development was limited due to varying levels of Task Performance and the

influences of Person, Context, and Time. Development was more accurately measured for Case

2018 than for Case 2020 based on available data (i.e., response rates); unfortunately, true

Development will remain unknown due to the retrospective nature of this dissertation study

design and the nature of self-reported outcomes. The contribution to scholarship is that using

outcome measurement instruments that include more than self-report tools may better inform

student Development.

Contributions to Scholarship: The Perspective of IPE Knowledge

Addressing the challenge from the perspective of the IPE knowledgebase, this

dissertation study contributed knowledge about theory by relying on theory to guide its

methodology. According to Hean et al. (2018), "Group and systems-level theories may provide

the sophisticated theoretical justifications that the interprofessional field requires to propel itself

forward" (p. 555). This dissertation study is the first study about IPE that used and tested the

mature version of the BTHD and pilot tested the EHP; both are systems-level theories. By

applying constructs from both theories, this dissertation study emphasized the importance of

Context and its reciprocal interactions or interrelatedness with the Person as a part of a dynamic

system.

Some studies have utilized Bigg's 3Ps (presage [context], process [teaching], product

[outcome]), and one study applied an older version of the BTHD (Bluteau et al., 2017; Brewer et

al., 2017; Reeves et al., 2016). However, this dissertation study is the first study that has

attempted to understand and explain two new-to-IPE theories (BTHD and EHP) that have a

systems-level, holistic perspective. Therefore, the contribution to scholarship from this

perspective is that blending these theories' constructs and applying them specifically to IPE—as

attempted in this dissertation study—provides opportunity for further exploration of the notion of

the Ecology of IPE.

Another contribution to IPE knowledgebase is being the first to report IPE student

learning outcomes during a pandemic. The rarity of this context permitted analysis, which in turn

indicated that knowledge is limited about this phenomenon. The merged outcomes provide

evidence that IPE learning experiences are effective through hybrid and online-only delivery with carefully aligned learning outcomes, based on student responses. This contribution may assist educators with instructional design for optimizing teaching/learning interventions that are flexible with changing contexts.

Lastly, this dissertation study has aligned with some of the methodological recommendations proposed by several authors. Brack and Shields (2019), Olson and Bialocerkowski (2014), and Reeves et al. (2016), for example, suggested that IPE research must include more contextual information, more rigorous methods (i.e., mixed methods and longitudinal), more use of valid outcome measures, and more use of theory. Following these recommendations, this dissertation study used a comparative mixed methods case study design guided by the BTHD, its PPCT, and the EHP with a validated outcome measure. Additionally, this dissertation study was the first to use a natural experiment quantitative design to study IPE learning outcomes with respect to dynamic exchanges between the Person (student) and Context (place, space, and time). By applying recommendations from previous literature and exceeding recommendations by utilizing new-to-IPE methodology, the outcomes from this dissertation study have contributed to and have strengthened the current body of IPE knowledge and have allowed the introduction of the Ecology of IPE.

Implications for Education

Addressing IPE challenges from two perspectives has implications for education and research based on the merged outcomes of this dissertation study. Ecological factors present during IPE-based learning experiences affected the extent to which students of the tri-alliance engaged in and benefitted from IPE. Ecology refers to the interaction between a human and the environment. Based on the BTHD, Proximal Processes are the "engines of development," and

these processes include the dynamic interactions between a student and their immediate environment, the Microsystem. Within the Microsystem are other people, objects, and symbols with whom the Person interacts.

Based on the importance of these theoretical constructs, the most relevant implication for IPE from this dissertation study is related to the student's ability to learn from, about, and with students of other health professions, no matter if the Microsystem is in a physical space or virtual environment. From Case 2018, the students' qualitative input indicated how they valued their IPE experience with peers from the tri-alliance and that they wanted to include students from other health professions with whom they commonly interact in practice-based environments. From Case 2020, students reported that they valued hearing from other professions through their uniprofessional IPE-based modules and videos, and they too expressed desire to have live interactions with students from other health professions. The key implication from this dissertation study related to education is that IPE must be *interprofessional*, no matter the Context (in-person, online, on campus, in the community), which may produce more learning outcomes (quantity) and more meaningful learning outcomes (quality).

Elaborating on Context and learning outcomes and based on the BTHD and EHP, other key implications include that educators must recognize how multiple levels of Context influence all Persons in some way, and in this case, students of the tri-alliance. This recognition will assist educators with creating learning experiences that support meaningful engagement, especially in their most proximal environments, which encourage Development through Proximal Processes. Pertaining to Development, learning outcomes (i.e., attitude changes and others) may be richer and greater when learning Tasks are purposeful, meaningful, and culturally relevant.

Specific to the students of the tri-alliance, opportunity also exists to explore, examine, and promote interprofessional socialization among students of the tri-alliance and other professions with whom they will collaborate in practice. Each profession has its own philosophical orientation and scope of practice, and each student brings their unique Person factors to their professional program of study. By understanding more about other professions and students of those professions, opportunities exist to develop IPE learning experiences that expand exposure to and socialization with more health and social care professions for student-to-student teaching. Through well-matched and intentional student-to-student teaching as an IPE method, profession-specific and interprofessional skills continue to develop, and student preparedness within their scope and through skill expansion will prepare a workforce that is more responsive and better utilized during global catastrophes and pandemics like COVID-19.

Implications for Further Research

From the perspective of IPE knowledge, a gap continues to exist related to several important areas: (a) the student and their unique Person-factors, (b) the Context/environment, (c) IPE outcome measures and frameworks, and (d) use of theory. Assessment of input from students in Case 2020 (who completed the full IPE-based learning experience from pretest through posttest and reflection) identified opportunities to study Person-factors and elements within each student's Microsystem that facilitated their participation during the unfavorable, multi-system Context of the pandemic. Evidence from this dissertation study supported the idea that ecological factors affected students' engagement in their full IPE-based learning experiences for both Cases. But what were the specific influencers for the students whose Person-factors appeared to be more impactful than the Context in Case 2020? Investigating resiliency-based Person factors within students may inform educators about how to include structures and

supports for encouraging flexibility and adaptability as personal and professional skills for students to thrive during non-normal circumstances as they do during normal circumstances. This implication also spearheads opportunity for consideration about evolving the IPEC competencies to include tenacity or resiliency-based qualities for preparing a collaboration-ready workforce that optimally functions during day-to-day, local, and global catastrophes.

With the dependency many industries now have on web-based technology for information sharing, especially during a pandemic, implications for further research about IPE and Context/environment include investigating web-based andragogy in higher education, including IPE. IPE is effectively delivered through a variety of Contexts, depending on the desired learning or practice outcomes of each experience. However, without more evidence-based or evidence-informed online and virtual andragogy for students of IPE, generalizing competencies and making links from didactic to practice-based IPE may result in fewer interprofessional collaboration-ready graduates.

Another implication for further research related to context and environment is the opportunity to learn more about the Microsystem level of Context and related supports for the student of IPE. The Context for Case 2018 included structure, support, and the presence of others that facilitated student engagement in their IPE learning experience, and the Context for Case 2020 was practically opposite. Based on nonresponses in Case 2020, multi-system Contexts appeared to be large influencers, but what was different for or about those who completed their experience? While Person factors appeared to be a big influencer, were there other Context factors present that facilitated participation for the students who completed the experience and not for others in Case 2020? Exploring these opportunities more deeply may provide additional insights into how to develop specific Person factors and/or encourage specific Microsystem

supports so that Proximal Processes will facilitate Development for each student of IPE to their fullest potential that are generalizable across Time and Context.

Another implication for research concerns outcome measures of IPE. Mixed reviews were reported about the IPAS in its original and modified versions. Although its original formulation was validated and the modifications for this dissertation study were consistent with others, students continue to report positive attitudes at pretest, which perpetuates the challenge to determine effectiveness of IPE teaching interventions and attitude changes. Opportunities exist for more sensitive tests to be developed for measuring attitude and perception changes in students who are in the middle of or near the end of their professional programs (Level 2a outcome). Additionally, emphasizing measurement of the acquisition of knowledge and skills (Level 2b) or behavioral change (Level 3) IPE outcomes for pre-licensure students of the tri-alliance appears to be a timely transition from measuring attitude changes if attitudes already measure high before an IPE intervention (Barr et al., 2005).

Lastly, a final implication is related to the use of existing theory or identifying a new theory that will effectively represent the complexities related to IPE. Literature supports the need for a holistic, systems-level theory or framework in IPE, and the evidence supplied in this dissertation study supported how ecology is important to understand in IPE for student Development by using two systems-level theories. Whether advancing an existing theory or framework or by developing a new theory, the discipline of IPE must continue to evolve in a direction that promotes consistency with education and research for ultimately achieving better health outcomes.

Limitations

The limitations of this dissertation study primarily involve the retrospective nature of its design. Because this comparative mixed methods case study analyzed the quantitative and qualitative outcomes from two points in time that occurred in the past (April 2018 and April 2020), there was no opportunity to design this dissertation study for control of more threats to validity and trustworthiness. For instance, due to threats to internal validity (e.g., attrition, history, selection bias), construct validity (e.g., disruption effects, reactive self-report changes), and external validity (e.g., population and ecological validity), too few students from Case 2020 responded for accurate generalization to their cohort. Additionally, there was no opportunity to follow up with these students about completing the outcome measures after their uniprofessional courses were over; therefore, all responses and nonresponses to the modified IPAS and reflection questions were included for measuring attitude changes within Case 2020, $N = 95$.

Additionally, rigorous qualitative data gathering could not be conducted for the case study arm of the mixed methods study because the events had already occurred. Therefore, the only source of qualitative information available was student responses to reflection questions (archival data). Triangulation with other qualitative was not possible. Additionally, the outcomes of this dissertation study contributed to a plentiful knowledgebase about attitudes as the outcome of interest.

Addressing use of theory in IPE and IPE research, the PPCT model of the BTHD is best tested when more than one Person factor is considered (J. Tudge, personal communication, December 9, 2020). This dissertation study only analyzed one Person factor, attitude changes, which was a Force characteristic. Although recognition of each student's professional program was given in parts of this dissertation study, this Person factor—a Resource characteristic—was

not included for testing. The decision to exclude the student's program of study from testing was due to the interprofessional intent of the questions and due to the imbalanced representation of student professions in the posttest data from Case 2020. However, having two or more Person factors included in this dissertation study would have allowed for better analysis of determining which Person factors might have been more influential during their Proximal Processes to better understand Development in IPE.

Lastly, Bronfenbrenner's BTHD has opportunity for evolution, especially if used again in IPE research. The BTHD is a developmental theory which captures how humans develop throughout a lifetime, but it is not reflective of what could be considered the ultimate purpose of Proximal Processes in a Microsystem (J. Tudge, personal communication, December 9, 2020). Attitude changes, which were the developmental outcomes of interest for this dissertation study as applied to the BTHD, were the results of the synergies within the elements of the PPCT model--specifically, the Person and the other persons, objects, and symbols in the Microsystem. Attitude changes (i.e., the Developmental outcomes) may be better understood when a person engages in culturally relevant, purposeful, or meaningful behaviors or tasks. Motivated engagement in tasks encountered in Proximal Processes may encourage more diligence or desire to participate, which further influences Development (Dunn, 2017, p. 218; Xia et al., 2020). Conversely, the synergies within the PPCT model could also produce maladaptive development or negative outcomes (i.e., "inverse proximal processes"), which is a perspective missed in Bronfenbrenner's BTHD and requires deeper analysis for more accurate application to research (Merçon-Vargas et al., 2020). These factors must be included in future uses of the BTHD or its future iterations as applied to IPE so that developmental outcomes of interest are more accurately understood.

Recommendations

Complex ecological factors challenge the full understanding of IPE because they are innumerable, no matter which theory guides a study or is tested. Continuing to explore the Ecology of IPE through a systems-level, holistic lens will begin to provide depth and breadth about what works for whom and in what context (Olson & Biolocerkowski, 2014). Opportunities exist to continue use of the evolving BTHD and the EHP together or to explore the utility of a blended model between their two complementary components. The application of these theories (and others [i.e., Bigg's 3P model]) could produce a new IPE outcome measure that intentionally gathers more information about the constructs of Person, Context, Development, and Task Performance over Time. Exploring and examining these constructs separately or together may provide additional insight into how to develop specific Person factors or encourage multi-system Contextual supports for optimal Task Performance during IPE and IPCP.

As previously explained, OTs, PTs, and SLPs commonly work together in a variety of settings. Opportunities exist to study more about the students of the tri-alliance and to provide more opportunities for these students to learn about, from, and with one another. In the words of two students from Case 2018, the IPE workshop "helped me learn more about the other two professions within the tri-alliance," and the IPE experience "makes me hopeful to work with different disciplines when I graduate." From the words of a student from Case 2020, "I think it would have been really awesome to get to actually collaborate with the [other tri-alliance] students." These tri-alliance collaborative IPE and research opportunities will continue to help to reduce professional biases that ultimately affect patient care. From the perspective of another student, "It was nice to be able to share words of encouragement and find similarities among

disciplines with positive feedback on the importance of ending old biases currently present in

older generation therapists."

Studying IPE during the COVID-19 pandemic has attracted the attention of several

researchers and for good reason. For researchers who measured outcomes at the beginning of the

pandemic in spring 2020, opportunities exist to learn about the experiences and perceptions of

IPE students and teachers, after the pandemic is declared over. Additionally, the proverb,

"necessity is the mother of invention," applies to the current state of higher education. With the

quick shift to the virtual context, there is opportunity to learn about new IPE interventions that

were created due to the transition to online education and to analyze the effectiveness of online

teaching/learning strategies from the viewpoint of all stakeholders. Exploring these opportunities

will advance IPE andragogy and ultimately IPCP and consumer outcomes.

Summary

Using strong theory to guide this dissertation study, it was possible to observe how

ecological factors appeared to influence attitude changes in students of the tri-alliance after their

respective IPE-based learning experiences in Cases 2018 and 2020. Based on the merged

outcomes from Case 2018, $N = 119$ and Case 2020, $N = 95$, their overall findings diverged

whereby Case 2018 had positive attitude changes, and Case 2020 had unfavorable outcomes due

to low response rates. However, when sample sizes were modified to Ns of 24 for both Cases,

which was based on data management strategies for Case 2020 and random selection for Case

2018, their quantitative results and qualitative findings converged resulting in positive attitude

changes for both. Based on the outcomes from both scenarios, theory provided explanation that

supported the hypotheses and propositions that ecological factors influenced attitude changes in

students of the tri-alliance; however, the Person factors in Case 2020 appeared to provide greater influence than Context for those who completed their full IPE-based learning experiences.

Because the study of ecology is highly complex, opportunities exist to further explore the reciprocal influences that the Person and Context have on the other as they affect human Development and Task Performance over Time. Continuing to use a systems-oriented, holistic theoretical lens to study IPE outcomes for students of the tri-alliance will advance the IPE body of knowledge, student learning outcomes, collaborative practice, and ultimately the quality of patient care.

As stated in Chapter 2, student factors include more than simple demographics. Teaching/learning contexts include more than the space where education occurs. University cultures include more than how much administrators and faculty support IPE. The external circumstances that surround students within their homes, communities, and parts of the world (i.e., social determinants) must also be studied to obtain a greater understanding of teaching and learning in health professional education. This enhanced understanding will help provide learning experiences, academic resources, and student supports that are responsive to each student's individual needs during planned and unplanned IPE events. Teaching strategies that include a broader understanding about ecology and IPE (the Ecology of IPE) may optimize student learning outcomes for ultimately improving patient experiences, population health, cost of health care, and work life of health and social care providers (the Quadruple Aim; Khalili et al., 2019, p. 30).

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Appendix A: Definition of Terms

Two sources provide essential definitions unique to interprofessional education (IPE) and interprofessional collaborative practice (IPCP), specifically InterprofessionalResearch.Global (IPRG) and Joint Evaluation Team (JET) classification of IPE outcomes (Barr et. al., 2005; Khalili et al., 2019). Additionally, the American Psychological Association (APA) recommends use of Merriam-Webster.com dictionary (MWD) for providing general, conceptual definitions (APA, 2019). The source of most terms in this appendix will be cited as abbreviated for reading flow. Other terms may have more specific citations.

- Attitude: A feeling, emotion, or mental position toward a fact or state (MWD); Level 2a IPE outcome (modification of attitude/perceptions) that recognizes (a) changes in reciprocal attitudes or perceptions between participant groups or (b) changes in perception or attitude towards the value and/or use of team approaches to caring for a specific client group (JET; see also Joint Evaluation Team classification of interprofessional education outcomes)

- Bioecological Theory of Human Development (BTHD): The primary theory guiding this dissertation that is briefly defined as "an evolving theoretical system for the scientific study of human development over time"; Originated by Urie Bronfenbrenner in the 1970s and continues to evolve after his death in 2005 by Dr. Jonathan Tudge and others (see also Appendices C and D; Bronfenbrenner & Morris, 2006, p. 793)

- Ecological factors: Factors that include the collective, reciprocal, and dynamic interrelations between the Person and their unique characteristics and factors and the Person's specific Contextual circumstances, levels, and factors that affect selection of Tasks, Performance of those Tasks, and the engagement in Proximal Processes over a

period of or in Time; These interactions facilitate development and participation in life

activities (Definition influenced by the BTHD and the Ecology of Human Performance

[EHP]; see Appendices C and F for specific definitions of these theoretical constructs)

- Ecology: A branch of science concerned with the interrelationship of organisms with

  their environments (MWD)

- Ecology of Human Performance (EHP): An additional theory (also referred to a

  framework by its authors) used to complement and supplement the BTHD for guiding

  this dissertation; Its purpose: "to provide a framework that emphasizes both the essential

  role of context in participation and the critical nature of the relationships among Person,

  Context, and Task to our understanding of Performance" (see also Appendices F and G;

  Dunn, 2017, p. 210)

- Ecology of IPE: The interrelationships of and reciprocal exchanges between students

  from two or more health and social service programs (Persons) and their learning

  environments and contexts (Contexts/Time) for engaging in IPE learning experiences

  (Proximal Processes/Tasks) with the goal of achieving IPE learning outcomes and the

  Interprofessional Education Collaborative (IPEC) competencies

  (Performance/Development; Definition influenced by BTHD, EHP, and IPE definitions)

- Health and social care professions: Refers to the occupations of trained individuals who

  provide health care and social services to patients/client/families/communities to address

  their health/wellbeing needs (IPRG)

- Interprofessional: Events or experiences that occur between or involving two or more

  professions or professionals (MWD)

- Interprofessional collaborative practice: Occasions when multiple health workers from different professional backgrounds provide comprehensive services by working with patients, their families, carers, and communities to deliver the highest quality of care across settings (IPRG)

- Interprofessional education: Occasions when members or students of two or more professions learn with, from, and about each other to improve collaboration and the quality of care and services (IPRG)

- Joint Evaluation Team (JET) classification of interprofessional education outcomes: Modification of Kirkpatrick's 1967 four-point typology of educational outcomes:

    o Level 1: Reaction

    o Level 2a: Modification of attitudes/perceptions

    o Level 2b: Acquisition of knowledge/skills

    o Level 3: Behavioral change

    o Level 4a: Change in organizational practice

    o Level 4b: Benefits to patients/client (Barr et al., 2005, p. 43)

- Occupational therapy (OT): Therapy based on engagement in meaningful activities of daily life (such as self-care skills, education, work, or social interaction), especially to enable or encourage participation in such activities despite impairments or limitations in physical or mental functioning (MWD)

- Physical therapy (PT): Therapy for the preservation, enhancement, or restoration of movement and physical function impaired or threatened by disease, injury, or disability that utilizes therapeutic exercise, physical modalities, assistive devices, and patient education and training (MWD)

- Process-Person-Context-Time (PPCT): The model that operationalizes the BTHD theory when applied to practice and research (see also Appendices C and D; Bronfenbrenner & Morris, 2006)

- Silo: A term commonly used in discussions about IPE and IPCP that refers to an isolated grouping, department, etc., and that functions apart from others, especially in a way seen as hindering communication and cooperation (MWD)

- Speech-language pathology (SLP): (a.k.a. speech therapy) Therapeutic treatment of impairments and disorders of speech, voice, language, communication, and swallowing (MWD)

- Quadruple Aim: Refers to an approach to optimize health system performance through improving the health of populations (better health), enhancing the experience of care for individuals (better care), and reducing the per capita cost of health care (better value), and improving the work life of health care providers (better work experience; IPRG)

- Uniprofessional: An activity undertaken by one profession alone (IPRG)

Appendix B: Interprofessional Education Collaborative 2016 Competencies

Competency 1: Work with individuals of other professions to maintain a climate of mutual respect and shared values. (Values/Ethics for Interprofessional Practice)

Competency 2: Use the knowledge of one's own role and those of other professions to appropriately assess and address the health care needs of patients to promote and advance the health of population. (Roles/Responsibilities)

Competency 3: Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease. (Interprofessional Communication)

Competency 4: Apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population-centered care and population health program and policies that are safe, timely, efficient, effective, and equitable. (Teams and Teamwork)

Interprofessional Education Collaborative. (2016). Core competencies for interprofessional collaborative practice: 2016 update. https://hsc.unm.edu/ipe/resources/ipec-2016-core-competencies.pdf

Appendix C: Process-Person-Context-Time Model, Defined

Process-Person-Context-Time Model of the Bioecological Theory of Human Development

Applied to Interprofessional Education in the United States

Table C1

Proximal Processes Construct of the Process-Person-Context-Time (PPCT) Model

Proximal Processes are reciprocal interactions taking place between a developing individual
and one or more persons, objects, and symbols in the individual's immediate environment;
these interactions become progressively more complex over time and help the developing
individual become more competent while inhibiting dysfunction (Bronfenbrenner & Morris,
2006, p. 795, 798; Xia et al., 2020). There are two main Propositions within the construct of
Proximal Processes, and together they describe how Proximal Processes are the primary
mechanisms producing human development, also known as the engines of development
(Bronfenbrenner & Morris, 2006).

In short, "such enduring forms of interaction in the immediate environment are referred to as
proximal processes" and are central to the PPCT model and Bioecological Theory of Human
Development (BTHD) theory (Bronfenbrenner & Morris, 2006, p. 797; Merçon-Vargas et
al., 2020). Extrapolating from Tudge (2008), engaging in interprofessional education (IPE)
learning experiences and interacting with students from other professions are the engines of
development for them to make sense of their worlds in the health and social care service
industry and to understand their roles as team members in these environments (p. 68).

PPCT Model Elements	Application to interprofessional education (IPE)
Proposition I	
"Human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate external environment that occur on a fairly regular basis over extended periods of time" (Bronfenbrenner & Morris, 2006, p. 797).	Dynamic, reciprocal, and progressively more complex interactions among students from two or more human service professional programs who are learning about, from, and with one another in an immediate learning environment conducive to interprofessional collaborative practice (IPCP)
Proposition II	
"The form, power, content, and direction of the proximal processes [affecting] development vary systematically as a	Simultaneous effects of the IPE student's Person characteristics, the Context of IPE learning, and the Time during which learning occurs

joint function of the characteristics of the developing person, the environment—both immediate and more remote—in which the processes are taking place, the nature of the developmental outcomes under consideration, and the social continuities and changes occurring over time through the life course and the historical period during which the person has lived" (Bronfenbrenner & Morris, 2006, p. 798).	that jointly function in ways affecting the student's Proximal Processes, which ultimately influences learning outcomes and IPCP development

Table C2

Person Construct of the Process-Person-Context-Time (PPCT) Model

The Person is the developing individual of interest: Person characteristics function as an indirect producer *and* as a product of development (Xia et al., 2020). Person appears twice in the PPCT model: 1st as one of the four model elements that influences the form, power, content, and direction of the proximal process; 2nd as a developmental outcome (Bronfenbrenner & Morris, 2006; Xia et al., 2020).

PPCT Model Elements	Application to interprofessional education (IPE)
Demand Characteristics	
"Characteristics that invite or discourage reactions from social environment that can foster or disrupt the operation of proximal processes" (Bronfenbrenner & Morris, 2006, p. 796).	Examples of student demographics: Age; gender; skin color
	Physical appearance of student: Body structure; perceived attractiveness; cleanliness
Demand characteristics act as immediate stimuli to another person; these characteristics are initially obvious to another person and are relatively passive (i.e., the individual may change the environment simply by their presence; Tudge, 2008).	Physical expression: Attire; body art; body language
(Biological) Resource Characteristics	
"Ability, experience, knowledge, and skill are required for effective functioning of proximal processes at a given stage of	Physical and mental ability and skills: Biological and genetic factors; health; verbal, nonverbal/gestural, and written expression/

development" (Bronfenbrenner & Morris, 2006, p. 799).

"Biological, mental, or experiential resources that individuals bring to proximal processes" (Xia et al., 2020).

Resource characteristics are not immediately apparent and more actively influence the environment than the demand characteristics of an individual; resource characteristics are linked with the types of physical, mental, emotional, and other resources available to the person (Tudge, 2008).

communication; ability to participate in IPE learning experiences; ability to navigate IPE learning environments; ability to fulfill essential functions and requirements of being a student with or without accommodations in a human service profession (e.g., safety awareness; time management; transfer patients from the bed to a wheelchair)

Emotional Ability and Skills: Emotional intelligence (e.g., self- and social-awareness, empathy, self-control); maturity; collectedness; disposition

Experience: Engagement in previous opportunities/events, such as educational (e.g., degrees earned; study abroad), employment (e.g., military experience; hospital employee), life (e.g., disability; married/divorced; children), or avocational (e.g., travel; volunteerism)

Knowledge: Academic intelligence; tactical intelligence; graduate versus undergraduate education level; level of understanding about professional roles/responsibilities

(Behavioral) Disposition/Force Characteristics	
Force characteristics are the most active characteristics of an individual that may influence changes in the environment; these characteristics involve differences in temperament, motivation, persistence, etc. (Tudge, 2008). "Characteristics that can set proximal processes in motion and sustain their operation (*developmentally generative*) or interfere or prevent their occurrence (*developmentally disruptive*)" (Bronfenbrenner & Morris, 2006, p. 810). "Dynamic personality traits that can either foster or sustain proximal processes or	Developmentally generative: Any of these examples could also be developmentally disruptive in their opposite connotation: Professionalism; confidence; team orientation; ethics; commitment to consumer; readiness/motivation; interpersonal skills; collaboration skills; collegiality; sociability; attitude; adaptable/flexible Developmentally disruptive: Existence of stereotypes, biases, professional hierarchies, territorialism, etc.

interfere with or even prevent their occurrence" (Xia et al., 2020).

Table C3

Context Construct of the Process-Person-Context-Time (PPCT) Model

Context is also referred to as the Environment. According to Bronfenbrenner and Morris (2006), "The ecological environment is conceived as a set of nested structures, each inside the other like a set of Russian dolls" (p. 814). However, some scholars prefer to visually represent the PPCT model differently than the concentric circles commonly associated with Bronfenbrenner's early theories about context (Tudge, 2008). Within this application of the microsystem to the IPE student, immediate environments are identified as the typical physical settings in which students may spend their time.

PPCT Model Elements	Application to interprofessional education (IPE)
Microsystem	
The Microsystem is an ecological environment in Bioecological Theory of Human Development (BTHD) and is the immediate setting in which developing individuals can engage in proximal processes with other people, objects, or symbols. (Xia et al., 2020) "[The Microsystem includes] patterns of activities, social roles, and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical, social, and symbolic features that invite, permit, or inhibit, engagement in sustained, progressively more complex interaction with, and activity in, the immediate environment" (Bronfenbrenner & Morris, 2006, p. 814).	Home Settings • Environment: House/apartment/trailer/homeless; virtual (online gaming); safety • People: Cohabitants (family/relevant or significant others/pets/temporary renters/single occupancy); visitors • Objects: Possessions/belongings (e.g., books, computer, basic health and living supplies, vehicle); refuse; objects belonging to someone else • Symbols: Religious symbols; symbols representing personal beliefs or stage in life Community/City Settings • Environment: Traffic; infrastructure; accessibility of resources; safety; professional (e.g., conference hall, meeting room); personal (state park; funeral home; bank) • People: Neighbors; other community/city dwellers; tourists or out-of-town visitors; workers; store owners • Objects: Dependent on the setting and nature of the visit • Symbols: Signage; flags; safety/emergency; graffiti; also dependent on the setting and nature of the visit School/Fieldwork Settings

Direct, reciprocal interactions and influences occur between the Person and the Microsystem.	• Environment: On-campus (auditorium, classroom, library, lab, parking lot); virtual (e.g., online education [asynchronous/ synchronous]); off-campus (e.g., hospital, clinic, home health); adequacy of educational space • People: Quantity of different professional programs and their enrolled students; intra- and interprofessional student peers; academic and clinical educators; academic and human service administrators and staff; consumers of services; educator characteristics (e.g., teaching/facilitating approaches; availability; presumptions and expectations; evaluation of student learning outcomes); consumer involvement and input • Objects: Supplies to engage in IPE learning experiences (e.g., high and low technology; office supplies; lab supplies) • Symbols: Signage; flags; safety/emergency; spiritual Work Settings • Environment: Brick-and-mortar building; home-is-office; consumer's home; service providing versus goods producing structures • People: Colleagues; acquaintances; other employees; supervisors; other leaders; consumers/customers • Objects: Tools; supplies; machinery; equipment; animals • Symbols: Signage; flags; safety/emergency; spiritual
Mesosystem	
The mesosystem is an ecological level "comprising the relationships existing between two or more settings" (Bronfenbrenner & Morris, 2006, p. 817). "The mesosystem involves relations among two or more microsystems" in which the developing individual of interest is situated (Tudge, 2008, p. 68; Xia et al., 2020).	Interactions between the student's academic and practice-based learning environments • A meeting between the academic fieldwork coordinator, the student, and the clinical educator at the fieldwork site Interactions between the student's academic and home environments • Participating in a virtual class for school while in apartment at the dining table Interactions between the student's academic and community environments • Service-learning assignment involving the student and their peers visiting elders at a senior center

Direct, reciprocal interactions and influences occur between the Person and the Mesosystem.	Interaction between the student's home and community environments • Sense of safety and security at home during unexpected natural or human-created events in community

Exosystem	
"The exosystem comprises the linkages and processes taking place between two or more settings, at least one of which does not contain the developing person, but in which events occur that indirectly influence processes within the immediate setting in which the developing person lives" (Bronfenbrenner & Morris, 2006, p. 818). The exosystem "consists of a context in which the developing individuals of interest are not situated, but in which those who interact with them are. The classic example, when considering children as the developing individuals of interest, is the parents' workplace" (Xia et al., 2020). The level of influence or type of interaction may be unidirectional or bidirectional between the Person and the Exosystem but is usually indirect.	The persons with whom the student may interact is identified in parentheses or within the bulleted item, which represent the Exosystems that are separate from but indirectly affect the student. Community level • Workplace (supervisors, subordinate employees, customers) Education level • University-specific educational policy (professors, staff) • Professional program and university accreditation standards (professors, program directors) • Curricular design, academic policy, and logistics between multiple programs (professors, program directors, other students) • National IPE and interprofessional collaborative practice (IPCP) association language, theory, philosophy, research, practices, and guidelines (professors, program directors) • Presence/absence of IPE administrative champions at the university and/or in the practice setting (professors, program directors) • Fieldwork setting student policy (clinical educators/supervisors, other students) • The clinical educator's professional practice that is separate from and concurrent with the student Home level • Student's roommate or family member's work environment • The environment of the person with whom the student is speaking via telecommunication (phone or computer-based/virtual)

Macrosystem	

The system that encompasses all of the other systems with indirect effects on proximal processes via the microsystem and relates to the values, beliefs, practices, access to resources, sense of identity, etc. of a socio-cultural group. (Xia et al., 2020). "A context encompassing any group ('culture, subculture, or other extended social structure') whose members share value or belief systems, 'resources, hazards, lifestyles, opportunity structures, life course options and patterns of social interchange'" (Tudge, 2008, p. 69). The norms, values, cultures, and expectations of sociocultural groups that vary in size and influence. Members of a group who share values, beliefs, etc., may constitute a macrosystem (Tudge, 2008; Xia et al., 2020).	National, regional, and community level • Government mandates, policy, and regulations (federal, state, municipal) • Presence of peace, war, or natural disasters • Economy (job security; availability of funds for resources, food, supplies; economic impact of IPE and IPCP [cost of education/benefit to stakeholders]) • Federal and state educational policy • National and state professional association policy and licensure requirements • Consumer health insurance (availability, affordability, effects on practice, policies, restrictions) • Media (news, social) • Public health (access, resources, information) • Human service provider availability • Urban, suburban, rural settings Norms/practices/customs • Patterns, habits, and routines • Lifestyles Values/beliefs • Consumer outcomes (health, wellbeing, satisfaction) • Societal views on education, health, equity/equality, peace, government influence/control/politics • Spirituality/religiosity • Professionalism Cultures • Sense of identity (e.g., personal, professional) • Human service profession-specific cultures • Cultures from religion and/or countries of origin Expectations/life course options • Gender roles • Professional ethics • Professional behavioral standards Resources/opportunities • Financial security • Sense of belongingness to a group, family, or culture Political • Political party influence

	• Social responses

Table C4

Time Construct of the Process-Person-Context-Time (PPCT) Model

The construct of Time was referred to as the chronosystem in previous versions of Bioecological Theory of Human Development (BTHD; Tudge et al., 2009). In its current model, Time is the final construct of the PPCT model and is also included as a qualifier in Proximal Processes (Bronfenbrenner & Morris, 2006). Time includes the extent to which it is interrupted or progressing and the life course and historical periods during which the person has lived (J. Tudge, personal communication, June 23, 2020; Merçon-Vargas et al., 2020). Including the influence of Time is important for understanding whether development has occurred, and studies should take place over an amount of time that is based on the developmental outcome of interest (Xia et al., 2020).

PPCT Model Elements	Application to interprofessional education (IPE)
Microtime	
Microtime involves the continuity or discontinuity within episodes of proximal processes (Bronfenbrenner & Morris, 2006) Microtime "deals with what is happening in the course of proximal processes—the extent to which there is continuity or discontinuity in the activity or interaction" (Xia et al., 2020).	• Duration: Minutes, hours • Participation in a class • Meeting with a clinical educator • Studying with student peers • Attention devoted to IPE learning experiences • The occurrence of spontaneous, urgent, or emergent events
Mesotime	
Mesotime is "periodicity of these episodes [of proximal processes] across broader time intervals, such as days and weeks" (Bronfenbrenner & Morris, 2006, p. 796). Mesotime is the extent to which the proximal processes occur with some consistency in the developing person's environment over days, weeks, or months (Tudge, 2008; Xia et al., 2020)	• Duration: Days, weeks, months • Academic course duration (trimesters, semesters) for IPE students • Time required for educators to plan, implement, and evaluate IPE learning experiences • Amount of time of the IPE learning experience to achieve educational outcomes (one day exposure versus whole semester immersion)

	• Time required for students to complete projects, theses, dissertations • The occurrence of predicted events
Macrotime	
"The changing expectations and events in the larger society, within and across generations, as they affect and are affected by, processes and outcomes of human development over the life course" (Bronfenbrenner & Morris, 2006, p. 796). In macrotime, "developmental processes are likely to vary according to the specific historical events that are occurring as the developing individuals are at one age or another" (Tudge, 2008, p. 71). Macrotime is akin to the chronosystem in earlier versions of the BTHD (Xia et al., 2020).	• The significance of a day of the week/month • Timing in the academic calendar • IPE learning experiences occurring throughout undergraduate and graduate studies • Phase or stage of education in the students' curriculum (first year students, pre-fieldwork, final year students) • IPE stakeholder generations and related experiences (Traditionalists, Baby Boomers, Generation X, Millennials) • Historical events or co-occurring external events affecting education and society as a whole • The ability to sustain positive outcomes of IPE over time

Appendix D: Schema of the Process-Person-Context-Time Model Applied to the Ecology of IPE

Figure adapted from Tudge, 2008, p. 69
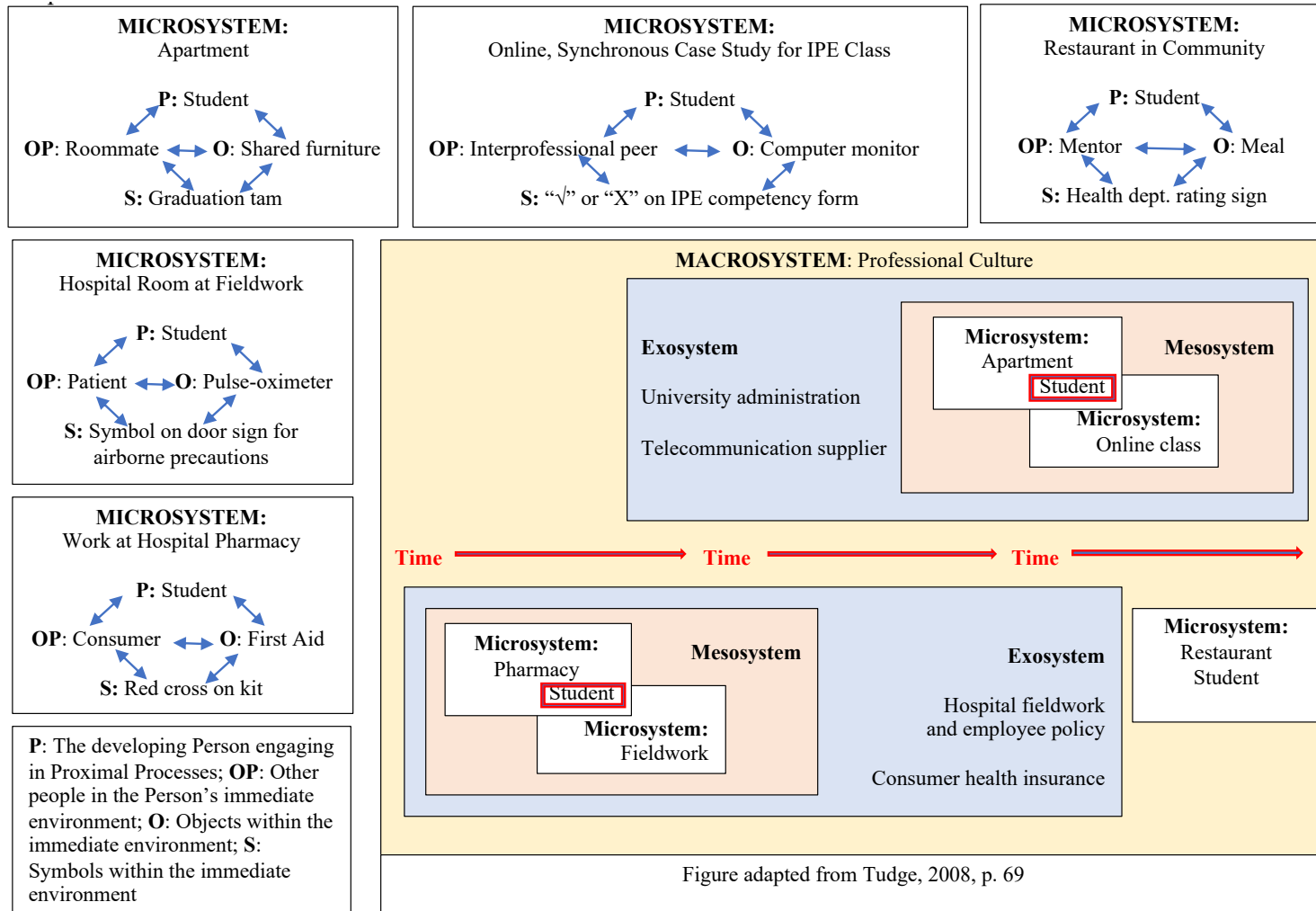
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Appendix F: Ecology of Human Performance, Defined

Ecology of Human Performance

Applied to Interprofessional Education in the United States

Table F1

Person Construct of the Ecology of Human Performance (EHP)

The Person in the Ecology of Human Performance (EHP) is an individual who is the center of the framework, which includes the individual's abilities; past experiences; personal values and interests; and sensorimotor, cognitive, and psychosocial skills (Dunn et al., 1994; Dunn, 2017).

Person Variables	Application to interprofessional education (IPE)
Abilities: A skill or attribute a Person possesses that is viewed as a strength (Molineux, 2017)	Strengths that facilitate student abilities pertaining to IPE and interprofessional collaborative practice (IPCP) may include mental focus, optimism, work ethic, inclusiveness, strategic thinking, financial resources, etc.
Past experiences: Something personally encountered, undergone, or lived through (Merriam-Webster.com Dictionary, n.d.)	Past experiences students possess may involve previous levels of education, travel, careers or jobs, interactions with members of health care team, socio-economic backgrounds and related privileges or lack thereof, etc.
Personal values and interests: The Person's perceptions, motivations, and related meaning that influence or are influenced by engagement in Tasks (American Occupational Therapy Association [AOTA], 2020)	Student values and interests related to IPE and IPCP may include consumer-centeredness, team-centeredness, autonomy, biases, personally held beliefs related to culture, etc.
Sensorimotor skills: Abilities related to the integration of sensory input (e.g., vision, taste, hearing, etc.) and motor output (e.g., coordination, endurance, bending, etc.; Molineux, 2017)	These Person-based skills or factors are similar to performance skills in occupational therapy which are "observable goal-directed actions that result in a client's quality of performing desired occupations" (AOTA, 2020, p. 43). These skills include the physical, mental, and emotional abilities of IPE students with or without accommodations per Title II and Title III, Section 504 of the Americans with
Cognitive skills: Abilities related to information-processing functions (e.g., memory, attention, problem-solving, etc.; Molineux, 2017)	

| Psychosocial skills: Psychological and social abilities of an individual in context (Molineux, 2017) | Disabilities Act (ADA National Network, 2017). |

Table F2

Task Construct of the Ecology of Human Performance (EHP)

"Tasks are objective sets of observable behaviors that allow an individual to accomplish a goal," and "theoretically, there are an unlimited number of tasks available" (Dunn, 2017, p. 211). In other words, a Task is a specific activity in which the Person engages within their Context, and the Task's meaning and performance will be different between different Persons based on their unique Person factors and cultural influences (Dunn et al, 1994). The EHP framework includes acknowledgement that "occupations exist when the person and context factors come together to give meaning to tasks" (Dunn, 2017, p. 210).

Task Categories	Application to interprofessional education (IPE)
Levels of scale: Tasks that may be quantified or qualified (e.g., small/large)	The IPE learning tasks may be categorized by: Quantity • An objective structured clinical evaluation check list of interprofessional collaborative practice (IPCP) items • Completion of any number of IPE learning experiences to progress IPCP competency Quality • Formal (e.g., structured tasks) or informal (e.g., networking; socialization) • Any level of authenticity (e.g., case-based or problem-based learning; role play, simulated mannequins, virtual reality; standardized patients; hands-on care with live patients/clients) • Professional, technical, or unskilled • Introductory or advanced • Exposure or immersion • Uni-professional versus interprofessional
Organization of tasks: Tasks organized by the roles of a	The IPE learning tasks may be organized by:

	Roles
Person, which are socially recognized sets of behaviors, rights and responsibilities, and obligations (Molineux, 2017)	• Learner, student peer, educator assistant • Leader, supporter, organizer Responsibilities and obligations • Optional, a necessity, a responsibility, or a requirement.

Table F3

Context Construct of the Ecology of Human Performance (EHP)

The interrelated conditions that surround the Person is the Person's Context (Dunn, 2017). These conditions include the physical environment and social, cultural, and temporal factors that operate external to the person, and the interaction between the Person and the Context affects human behavior and performance (Dunn et al., 1994; Dunn, 2017). "Contexts provide both supports and barriers to performance" (Dunn, 2017, p. 212). Additionally, a Person's "role is defined within a particular context" (Dunn, 2017, 214).

Context Conditions	Application to interprofessional education (IPE)
Physical context: An environment consisting of "natural and built/fabricated nonhuman surroundings and the objects in them" (American Occupational Therapy Association [AOTA], 2020; Dunn, 2017).	IPE physical contexts may include: The university/academic environments: Lab space, classroom, auditorium, off-site/home (virtual platforms for online education) Clinical environments: Hospital, home, outpatient clinic, community agency, community spaces (e.g., health fairs), off-site (e.g., virtual platforms for telehealth service delivery) Other physical contexts relevant for IPE students: Home, work, places of leisure or avocation
Social context: An environment that includes the "presence of, relationships with, and expectations of persons [e.g., family, friends], groups [e.g., clubs, churches], or populations (e.g.,	IPE social contexts may include: Classroom, breakroom, conference room, patient room, in a vehicle, virtual

communities, governments] with whom [the Person has] contact" (AOTA, 2014, p. S28; Dunn, 2017, p. 212).	Social contexts: Social clubs, churches, homes, restaurants Other types of context: Gender mix, socioeconomic status of the surrounding environment
Cultural context: "Customs, beliefs, activity patterns, behavioral standards, and expectations accepted by the society of which [the Person] is a member" (AOTA, 2014, p. S28). "Includes ethnic, religious, organizational, and other groups that contribute to a person's sense of identity or set of expectations or rules of behavior" (Dunn, 2017, p. 212).	IPE cultural contexts may include: Patient safety, practice of health precautions, profession- or team-specific values/expectations, ethical practice, diversity of consumers and practitioners Other cultural contexts: Religious, avocational organization values/expectations, practices in home environments
Temporal context: "The experience of time as shaped by engagement in [Tasks]" (AOTA, 2014, p. S28). Includes "aspects of chronological age, developmental state, life cycle, and health status" and "social and cultural meanings [are] attached to them" (Dunn, 2017, p. 212).	IPE temporal contexts may include: Unplanned/planned occurrences (e.g., spontaneous, urgent, emergent), year in professional program, assignment due dates, stage/age in life as a student of a professional program, moment in time (e.g., graduation, historical event) Other: Personal events; age

Table F4

Performance Construct of the Ecology of Human Performance (EHP)

The final construct of the EHP framework, Performance, is when the Person engages in Tasks within a Context, which requires the Person's skills and abilities to select and engage in the tasks they want or need to do (Dunn, 2017). The interrelationship of Person factors and Context variables determines the number and types of tasks available to the Person within their performance range (Dunn et al, 1994, Dunn, 2017). According to Bronfenbrenner's work in 1979, the Person's Performance of a Task is affected by the degree of authenticity of the Context (i.e., natural contexts versus contrived contexts; Dunn, 2017, p. 211).

"The primary theoretical postulate fundamental to the EHP framework is that ecology, or the interaction between person and the environment, affects human behavior and *performance*, and that performance cannot be understood outside of context" (Dunn et al., 1994, p. 598).

Performance Range	Application to interprofessional education (IPE)
Number and type of tasks: The quantity and quality of tasks available to the Person based on the interaction of their unique Person factors and the supports and resources for Performance within the Context	Any number of professional and personal Tasks requiring Performance by the Person within a Context A student may have two homework assignments, a four-hour shift at work, and supper to prepare in any given evening. These tasks may or may not be manageable depending on the unique Person factors of the individual and supports/barriers within a Context, thus affecting the Person's performance range.
Meaning/purpose of tasks: Derived from the interaction that occurs between the Person and the Context, to include roles	The amount of meaning and/or purpose assigned to any Task is unique to the Person within their Context. One student may find a high level of meaningfulness participating in team building Tasks with interprofessional peers, while another student may perceive these tasks as unimportant. Perceptions related to meaningfulness and purposefulness may affect output within a Person's performance range.

Appendix G: Schema of Ecology of Human Performance Applied to the Ecology of IPE
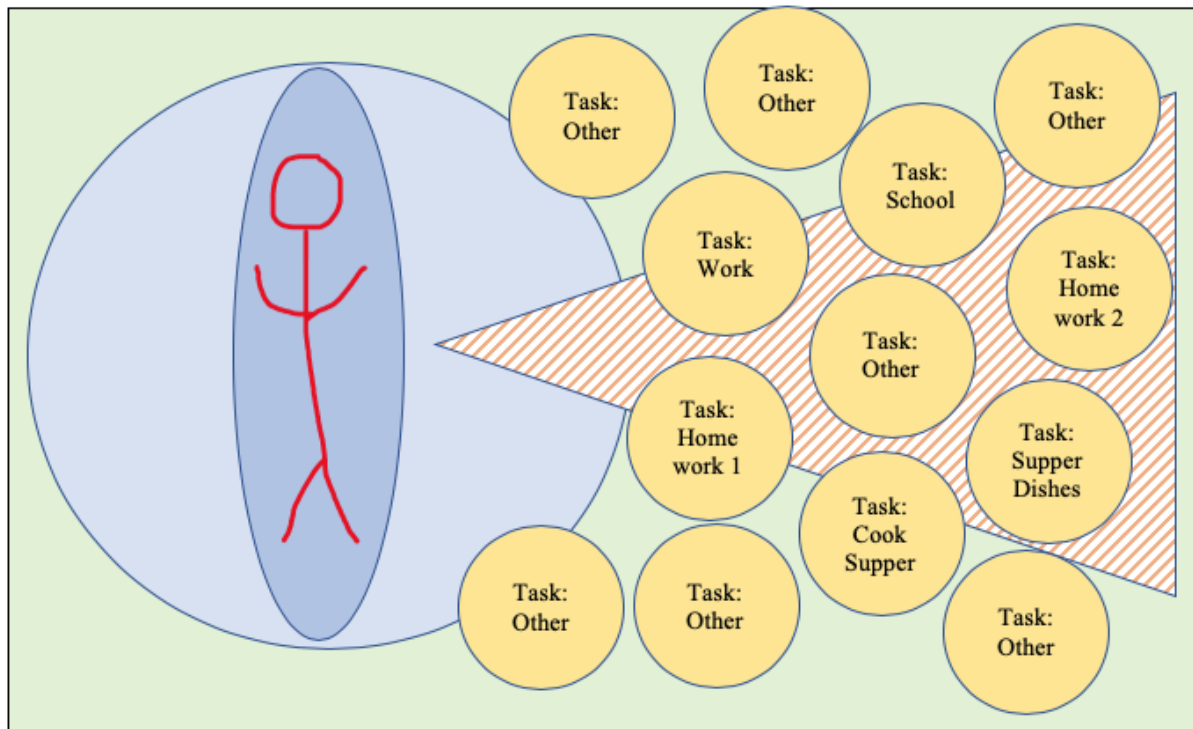
Note. Schema adapted from Dunn, 2017, p. 213

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Appendix I: Schema of Comparative Mixed Methods Case Study Design

Step 1: Case Selection

Case 2018 (holistic):
The Tri-Alliance Interprofessional Group

Normal, Campus-based Curricular Activity

N= 119 (41 OT, 44 PT, 34 SLP students)

Hybrid IPE learning experience with emphasis on in-person workshop on campus

Case 2020 (holistic):
The Tri-Alliance Uni-Professional Groups

Modified, Home-based Curricular Activity due to COVID-19

N= 42 OT students Online, uniprofessional learning experience about IPCP via modules

N=38 PT students Online, uniprofessional learning experience about IPCP via modules and one follow-up online meeting

N=15 SLP students Online, uniprofessional learning experience about IPCP via simulated cases

Step 2: Methodological Inquiries Performed for Case 2018 and Case 2020

Method: Quantitative

Research: Observational
Approach: Between subjects
Design: Natural experiment
Outcome measure: Pre/Posttest Survey (modified Interprofessional Attitude Scale)
Data analysis: Mann-Whitney U-Test and independent samples t test

Method: Qualitative

Research: Nonexperimental
Perspective: Explanatory
Design: Comparative case study
Outcome measure: Open-ended reflection questions
Data analysis: Content analysis, interpretation, and synthesis

Step 3: Results

Case 2018

Analyze statistical results

Analyze narrative responses

Merge results

Case 2020

Analyze statistical results

Analyze narrative responses

Merge results

Step 4: Cross-Case Comparisons and Interpretation

1. Merge data from methodological inquires for Case 2018 and Case 2020
2. Compare and contrast Case-specific results
3. Identify common outcomes, themes, new variables, or insights
4. Interpret merged outcomes
5. Describe how understanding is enhanced about the interrelatedness of contexts, IPE learning experiences, attitudes, and the learners.

Appendix J: Literature Search Exclusion/Inclusion Criteria

Table J1

Summary of Inclusion and Exclusion Criteria Based on Important Concepts

Inclusion Criteria	Related Terminology	Exclusion Criteria
Primary Concepts for Literature Search Methodology		
Interprofessional education (IPE)	Interdisciplinary education, multidisciplinary education, team-based learning	Interprofessional practice, leadership, advocacy, or other non-education focused aspect of interprofessionalism
Pre-qualification students of occupational therapy (OT), physical therapy (PT), and speech-language pathology (SLP; or speech therapy) professional programs	Undergraduate or graduate-level professional programs of rehabilitation professions, tri-alliance, allied health professions	Pre-professional students; post-qualification or post-graduation students of IPE; articles that did not include OT, PT, or SLP
Attitude changes related to interprofessional collaborative practice (IPCP)	JET Level 2a IPE student learning outcomes	Measurement about Levels 1, 2b, 3, 4a, or 4b outcomes
Important Concepts of Interest		
Interprofessional versus uniprofessional	Same related terminology as IPE, silo, context	See IPE
Classroom-based versus online learning experiences	Didactic, face-to-face, in-person, workshop, seminar, modules, context, environment	n/a
Context, environment, ecological factors	Pandemic, global health crisis, presage, 3P model	Articles that did not include any related content about ecological factors as defined in this study; health crises not categorized as pandemics by the WHO

Interprofessional Attitude Scale (IPAS)	Measurement, outcome measure, instrument	n/a
Mixed methods, natural experiment, case study	Ex post-facto, perceptions, experiences, causal-comparative, phenomenology, multiple case study	n/a
Bioecological Theory of Human Development (BTHD); Ecology of Human Performance (EHP)	Theory, framework, model, ecology	n/a

Appendix K: Johns Hopkins Nursing Evidence Based Practice Model, Evidence Level and Quality Guide

Evidence Levels	Quality Ratings
Level I • Experimental study, randomized controlled trial (RCT) • Explanatory mixed method design that includes only a level I quaNtitative study • Systematic review of RCTs, with or without meta- analysis	**QuaNtitative Studies** 　**A High quality**: Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence. 　**B Good quality**: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence. 　**C Low quality or major flaws**: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn.
Level II • Quasi-experimental study • Explanatory mixed method design that includes only a level II quaNtitative study • Systematic review of a combination of RCTs and quasi-experimental studies, or quasi- experimental studies only, with or without meta- analysis	**QuaLitative Studies** No commonly agreed-on principles exist for judging the quality of quaLitative studies. It is a subjective process based on the extent to which study data contributes to synthesis and how much information is known about the researchers' efforts to meet the appraisal criteria. *For meta-synthesis, there is preliminary agreement that quality assessments of individual studies should be made before synthesis to screen out poor-quality studies[1].* **A/B High/Good quality** is used for single studies and meta-syntheses[2]. The report discusses efforts to enhance or evaluate the quality of the data and the overall inquiry in sufficient detail; and it describes the specific techniques used to enhance the quality of the inquiry. Evidence of some or all of the following is found in the report:
Level III • Nonexperimental study • Systematic review of a combination of RCTs, quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta-analysis • Exploratory, convergent, or multiphasic mixed methods studies • Explanatory mixed method design that includes only a level III quaNtitative study • QuaLitative study Meta-synthesis	• Transparency: Describes how information was documented to justify decisions, how data were reviewed by others, and how themes and categories were formulated. • Diligence: Reads and rereads data to check interpretations; seeks opportunity to find multiple sources to corroborate evidence. • Verification: The process of checking, confirming, and ensuring methodologic coherence. • Self-reflection and scrutiny: Being continuously aware of how a researcher's experiences, background, or prejudices might shape and bias analysis and interpretations. • Participant-driven inquiry: Participants shape the scope and breadth of questions; analysis and interpretation give voice to those who participated. • Insightful interpretation: Data and knowledge are linked in meaningful ways to relevant literature. 　**C Low quality** studies contribute little to the overall review of findings and have few, if any, of the features listed for high/good quality.

Evidence Levels	Quality Ratings
Level IV Opinion of respected authorities and/or nationally recognized expert committees or consensus panels based on scientific evidence Includes: • Clinical practice guidelines • Consensus panels/position statements	**A** **High quality:** Material officially sponsored by a professional, public, or private organization or a government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise clearly evident; developed or revised within the past five years **B** **Good quality:** Material officially sponsored by a professional, public, or private organization or a government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise clearly evident; developed or revised within the past five years **C** **Low quality or major flaws:** Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the past five years
Level V Based on experiential and non-research evidence Includes: • Integrative reviews • Literature reviews • Quality improvement, program, or financial evaluation • Case reports • Opinion of nationally recognized expert(s) based on experiential evidence	**Organizational Experience (quality improvement, program or financial evaluation)** **A** **High quality**: Clear aims and objectives; consistent results across multiple settings; formal quality improvement, financial, or program evaluation methods used; definitive conclusions; consistent recommendations with thorough reference to scientific evidence **B** **Good quality**: Clear aims and objectives; consistent results in a single setting; formal quality improvement, financial, or program evaluation methods used; reasonably consistent recommendations with some reference to scientific evidence **C** **Low quality or major flaws**: Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement, financial, or program evaluation methods; recommendations cannot be made **Integrative Review, Literature Review, Expert Opinion, Case Report, Community Standard, Clinician Experience, Consumer Preference** **A** **High quality**: Expertise is clearly evident; draws definitive conclusions; provides scientific rationale; thought leader(s) in the field **B** **Good quality**: Expertise appears to be credible; draws fairly definitive conclusions; provides logical argument for opinions **C** **Low quality or major flaws**: Expertise is not discernable or is dubious; conclusions cannot be drawn

Appendix L: Literature Synthesis Diagrams

Figure L1

Synthesis of Interprofessional Education Research Methodology From Literature Review
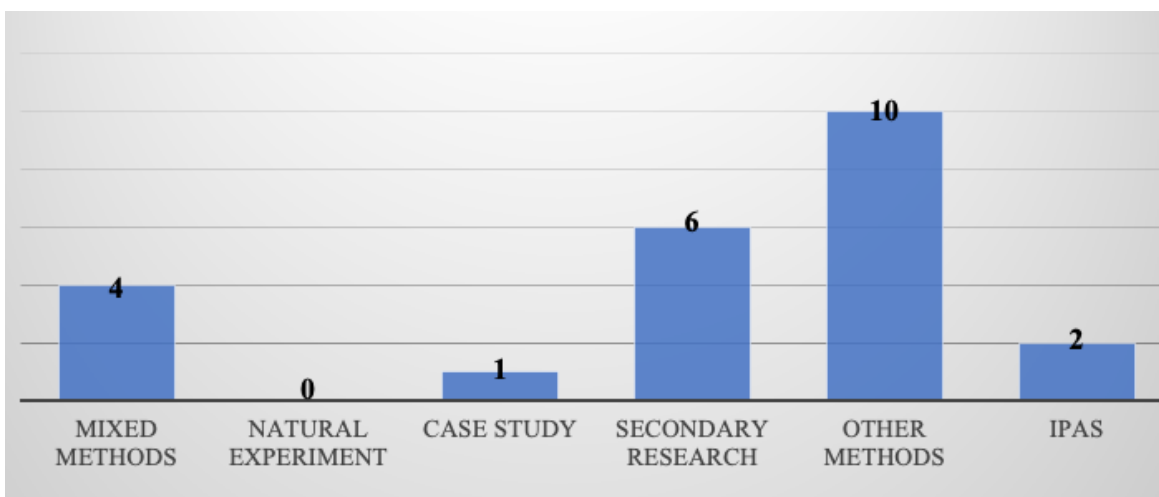
Figure L2

Synthesis of Interprofessional Education Evidence per the Johns Hopkins Nursing Evidence Based Practice Model From Literature Review
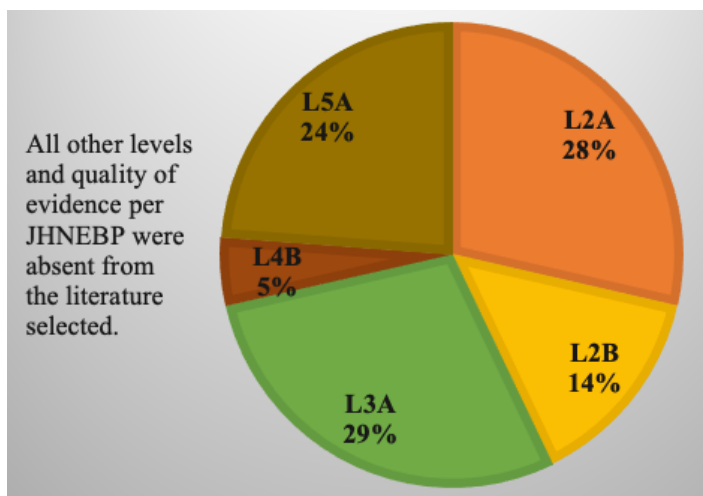
Figure L3

Synthesis of Positive Trends in Interprofessional Education From Literature Review
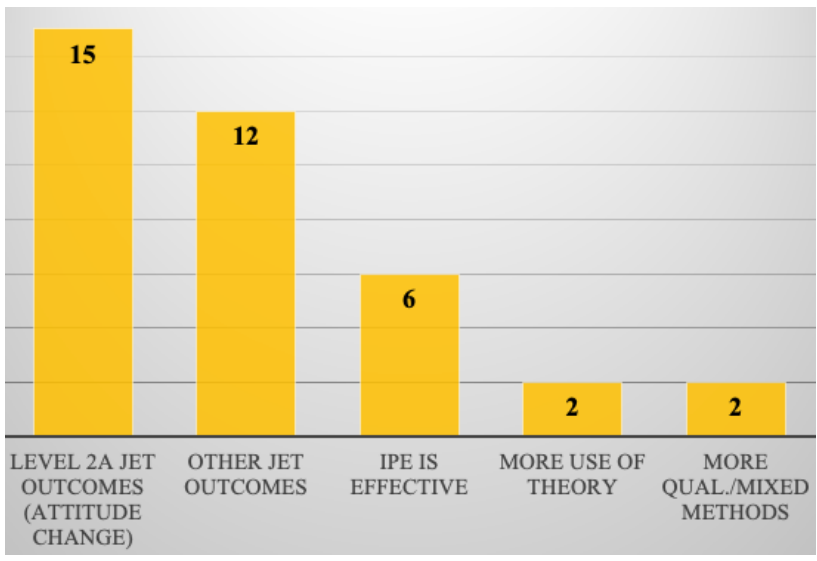
Figure L4

Synthesis of Interprofessional Education Shortcomings From Literature Review
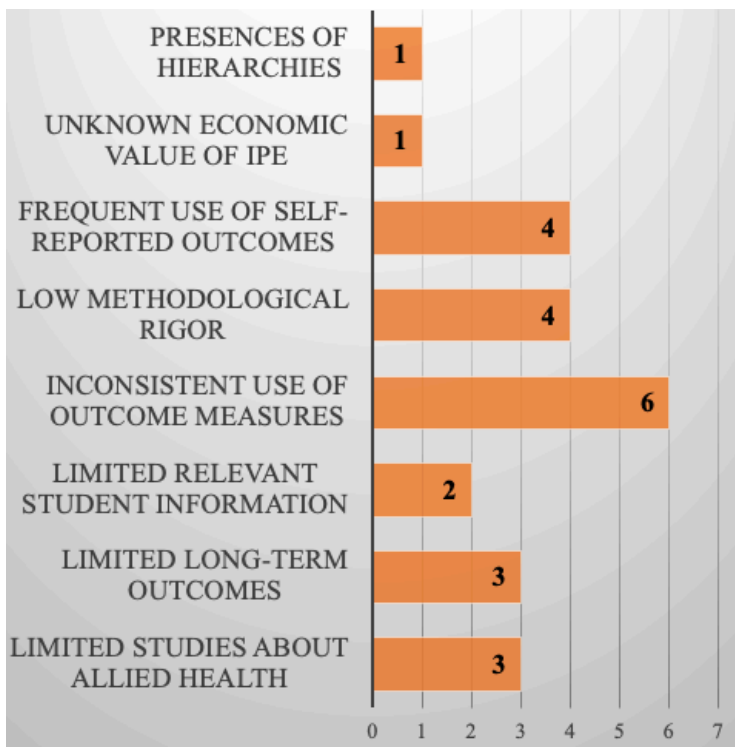
Figure L5

Synthesis of Interprofessional Education Context-Based Influencers From Literature Review
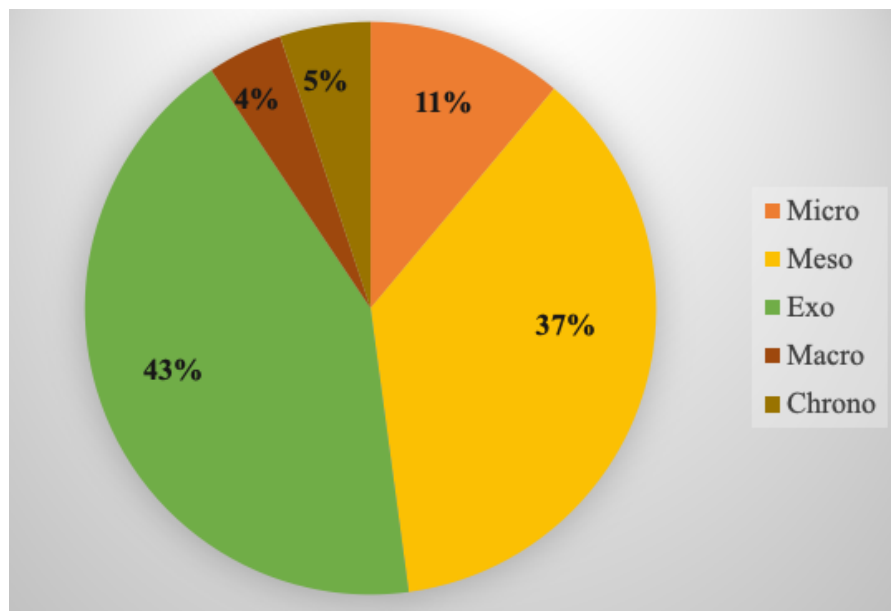
Appendix M: Unmodified IPAS

Authors: Jeffrey Norris, Joan Carpenter, Jacqueline Eaton, Jia-Wen Guo, Madeline Lassche, Marge Pett, Donald Blumenthal

Description: IPAS is a scale designed to assess attitudes that relate to the 2011 Core Competencies for Interprofessional Collaborative Practice. IPAS is one of the first scales to focus specifically on the Core Competencies. IPAS consists of 27 items in 5 sub-scales, which we have called "Teamwork, Roles, and Responsibilities", "Patient-Centeredness", "Interprofessional Biases", "Diversity & Ethics", and "Community-Centeredness". IPAS was created from factor analysis of survey data collected from over 700 student respondents at the University of Utah Health Sciences Center in 2012.

Contact: Jeffrey Norris, MD jeffreynorris@gmail.com 801-671-8500

Citation: Norris, J., Lassche, M., Joan, C., Eaton, J., Guo, J., Pett, M., & Blumenthal, D. (2015). The Development and Validation of the Interprofessional Attitudes Scale: Assessing the Interprofessional Attitudes of Students in the Health Professions. Academic Medicine. 2015 Oct;90:1394-1400. PMID 25993280. http://www.ncbi.nlm.nih.gov/pubmed/25993280.

Scale with Sub-Scales:
All items assessed using a 5-level Likert scale (from "strongly disagree" to "strongly agree")

Teamwork, Roles, and Responsibilities
1.1. Shared learning before graduation will help me become a better team worker.
1.2. Shared learning will help me think positively about other professionals.
1.3. Learning with other students will help me become a more effective member of a health care team.
1.4. Shared learning with other health sciences students will increase my ability to understand clinical problems.
1.5. Patients would ultimately benefit if health sciences students worked together to solve patient problems.
1.6. Shared learning with other health sciences students will help me communicate better with patients and other professionals.
1.7. I would welcome the opportunity to work on small-group projects with other health sciences students.
1.8. It is not necessary for health sciences students to learn together.
1.9. Shared learning will help me understand my own limitations.

Patient-Centeredness
2.1. Establishing trust with my patients is important to me.
2.2. It is important for me to communicate compassion to my patients.
2.3. Thinking about the patient as a person is important in getting treatment right.
2.4. In my profession, one needs skills in interacting and co-operating with patients.
2.5. It is important for me to understand the patient's side of the problem.

Interprofessional Biases

3.1. Health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying.

3.2. I have prejudices or make assumptions about health professionals/students from other disciplines.

3.3. Prejudices and assumptions about health professionals from other disciplines get in the way of delivery of health care.

Diversity & Ethics

4.1. It is important for health professionals to:

4.2. Respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.

4.3. Understand what it takes to effectively communicate across cultures.

4.4. Respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.

4.5. Provide excellent treatment to patients regardless of their background (e.g. race, ethnicity, gender, sexual orientation, religion, class, national origin, immigration status, or ability).

Community-Centeredness

It is important for health professionals to:

5.1. Work with public health administrators and policy makers to improve delivery of health care.

5.2. Work on projects to promote community and public health.

5.3. Work with legislators to develop laws, regulations, and policies that improve health care.

5.4. Work with non-clinicians to deliver more effective health care.

5.5. Focus on populations and communities, in addition to individual patients, to deliver effective health care.

5.6. Be advocates for the health of patients and communities.

Appendix N: Modified IPAS using Qualtrics®

What is your mother's birth date in month, day, year format (e.g. 07221944)?
What is your therapy discipline?
Occupational Therapy   Physical Therapy   Speech-Language Pathology

"Shared Learning is the process of working collectively to achieve a common objective in a group. Team members tend to share knowledge and complement each other's skills. Once you have read the definition of **Shared Learning**, click the arrow to advance forward to the next statement."

(Each item included the Likert scale options of "strongly disagree," "mostly disagree," "somewhat disagree," "neither agree nor disagree," "somewhat agree," "mostly agree," and "strongly agree." Numerical scale options were not included in the survey participant's view, only the wording. This modification allowed the Qualtrics software to calculate the statistics based on how the participants responded.)

1. Shared learning before graduation will help me become a better team worker.
2. Shared learning will help me think positively about other professionals.
3. Learning with other students will help me become a more effective member of a healthcare team.
4. Shared learning with other health sciences students will increase my ability to understand clinical problems.
5. Patients would ultimately benefit if health sciences students worked together to solve patient problems.
6. Shared learning with other health sciences students will help me communicate better with patients and other professionals.
7. I would welcome the opportunity to work on small group projects with other health sciences students.
8. It is not necessary for health sciences students to learn together. (reverse coded)
9. Shared learning will help me understand my own limitations.
10. Establishing trust with my patients is important to me.
11. It is important for me to communicate compassion to my patients.
12. Thinking about the patient as a person is important in getting treatment right.
13. In my profession, one needs skills in interacting and cooperating with patients.
14. It is important for me to understand the patient's side of the problem.
15. Health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying. (reverse coded)
16. I have prejudices or make assumptions about health professionals/students from other disciplines. (reverse coded)
17. Prejudices or assumptions about health professionals from other disciplines get in the way of delivery of health care.
18. It is important for health professionals to respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.
19. It is important for health professionals to understand what it takes to effectively communicate across cultures.

20. It is important for health professionals to respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.
21. It is important for health professionals to provide excellent treatment to patients regardless of their background (e.g., race, ethnicity, gender, sexual orientation, religion, class, national origin, immigration status, or ability).
22. It is important for health professionals to work with public health administrators and policy makers to improve delivery of health care.
23. It is important for health professionals to work on projects to promote community and public health.
24. It is important for health professionals to work with legislators to develop laws, regulations, and policies that improve health care.
25. It is important for health professionals to work with non-clinicians to deliver more effective health care.
26. It is important for health professionals to focus on populations and communities, in addition to individual patients, to deliver effective health care.
27. It is important for health professionals to be advocates for the health of patients and communities.

The modified IPAS for Case 2020 included four open-ended reflection questions (see Chapter 3).

Appendix O: SAGE Publications License to Reprint

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Sent:	Thursday, July 30, 2020 7:10 PM
To:	Cecil, Angela
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Request ID: 600019301
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1

Appendix P: NSU IRB Approval Letter

NOVA SOUTHEASTERN UNIVERSITY
Institutional Review Board

NSU

MEMORANDUM

To: Angela Cecil
            Dr. Pallavi Patel College of Health Care Sciences

From: Cristina Garcia-Godoy, D.D.S., M.P.H., C.C.R.P.
            Chair, Institutional Review Board

Date: September 18, 2020

Subject: IRB Exempt Initial Approval Memo

TITLE: Applying an ecological perspective to interprofessional education: A mixed
            methods study about attitude changes in OT, PT, and SLP students– NSU IRB Protocol
            Number 2020-445

Dear Principal Investigator,

Your submission has been reviewed and approved by the Institutional Review Board on
September 18, 2020. You may proceed with your study.

*Please Note: If you receive stamped copies of consent, assent, and recruiting materials indicating
approval date, these documents must be used when recruiting and consenting or assenting
participants.*

Level of Review: Exempt

Type of Approval: Initial Approval

Exempt Review Category: Exempt 4: Use of previously-collected records, data, specimens,
tissues, etc.

Post-Approval Monitoring: The IRB Office conducts post-approval review and monitoring of all
studies involving human participants under the purview of the NSU IRB. The Post-Approval
Monitor may randomly select any active study for a Not-for-Cause Evaluation.

Page 1 of 2

3301 College Avenue · Fort Lauderdale, Florida 33314-7796
(954) 262-5369 · 866-499-0790 · Fax: (954) 262-3977 · Email: irb@nova.edu · Web site: www.nova.edu/irb

Final Report: You are required to notify the IRB Office within 30 days of the conclusion of the research that the study has ended using the IRB Closing Report Form.

Translated Documents: No

Please retain this document in your IRB correspondence file.

CC: Rose M Colon, PhD

       Elizabeth Swann

Appendix Q: Case 2018, N = 119 and Case 2020, N = 95 Tables of Statistics

Figure Q1

Mann-Whitney U-Test Distributions for Case 2018, N = 119 and Case 2020, N = 95 (Pretest)

Note. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Figure Q2

Mann-Whitney U-Test Distributions for Case 2018, N = 119 and Case 2020, N = 95 (Posttest)
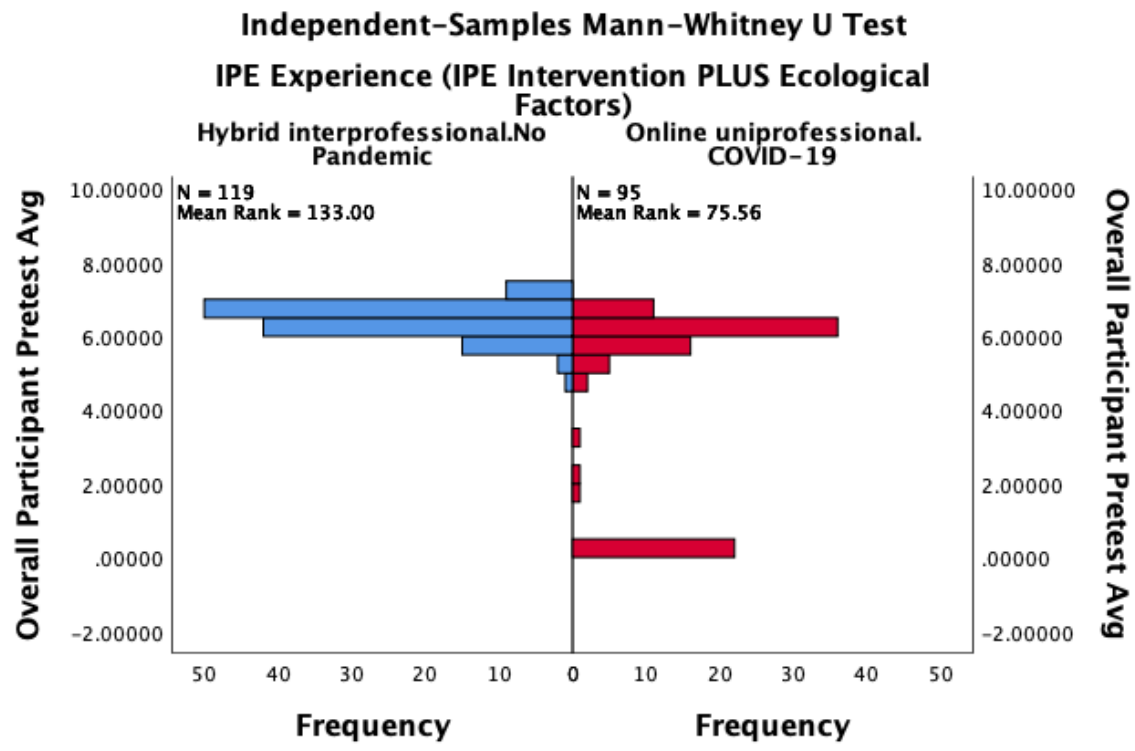
Note. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Appendix R: Case 2018, N = 119 and Case 2020, N = 24 Tables of Statistics

Figure R1

Mann-Whitney U-Test Distributions for Case 2018, N = 119 and Case 2020, N = 24 (Pretest)
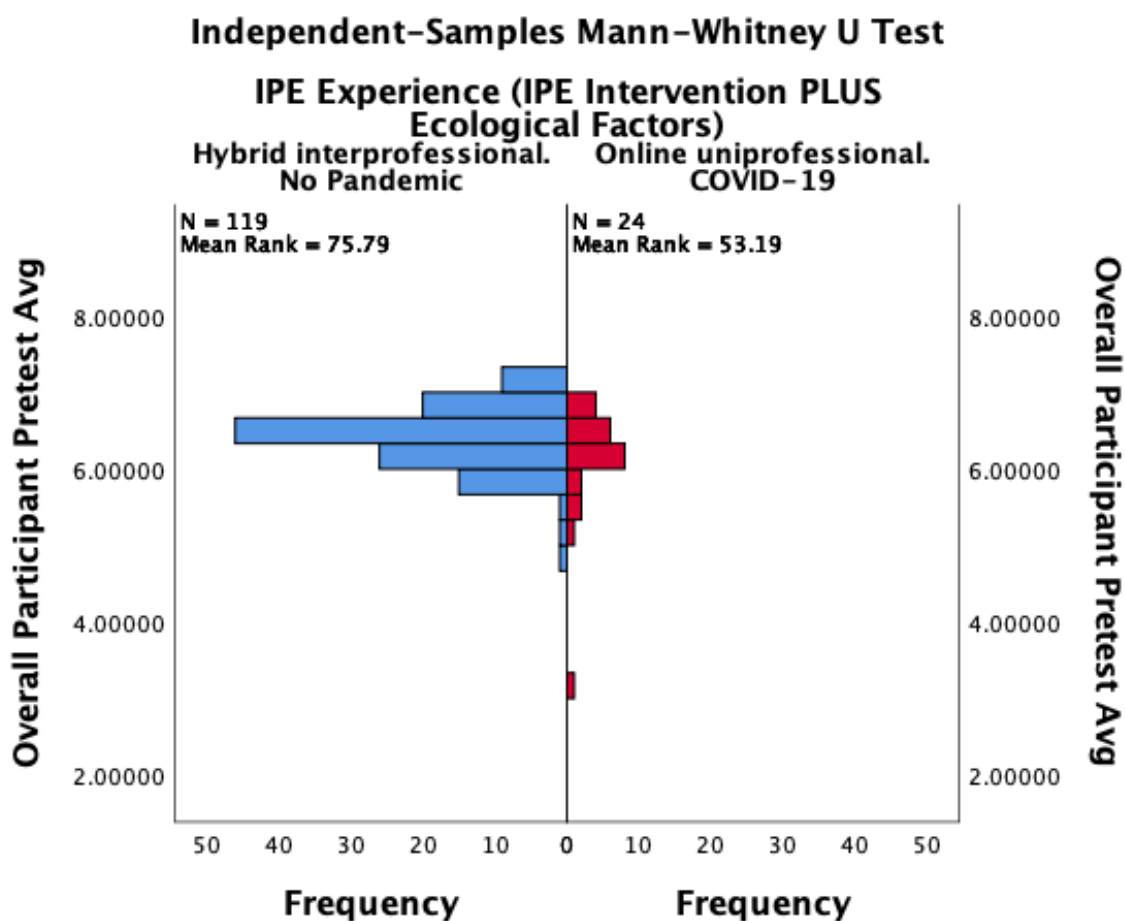
Note. Pretest mean rank for hybrid interprofessional & no pandemic (Case 2018, $N = 119$) =

75.79. Pretest mean rank for online uniprofessional & COVID-19 (Case 2020, $N = 24$) =

53.19. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Figure R2

Mann-Whitney U-Test Distributions for Case 2018, N = 119 and Case 2020, N = 24 (Posttest)
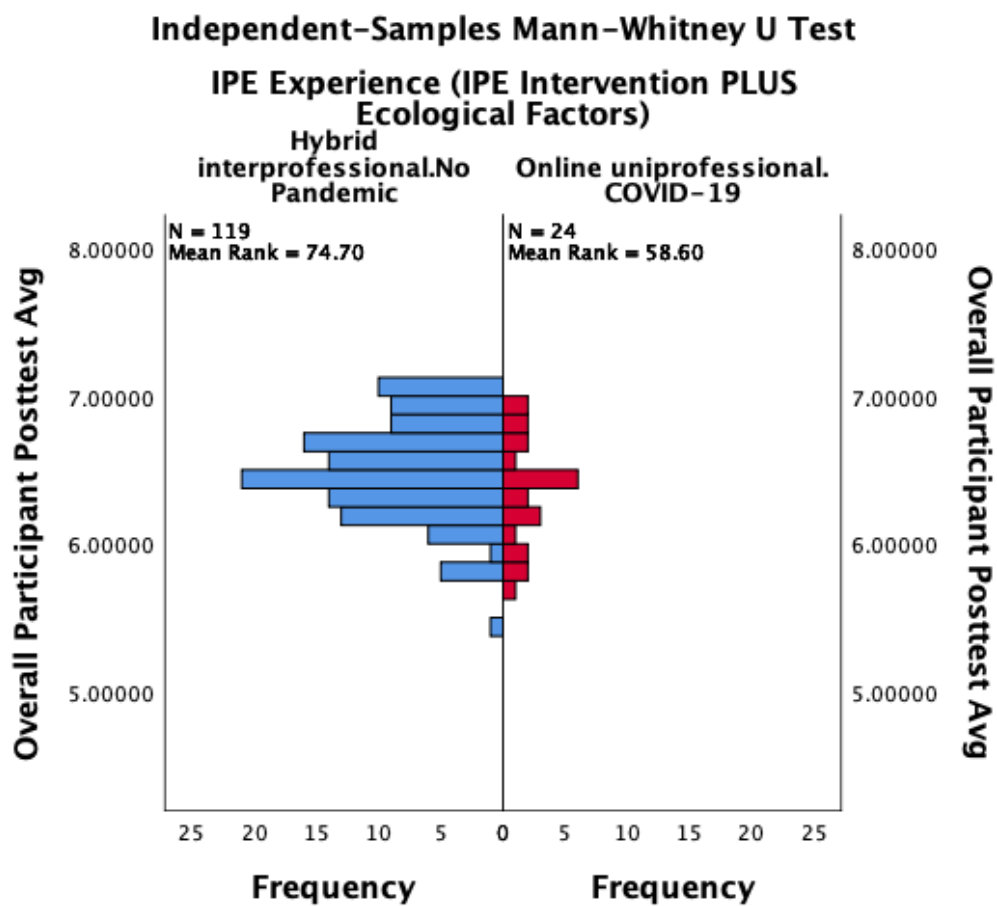
Note. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Figure R3

Boxplots for Overall Posttest-Only in Case 2018, N = 119 and Case 2020, N = 24
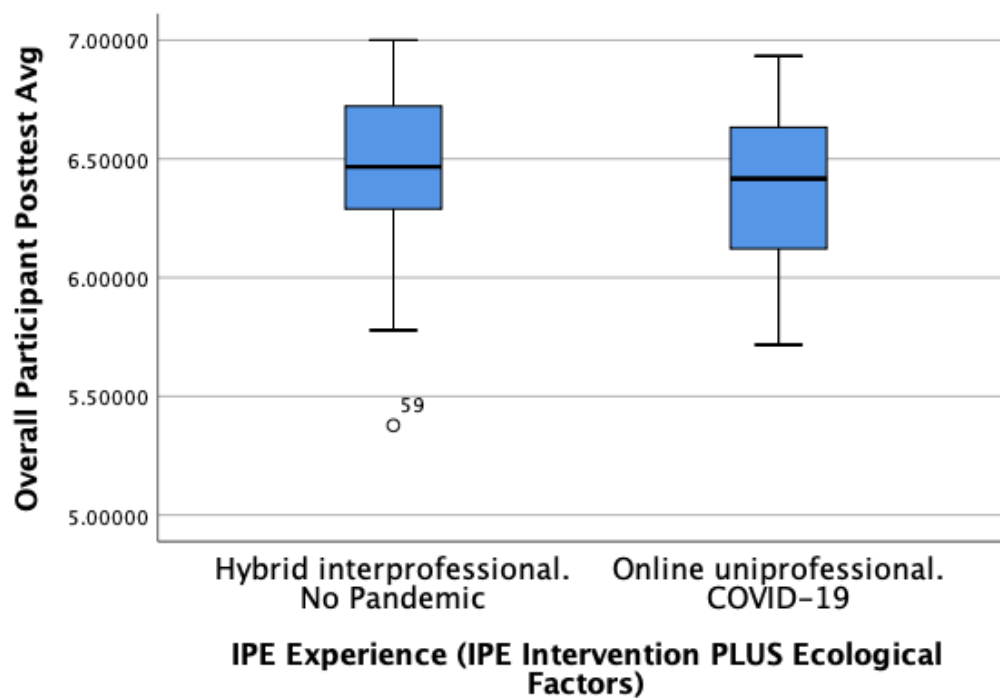
Note. Image of boxplots is from IBM SPSS Statistics®, Version 26 output.

Figure R4

Bar Charts of Overall Posttest-only Averages by IPE Experience for Case 2018, N = 119 and Case 2020, N = 24
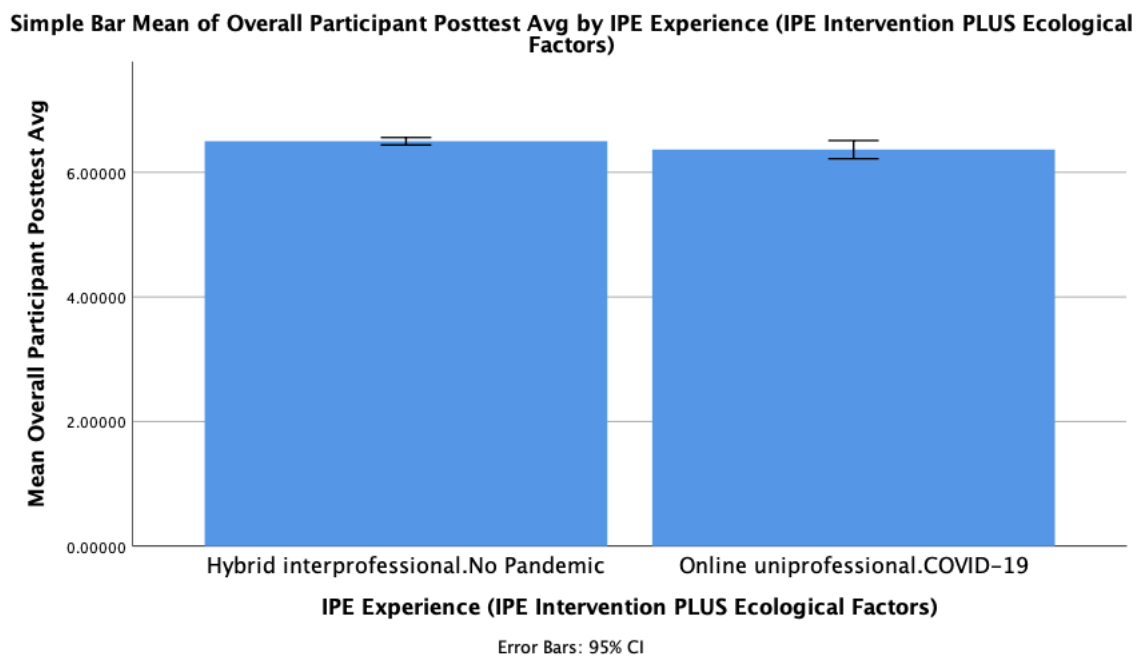
Note. Image of bar charts is from IBM SPSS Statistics®, Version 26 output.

Appendix S: Case 2018, N = 24 and Case 2020, N = 24 Tables of Statistics

Figure S1

Mann-Whitney U-Test Distributions for Case 2018, N = 24 and Case 2020, N = 24 (Pretest)
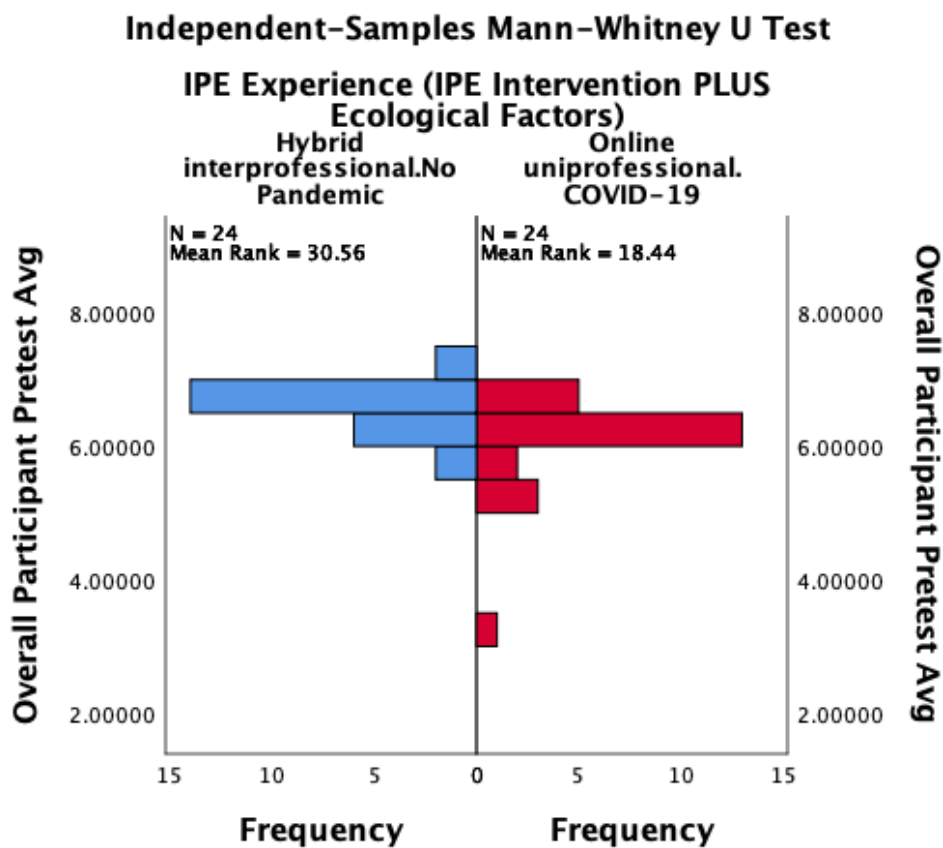
Note. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Figure S2

Mann-Whitney U-Test Distributions for Case 2018, N = 24 and Case 2020, N = 24 (Posttest)
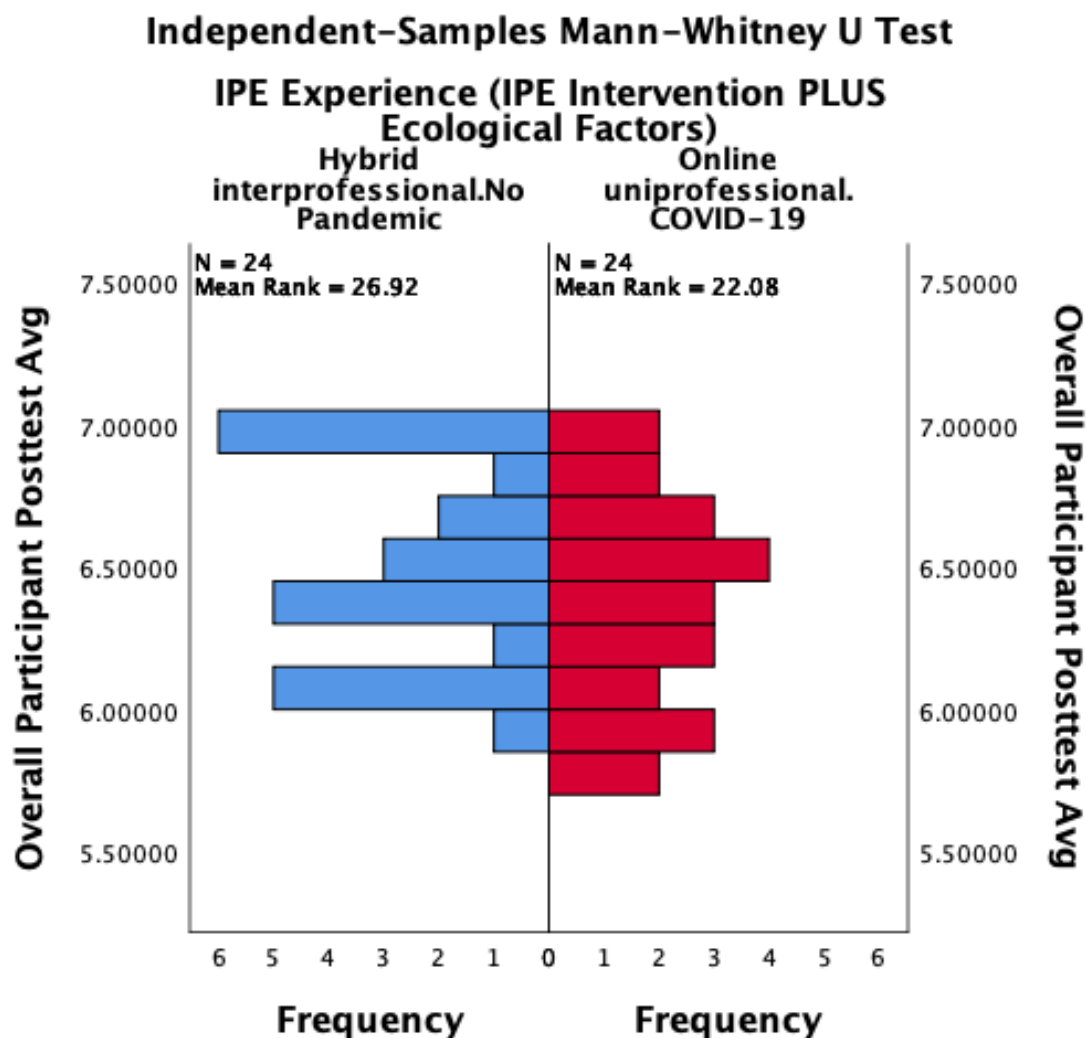
Note. Image of population pyramid is from IBM SPSS Statistics®, Version 26 output.

Figure S3

Boxplots for Overall Posttest-Only Averages for Case 2018, N = 24 and Case 2020, N = 24
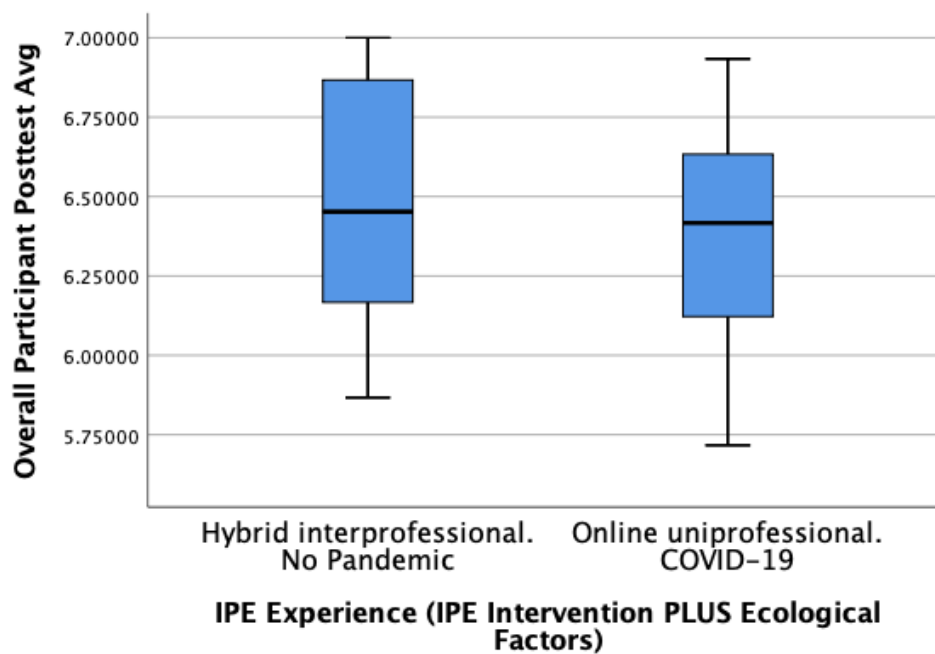
Note. Image of boxplots is from IBM SPSS Statistics®, Version 26 output.

Figure S4

Bar Charts of Overall Posttest-only Averages by IPE Experience for Case 2018, N = 24 and Case 2020, N = 24
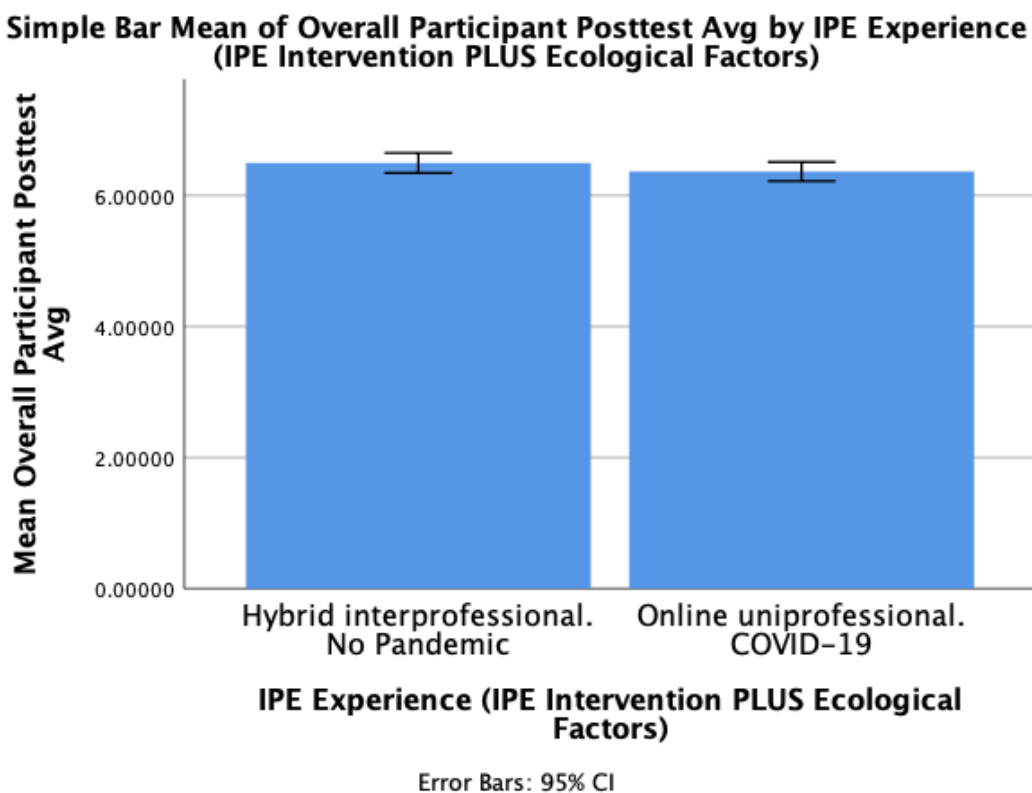
Note. Image of bar charts is from IBM SPSS Statistics®, Version 26 output.

Appendix T: Student Reflections for Case 2018

Table T1

Question 1a: What did you find beneficial or like the most from the IPE Workshop?

| Student Participant	Student Response to Reflection Question
G1.SLP.1	The most beneficial aspect of the IPE workshop for me was the opportunity to complete a case study together and discuss the different roles of each team member. I learned a lot about the unique ways other disciplines approach situations, but also discovered the points of overlap between each field. Learning about these points of overlap is much more effective and "real" when it's not just a brief conversation in a class of students within the same discipline. My group had a great dynamic of asking each other a lot of questions which provided me with a lot of new insight!
G1.PT.1	I truly enjoyed this opportunity to learn and hear from other disciplines in regards to their roles in patient care. I never realized how much overlap lies between the three professions. During my clerkship and observation hours, I was never exposed to other professions. Therefore, the IPE session allowed myself to work collaboratively with other students in order to find the best treatment approach. The case studies provided insight on the importance of interdisciplinary care.
G1.PT.2	Like stated above, I also believe the most beneficial aspect of this IPE workshop was the ability to work through a case study with the other professions. By doing this, I gained a deeper understanding of what both OT and speech occupations actually do. I had a vague idea of this prior to the IPE, but to hear treatment ideas and concerns from their aspect of care really gave me a better understanding of their professions. Ultimately, I gained the insight on the proper referrals I will need to make in the future when I encounter something outside of my scope of practice.
G1.PT.3	The most beneficial aspect or what I liked the most from the workshop was completing the case with my team members, and learning more about what the other professions do. There was a lot that I learned about what they do, that I did not know before. This also allowed us to engage in a lot of dialogue with each other, and it was very beneficial for me as a student physical therapist.

G1.OT.1   I agree with Student 1 that the case study was the most beneficial part of the workshop. I learned a great deal about the other professions and it us allowed us to get a better insight into what the other does.

G1.OT.2   Like most everyone described above, I thought that the case studies at the end of the workshop were the most beneficial for me, as I got to hear how all three disciplines would approach the different cases. Though we (all three disciplines) are working toward the same goals for the patient, we all were able to point out different things described in the case study that we would target first. All of our goals we created for the client reflected one another. The goals and case study, in general, allowed us students to engage in lots of dialogue and I really enjoyed getting to hear everyone's ideas.

G2.OT.1   What I found beneficial is learning how to communicate with each profession. Yes, we have some overlap between the 3, however, it is important to be clear and give every detail so that the other professions can be on the same page as you. What I liked about the IPE Workshop is learning more about the other professions. I was really interested to hear about the different specializations each profession had and the deeper practices each profession performs.

G2.OT.2   I enjoyed the activity where we folded the paper in half and drew what we believed other professions did. I think this activity was eye-opening that we know the basics of other professions, but there is still so much we don't know. This activity opened up conversation within the group about specializations in each field that we were previously unaware of, and was a good opportunity to teach other professions about the uniqueness of your own profession as well as areas that overlap with others.

G2.PT.1   I liked learning more about the practices of both OTs and SLPs. I also enjoyed learning about ways all 3 professions can come together to provide the highest quality of care for patients; this gave me a stronger appreciation for the other professions.

G2.PT.2   The best part of this workshop was the opportunity to build relationships with other young healthcare professionals, and get to know individuals within other areas of the rehab team. It was nice to have an open discussion about what exactly each profession does, in an academic setting. I feel that most students, including myself, might feel foolish if they asked what an OT or SLP does in a clinical setting, so addressing these details in an educational workshop was helpful. I definitely learned things about SLP and OT that I had not known

previously. For example, I was unaware that OTs have extensive training in mental health and medication management. I also learned that OT and speech have very specific specialization areas that are less broad than what we have in the PT field.

G2.SLP.1   What I found beneficial about the workshop was the ability to network with other students in the therapy fields. I feel that we learned a lot about what is in each therapy's scope of practice. The most beneficial thing to me was the case study. I enjoyed noticing the jobs and activities that we all had in common and where we differed.

G3.OT.1   I found the entire experience to be not only informative, but beneficial in creating a more collaborative union between disciplines for the future. It was interesting to learn about the various specialities and differing areas of practice available for each discipline and I enjoyed getting to share/listen to what makes all of our professions unique and valuable. Though mandatory educational workshops are often regarded as undesirable requirements, I truly feel my entire group enjoyed their time and had a fun experience together!

G3.OT.2   I think the whole experience was incredibly enlightening. I really enjoyed learning more about SLP and Physical Therapy. I found the case studies to be most beneficial for me. We were able to explain how each discipline would approach a situation and it was interesting to see the amount of overlap.

G3.OT.3   I found the workshop to be really beneficial to my personal development. The workshop highlighted the importance of interprofessional collaboration. The case studies were especially useful in pointing out how each profession would approach the situation. It was very interesting to notice the amount of overlap between professions.

G3.PT.1   I found the entire workshop very beneficial for my understanding of the OT and SLP scope of practice. I appreciated the collaboration within my group while completing the case studies. Before this workshop, I was only exposed to one SLP as a patient and to two OT through my observation hours in an acute care setting. My idea of each healthcare branch broadened after listening to each individual intervention during our case studies. I realized that each disciple had a unique and important piece in patient care and that many of our approaches/techniques overlapped.

G3.PT.2 The part that I liked the most about the IPE was getting the chance to sit down and talk about what OTs and SLPs actually do. It was great how understanding that everybody was about the lack of knowledge we each had about the other professions. I also appreciated how cooperative our group was when completing each activity. This experience continued to show me how important interprofessional collaboration is as well as how important it is to make sure that we all have a basic understanding of what our roles are in treating patients.

G3.SLP.1 This workshop was a great review of the previous one, where my feelings about how important IPC is and how enlightening it can be to hear the views of other professionals. It was also helpful to hear all of the specialty trainings that each field can achieve.

G3.SLP.2 I had a great time socializing with our group and getting to find out other people's background s and why they chose their discipline. So often in my practicum, I spend most of my time with my SLP supervisors and don't to know the other therapists.

G4.OT.1 I really liked getting to know the students from the PT and SLP disciplines, hearing their perspectives about OT, working together on a case study and explaining what each of our roles in that situation would be. It also became evident that we not only need to know how and when to work together as a OT/PT/SLP team, but also be active in contacting other disciplines as well such as case managers/social workers.

G4.OT.2 I liked working through the case study scenario as a treatment team. The purpose of the workshop was to help us understand the roles within the care team and how to make effect clinical decisions together without disrupting the rapport of the team. I feel that the case study embodied all aspects of the workshop and was the most beneficial experience for me.

G4.OT.3 I liked learning about each profession the most. Unfortunately what most of us do know about one another's profession are the stereotypical answers. We do know how to be professional and work as teams as our primary programs have instilled that in us.

G4.PT.1 The most beneficial aspect of the IPE workshop was the ability to network and learn from OT and SLP professions. It was informative to work through case studies and hear OT and SLP's treatment approaches and how we can work together to provide the best possible care for patient's.

G4.PT.2   I thought the case scenario was the most beneficial aspect of the IPE workshop. It gave me the opportunity to see what each professions role is and can be with a complex patient. I also learned the importance of communication throughout this task, both from me and from other students. Communication allowed me to explain my scope of practice and our treatment ideas while also being informed about the wide variety of treatments that other disciplines can implement with the patient.

G4.PT.3   My favorite thing about the IPE workshop was the ice breaker challenge. While it helped us to get to know one another, it also helped teach us the importance of communication. It taught us how to be effective with communication. It helped to show us each other's strengths and weakness as well.

G4.SLP.1   I enjoyed the ice-breaker challenge. The exercise proved that everyone has a role, and every role is important. Sometimes some people need to take a step back and allow others to step in with skill sets they have. Not everyone can be a leader, and that not everyone can lead at once during a meeting. It also taught camaraderie and teamwork. I think my group was good about it, but it proved when you listen to each other, and not try to talk over one another that effective communication can be achieved. I also liked breaking off and doing the case studies. This exercise proved that you can't just think about individual treatment of the client.

G4.SLP.2   Though this is my second time completing the workshop, an aspect that I still found to be most beneficial was the opportunity to discuss various case studies with our peers. It was enlightening to hear how each of the different professions would approach the patient's plan of care and how the three professions can work together to guarantee the best service for the patient. Discussing these case studies gave me a deeper understanding of the scope of practice that each field encompasses.

G5.OT.1   I found the most beneficial aspect of the IPE meeting the ability to talk to other individuals about occupational therapy, who knew what occupational therapy generally does and to learn more about other professions.

G5.OT.2   I think the most beneficial aspect of the IPE Workshop was going through the case study with my group and seeing how each individual profession can contribute to helping the client. I think it was very helpful because we were able

to see how each of our professions overlap and how we may be able to help each other in providing the best care for our clients.

G5.PT.1 I was really encouraged by the positive perception other professions have on Physical Therapy. It was also very interesting to learn how each discipline overlaps in terms of patient goals, which is why it is important to have good communication between the health care team in order to maximize treatment sessions. Having faculty from all the disciplines take part in leading the workshop was a good example interprofessional collaboration and gave insight to different viewpoints.

G5.PT.2 I found that the most beneficial thing from the workshop was just being surrounded by people very similar to you. I loved the idea of a small group working within a larger group, all revolving around the rehab aspects of patient care. I gained the most from my conversation with different student professionals and what their role within healthcare involves.

G6.PT.1 I really enjoyed meeting other professionals and being able to make a connection that I could possibly use in the future. I also enjoyed learning what each individual profession does and how it can be intertwined with my treatments in the future and how important it will be to work together.

G6.PT.2 I was able to meet individuals from different professions and network with them. I was a valuable experience to be able to learn from people from different experiences and expertise, and be able to work with them.

G6.OT.1 Being able to inform the other members about the scope of OT and how we do more than just work with hands was beneficial. Further, being able to get that type of information from PTs and SLPs was interesting in order to see how we overlap and how we can help one another.

G6.OT.2 Meeting and collaborating with other disciplines and learning more of the complexities of each profession was very beneficial. There was more overlap in treatment and intervention techniques that I thought there would be, which was quite eye-opening.

G6.OT.3 I found it beneficial interacting with other students from other allied health fields as well as faculty members. I liked listening to everyone's ideas, professional interests as well as their experiences in their professional journey.

G6.SLP.1   I enjoyed meeting other future allied health professionals and exploring our unique perspectives on patient care. This exploration revealed the ways in which we could collaborate as future clinicians. Starting the conversation early about interprofessional collaboration will help to normalize and encourage these interactions in the workplace.

G6.SLP.2   I enjoyed working on the case studies and learning each professions' perspective. It was interesting to hear how we can all work with the same patient while addressing separate goals.

G7.PT.1   I found that what was most beneficial for me was learning more about what each discipline was a part of. I honestly did not have much knowledge of what SLPs fully did in their practice, so it was quite eye opening for me to learn about how they not only help with speech and cognition, but also swallowing and training in that regard. I thought it was also a really good time to reflect upon my own communication skills and how they can improve. I thought our group was awesome though!

G7.PT.2   I liked the interaction with other disciplines. Getting to know one another better was a good way to get started. It was cool to discuss the differences in each educational program. It became obvious we had more in common than we may have thought.

G7.OT.1   I enjoyed understanding the scope of practice of the other disciplines on a deeper level. There is so much overlap and collaboration, but also specialties within each discipline that only contributes to the occupational success of the patient.

G7.OT.2   I found the most beneficial from the IPE workshop was learning more about SLPs and PTs.. We work so closely with these two professions and I think it was very important to learn what they do because sometimes our professions overlap. I also liked getting the chance to talk about what OTs do as well. Most of the other professions thought that OTs only worked with hands. I had the opportunity to tell them we do way more than just that. This part of the workshop was very informative for everyone in the group.

G7.SLP.1   What I found most beneficial from this IPE workshop was working as a team to tackle case studies. This gave a "real world" scenario as to what it would be like collaborating with medical professionals out in a therapy setting. All of my group members added important treatment ideas to treat different symptoms. As a group, we divided up treatment based on our scope of practice and what would

benefit the patient the most. It was also extremely helpful to work with such a wonderful team!

G8.OT.1   I found the opportunity to discuss a case study with other students to be the most beneficial activity from the IPE workshop. It was a great opportunity to see the overlap between PT, OT, and Speech Therapy, but also to appreciate and highlight each profession individually. Learning to communicate well with other professionals will be essential to successful, client-centered care in the future.

G8.OT.2   I believe the IPE workshop allowed me to simulate a collaborative meeting with other professionals. As students, we may observe a meeting including different professionals, but do not have the chance to practice this skill. The workshop allowed me advocate and educate for my profession, while listening and learning about approaches from the other two professions.

G8.PT.1   The part of the IPE workshop that I found the most beneficial was learning more about the other two professions within the tri-alliance. It was really awesome to hear what all the other professions can bring to the table in order to help benefit out patients. I also found it interesting how much overlap of skills there was between professions, although each profession had their own individual spin on how to treat their patients.

G8.PT.2   What I liked the most about the IPE Workshop was really getting to know and understand what the other professions do within their scope of practice. The case studies were really beneficial in helping me to understand how each of us can have a different approach to treating a patient and how if we work together we can treat the whole patient.

G9.SLP.1 The most beneficial aspect of the IPE workshop for me was the opportunity to collaborate on a case study with students from other disciplines.

G9.SLP.2 It was very beneficial for us students of different professions to begin networking early in our careers. I enjoyed talking with fellow group members regarding each profession's scope of practice as well as areas that may overlap between the 3 disciplines. It was beneficial to see how each of us view the patient from a different perspective to meet a common goal.

G9.OT.1   It was a unique experience getting to know people from other health professions. I enjoyed working through a case study in a small group; hearing what PT and

speech would want to focus on for that patient. Many times PT stated the same tasks that I was thinking for OT.

G9.PT.1   The IPE workshop allowed me to meet students from professions that I will be collaborating with as a physical therapist in the near future. I enjoyed getting to know the speech and OT students.

G9.PT.2   What I liked most about the IPE workshop was the collaboration with the different professions. It was much more fun than I expected. I think the team building games were very beneficial as they were fun and also showed you how important communication is. Everyone communicates differently and it is important that we can adapt and understand each other.

G10.SLP.1   The IPE Workshop was an enjoyable and education experience. Having attended the IPE workshop in Fall, 2017, many of the concepts covered served as a helpful review. Aside from this review, the biggest takeaways I have following the workshop are related to language and time management. Specifically, our team discussed efficient word-choice when documenting patient encounters. This skill was sharpened by our case study, where we had to summarize a long medical history within 1-minute.

G10.SLP.2   I really enjoyed diving into the other disciplines more thoroughly. I appreciated learning how OT and PT are similar but also how they have their own unique skill sets. I found the case studies to be beneficial because it was an opportunity to apply our knowledge to a case we are likely to see in the future. It allowed the different disciplines to work in action together in order to create a plan that benefited the patient to his/her full potential. This workshop allowed me to gain an appreciation for other disciplines and also respect for what they do.

G10.OT.1   Overall, the IPE workshop was a great educational learning experience. Initially, I did not know what to expect going into the workshop, but as it came to an end I can most definitely attest that I received an abundant amount of information that will not only prepare me to be a successful student practitioner, but also a future Occupational Therapist. What I enjoyed the most about the IPE workshop was being able to truly grasp a deeper understanding of the healthcare disciplines that I will be working so closely with in the near future. The games were not just a fun activity for us to engage in, but they also allowed us to explore various communication outlets for optimum performance. At first, it was trial and error but once we quickly figured out the best way for our group to communicate with one another, we saw great results!

G10.OT.2   I truly enjoyed being educated on all of the valuable assets that other disciplines contribute to rehabilitation. Now, I understand what it means to consider the patient holistically, as it will be by incorporating all of the rehab team's considerations. I feel that the best exercise in practicing these newly acquired skills was the case study. I enjoyed this activity because not only did it allow insight into another discipline but it also incorporated effective communication strategies. At the beginning, the group was attempting to figure out the best way to effectively communicate by still remaining respectful. I feel the group did a wonderful job in only a short time and recognized the most efficient way to communicate with each group member.

G10.PT.1   I found it very beneficial to learn from the students from the other professions to gain a better knowledge of what their scope of practice was and the skills they learn in their programs along with what their expectations are of other professions including physical therapy.

G10.PT.2   I really enjoyed the opportunity to engage with students in different professions. It was a great opportunity to learn more about the professions that I will commonly come into contact. It is better for our future patients to work as a team and collaborate on the plan of care. This became more evident during this workshop and I will now be able to use the tools that I learned and carry it over into my practice.

G11.SLP.1   Working together on the case study was the best part of the workshop. It was enlightening to see what other professions focus on compared to an SLP's focus. It was also good to consider the patient's whole body and independence when creating a plan of care.

G11.SLP.2   I found the case history portion of the IPE workshop was the most beneficial. The proposed topics resulted in excellent discussion. It was evident how important it is to think about patients from all different perspectives/scopes.

G11.OT.1   I thought the most beneficial aspect of the IEP workshop was getting to dialogue with the other members of the group and see how they would handle various cases from their scope of practice.

G11.OT.2   What I found the most beneficial were the case studies that allowed us to see how the disciplines of OT, PT, and Speech would treat a client. It was very beneficial seeing how there is so much overlap in goals, possible interventions, as well as the overarching goal but the process is different. I also really enjoyed

learning more about Speech therapy in terms of what is part of their practice and how there is so much more to their discipline than just helping pronounce words. I also really enjoyed the team building experience as it serves as a reminder how different we all communicate and the importance of being a good listener.

G11.OT.3   I really enjoyed working with the students from the SLP and PT programs, because it gave me more insight into what it is that they do, and enhanced my knowledge of those two disciplines. I am glad that we had time to talk to the students and get to know them better from our first meeting, and listen to them talk about their experiences in their programs. One of the most beneficial activities that we took part (in my opinion) was going through the case studies and pulling out ideas as to what discipline would focus on what, and how effective communication could be established in order to provide the clients with the best care and treatment possible.

G11.PT.1   I thought the most beneficial part was getting the chance to talk with other healthcare professionals about what they know and seeing patients from their perspectives.

G11.PT.2   I thought it was nice just being able to talk to and get to know students from other professions. We were able to spend a lot of time talking about our professions and tried to get a better sense of what each discipline's role in patient care could be. I found the case studies to be most beneficial-it sparked a lot of good conversation and our group I think learned the most about the other professions this way. It also showed how similar treatment strategies PT and OT do, but from different approaches.

G11.PT.3   I thought the interactions with the other professions was a great experience! I also thought that learning about everyone else what they do was so beneficial. I learned a lot about everyone in a stress free enjoyable environment.

G12.OT.1   I found the case study discussion to be a beneficial part of the IPE workshop because it really gave each student an opportunity to discuss how the case would be approached from various perspectives depending on the profession. I think this activity helped the group members see how PT, OT, and SLP can work together efficiently and effectively, while always keeping the focus on the client. Additionally, this activity also gave each group member a moment to reflect how he/she would approach this case and challenged critical thinking and evaluation skills, which will be valuable when working in the field.

G12.OT.2   I appreciated working on the case studies together and found the experience to be quite engaging. I also enjoyed the block building exercise in the beginning and felt it was a good icebreaker to see how the team would function together.

G12.PT.1   I found that the introductory period allowed for natural relationship building with conversations happening organically and not having to be forced. This followed by a simple and fun team building exercise made it more enjoyable and beneficial when getting to know someone and work with them.

G13.OT.1   I greatly enjoyed meeting students from disciplines other than my own and learning about their professions. It was a great learning experience to work through case-studies with students from other disciplines and recognizing how they would approach clinical scenarios. Each discipline overlaps in some way, but each discipline also brings unique perspectives and skills to the table.

G13.OT.2   I really enjoyed meeting students of other health professions and learning more about their fields. The IPE workshop increased my knowledge base regarding speech pathology and physical therapy. I particularly enjoyed learning about the different areas in which these professionals may specialize.

G13.PT.1   My favorite aspect of this IPE workshop was getting to know students from different disciplines. Both the OT students and the SLP students were easy to engage and talk with, which made the experience much more enjoyable. This workshop increased my knowledge of the other discipline's scope of practice. I was also enlightened on what OT and SLP students thought about my future profession. I enjoyed hearing about the other students clinical experiences, especially since I am about to embark on my 9 months of clinical rotations.

G13.PT.2   I enjoyed meeting other student healthcare professionals and talking about what kind of information we were learning in school and different aspects we didn't understand about each profession.

G13.SLP.1   I loved getting to know my group members. I loved how interactive the workshop was and I found it even more interesting the second time around. I really loved having time to ask meaningful questions. Uninterrupted time to ask questions isn't always easy in the workplace so I appreciated the time to really learn from my team members.

G14.OT.1   What I enjoyed most about this IPE workshop was connecting with students from other professional programs. It was very interesting to learn about how others view Occupational Therapy and vice versa. I went into this experience thinking I already had a vast understanding about Physical Therapy and Speech-

Language Pathology. I learned very quickly that there was much knowledge I still had to gain.

G14.OT.2   Interacting with peers and networking was enjoyable to me. We communicated with the tasks, but most of all about each others situations, and there was genuine interest in each other. We asked each other questions about our careers, futures, and we all learned things we didn't know.

G14.OT.3   I originally thought that I had a thorough understanding of the dynamics between the allied health triad, but quickly learned that there way more to each profession's role and expertise than meets the eye. I think this workshop did an excellent job of highlighting the importance of learning from, and advocating for your own profession, all while demonstrating professionalism within the health-care team.

G14.SLP.1   I really enjoyed any parts of the workshop when we were able to simply discuss amongst our group about the various professional represented. I always like explaining my career, so getting to do this with like-minded individuals with similar career perspectives and future clientele is always a great time.

G14.SLP.2   I found the case studies to be the most beneficial part from the IPE workshop. It was great to figure out which profession would be the best fit for particular issues. This also helped me think of how I can communicate what my goals are for the patient and how the other professionals could help me in their individual therapy sessions.

G14.PT.1   I enjoyed sitting and getting to know our other group members and learn about their respected professions. Even as fellow healthcare professionals, it was clear we all had preconceived notions regarding the other professions and their roles in the field. Personally I think breaking that barrier among health care professions will allow healthcare to expand and grow as a cohesive, supportive unit and help to take out the competition we sometimes see among different specializations.

G15.PT.1   I found that working through the case studies helped me better understand what other professionals can bring to the team. I also enjoyed just talking to the OT and SLP students and learning about what they learn/do within their program and what their various specialties were within their profession. I also learned a lot about how communication can really affect a patient's outcome, especially when professions cannot work together/learn from each other.

G15.PT.2	I liked interacting with other professions and getting a better idea of how to effectively collaborate within the clinic. I also enjoyed getting to know other students, in hopes of creating a bigger networks in system.
G15.OT.1	I enjoyed collaborating and working on the various case studies with SLP and DPT students. This process enabled myself to have a deeper understanding of each profession.
G15.OT.2	After discussing with the other PT and SLP students about our programs and what we do in practice, I felt like I had a better understanding of the other two professions and areas of overlap among the professions. I found that this helped later on with the case studies and was very beneficial to see how all three disciplines work together.

Note. All student responses were taken directly from original source, and wording remained unedited to capture original thoughts. Student Participant was identified by group number, profession, and numerical identifier in group (e.g., Group 1.OT Student.Number 1[G1.OT.1])

Table T2

Question 2: How will your new knowledge of and experience with interprofessional collaboration affect your future practice?

Student Participant	Student Response to Reflection Question
G1.SLP.1	I loved the enthusiasm, ideas, feedback, and opportunity to ask questions within the interprofessional groups. I hope to carry these communication skills into my job. I am now more eager to learn from other disciplines to better serve my patients.
G1.PT.1	In regards to future practice, I will make an effort to incorporate other disciplines into my plan of care. The teamwork associated with interdisciplinary care allows for optimal treatment, because we can all utilize each other's skills in order to find the best solution. After this experience, I realized how willing other's are to help out. I will make an effort to bring multiple disciplines together wherever I may work.

G1.PT.2   This IPE event really ingrained the importance of communication and team work in relation to patient treatment. Therefore, in my future clinical and workplaces I will do my best to ensure proper communication and cohesive plan of cares between the tri-alliance. I will also try to expand this team work aspect of care to the physicians, nurses, and other appropriate health care professionals for each patient.

G1.PT.3   This interprofessional collaboration experience was very beneficial to me as a future physical therapist. I now have a better understanding of what other professions do, and this will be helpful when deciding whether or not to refer a patient, and who I will refer to. It will also be helpful when having team meetings regarding a patient.

G1.OT.1   The IPE workshop has opened my eyes to how important communication with other disciplines is. In order to give the patient the most client-centered care possible, we must work together as a team to address the person as a whole. We all have different insights and ideas and can learn a lot from each other. In future practice I will always make sure to communicate with other disciplines, especially when we share a patient on our caseload.

G1.OT.2   My new knowledge and experience of interprofessional collaboration will help me in my future practice by emphasizing the importance of teamwork, and always remembering that the patient comes first! Like mentioned above, I have a better idea of the roles/responsibilities of each profession and feel more confident about referring to the other disciplines when I feel that something isn't in my scope of practice (for example, when providing adaptive equipment such as a walker, I would want to check with PT first and see what their ideas on it are)

G2.OT.1   The knowledge that I have gained from this experience will impact my future collaboration practices positively. Like mentioned above, I will be sure to communicate with the team effectively and be sure to understand each profession that I am working with. Doing both will ensure a smooth and productive collaboration.

G2.OT.2   This training has helped me appreciate the collaboration of each discipline to achieve better outcomes for the client. While at Level II FW and as a future practitioner I will understand the importance of communication between disciplines to create the best treatment program for the client.

G2.PT.1   My knowledge of and experience with interprofessional collaboration will affect my future practice, because when appropriate, I will know when to refer to an OT or SLP based on a newfound understanding of their scopes of practice. I think it is also important to maintain a relationship with these professions and reach out to them if I have a patient whom I need additional treatment ideas, questions about, etc.

G2.PT.2   The information I gained at the IPE workshop will allow me to approach OTs and SLPs more openly in the future, seeing them more as a teammate than an opponent. It was clear in our case study discussions that we all recognize the same needs of a patient, and all have the same goal to adequately meet those needs. This experience will also affect my future career, as I now know more details about each rehab member's scope of practice, and will therefore be more likely to make patient referrals.

G2.SLP.1   I feel that interprofessional collaboration is very important in our future roles as therapists. I feel that that the information that I learned will help me to work as a team with other therapists in the future and to have the ability to reach out and be able to ask questions.

G3.OT.1   I believe this experience has provided me with a new feeling of excitement for the future of interprofessional collaboration. During the workshop it felt like there was an evident shift in the attitudes and opinions we all held of each other. We found ourselves surprised, amazed, and even a little silly when sharing stories or tips we had acquired during classes and fieldwork experiences. It was nice to be able to share words of encouragement and find similarities among disciplines with positive feedback on the importance of ending old biases currently present in older generation therapists. As students, I think it is easy to get caught up in our own little discipline bubbles making it difficult for us to appreciate or even consider how we can all assist or work together to achieve goals. After attending the IPE workshop, I know I will always try to promote and encourage efficient and caring interprofessional collaboration and communication. I will use the knowledge I obtained to respect and support my fellow PTs and SLPs and strive to always make an effort to improve relationships between disciplines.

G3.OT.2   In future practice, I will definitely seek out opportunities to work with other disciplines. Going through this workshop, it was very apparent that everyone had something new to bring to the table and I think that could be very beneficial within treatment. Not only does it allow a patient or client to not have to have person after person come in all day, but it allows us as

healthcare professionals to give the best and most effective service we can possibly give. I also think it will be important to take the aspect of communication with me into my future practice. There can be a lot of overlap between professions so it's important to keep each other in the loop about a mutual client or patient. After this workshop, my respect for SLPs and PTs has been reinforced and deepened. I hope that in future practice everyone has the same respect for each other that I had the pleasure of witnessing in this workshop.

G3.OT.3   This experience provided me with additional knowledge of the roles of SLPs and PTs in different settings. In the future, I can utilize this information to serve as an advocate for the other professions, as well as my own, to ensure clients are receiving the most holistic treatment possible. My newly gained knowledge also encourages me to utilize co-treatments in the future and to communicate with my interprofessional colleagues about each discipline's approach of treatment.

G3.PT.1   Because I am more aware of the roles of each health care professional, I will be motivated to collaborate with each one in order to improve my patient plan of care. As a future DPT, I will have an ideal intervention limited to what is entitled to my scope of practice. By collaborating with SLP and OT during my patient sessions, we will be able to provide a more indepth treatment for our patient. Even though the three disciples overlap in some ways, each branch has a unique viewpoint and technique in order to provide optimal care.

G3.PT.2   Thanks to the better understanding I have of everybody's roles, I feel that I am better prepared to know when I need to include OTs and SLPs in the treatment of my future patients if they have not already been included. There will be a lot of moments when I will have a patient come directly to me in direct access states. Therefore, it is very important for me to know what each profession does to make sure that my future patients are getting the best care possible.

G3.SLP.1   This experience aided in expanding my knowledge about the roles of each professional, and the specialties each can achieve. Knowing more about each field will help me in referrals in the future, who to ask when I have concerns or questions about certain patients, and more.

G3.SLP.2   I can look at things not only from my perspective as an SLP, but I'll be able to discuss options with the patient, know when to refer, and recommend a more holistic approach to achieving the kind of outcomes we all want to see.

G4.OT.1   I think a big take away was that we don't know exactly what discipline has what role when it comes to aspects of our jobs that overlap. I've learned that communication in a respectful, professional manner can not only get you the answers you need to be able to do a job or delegate tasks about a client, but also builds an interprofessional and personal rapport.

G4.OT.2   As a future healthcare practitioner this experience has taught me the values of having a sense open-mindness to the related knowledge around me. When working with other professions, like PT and speech, I can enhance my own knowledge by listening to other perspectives rather than just having a one track mind.

G4.OT.3   I now have a new understanding of what it means to be working on a team with these professions. In the end, we all want what is best for the patients that we are treating. I could do my job better by calling on the strengths of our allied professions.

G4.PT.1   As a future clinician, I will utilize my resources and have open communication with my coworkers. This experience has provided me new knowledge of the OT and SLP professions as well as treatment approaches they use when working with patient's. The IPE workshop has taught me to work with patient's in a more team oriented approach.

G4.PT.2   This experience really opened my eyes to some of treatments that both occupational therapy and speech language pathology did. I think that knowing their whole scope of practice will benefit my future patients, so that when they need help with those things I will be able to make the correct referral. This experience also taught me a lot about teamwork and the importance of working together to help the patient as much as we can.

G4.PT.3   While I knew that interprofessional collaboration was important before the workshop, I think the workshop helped how to be effective with implementing it. I think it was also beneficial to learn more about the different professions so we knew somewhat of how to include the other professions for dynamic treatment sessions.

G4.SLP.1   I think this workshop has taught me how to better speak up about my opinion since there are so many other voices in the group. I also believe that this

workshop has helped diminish the idea that certain disciplines can only work on certain parts of the body and has shown effective ways to work/communicate with each other. It proved how much different disciplines cross, and how we can learn a lot from each other. I have a better understanding of how other disciplines work, and how to advocate for them as well as our profession.

G4.SLP.2   Because of this experience, I will eagerly look for opportunities to engage in IPC as I begin my career as a speech-language pathologist. Collaboration among professionals is important to guarantee the highest care for our patients. Going forward, I will work to be more confident in what I know, as well as what I don't know, and always be willing to seek advice and/or opinions from my peers of the same and different professions.

G5.OT.1   I think that this will impact my future relationship with practitioners by instilling a greater sense of camaraderie with other professions.

G5.OT.2   I will take the new knowledge gained from the IPE Workshop into my future practice by coming to my fellow medical professionals for advice and counsel when working with a client that they may have more expertise or knowledge on and will offer my knowledge whenever it may be needed.

G5.PT.1   I feel a lot more comfortable talking with other professions now that I have a better understanding of what they are looking for in their treatment sessions as well as knowing more about the education they have obtained in order to be in the position they are in. I look forward to working closely with Speech and OT and learning more from them in my future practice.

G5.PT.2   My future practice as a clinician will only benefit from this interprofessional education. I will be able to better refer and hand off patient care to a better educated professional surrounding whatever topic it may be. This will allow me to better communicate with each rehab profession better, as well, with more knowledge about what each person involves.

G6.PT.1   I think that I am better prepared to effectively work together with OTs and SLPs when I get out into the clinic. I was never opposed to working together, but once you actually sit down and have a conversation with other professionals, it makes it easier to see and understand how much you can work together.

G6.PT.2   It will affect my future practice because I will be able to work with other professions in a much more efficient and productive manner. Now that I am more familiar with what these other professions do, and where we overlap, I can improve how I treat patients, and who to refer them too for more specialized care outside my expertise.

G6.OT.1   This workshop will make me more open to communicating and working with other disciplines in practice as I feel I know have greater understanding of their ability and scope.

G6.OT.2   Collaborating with SLP and PT will ultimately provide client-centered goals and the best patient care. Discussing treatment plans and incorporating interprofessional ideas and techniques is what the future of medical care will look like.

G6.OT.3   The new knowledge acquired in the IPE will allow me to interact more smoothly with members of other health professionals. I will have a good working knowledge of how to approach or participate in co-treatments and interprofessional meetings.

G6.SLP.1   I hope to collaborate more directly with allied health professionals in the future, either directly during co-treatment sessions or indirectly through education moments and patient status updates.

G6.SLP.2   I will be more willing to collaborate and co-treat with PTs and OTs now that I understand their professions.

G7.PT.1   In the future, now that I am more knowledgeable about each discipline's scope of practice, I will know how to best refer out and get the best overall care for the patients that we see. It really is all about the patient in the end.

G7.PT.2   Ultimately, I believe this interaction made me more aware of what each discipline does and will help me feel more comfortable working with these professionals in the future.

G7.OT.1   I think the knowledge I have gained from this experience will help me during level 2 fieldwork and as an entry-level practitioner by emphasizing the need for open communication. It is beneficial for each discipline to take advice/tips from others to further improve therapeutic practice.

G7.OT.2   My new knowledge and experience with interprofessional collaboration affect my future practice because I now have a new respect for other professions.

This workshop made me realize that my profession isn't the most important. The most important profession is the profession that the patient needs at the time. I also learned the importance of communicating with the other professions because some of our interventions overlap.

G7.SLP.1   This workshop helped to reiterate how important it is to collaborate with other medical professionals when working with a complex patient. This is something I will follow after graduation when I have a caseload and patients of my own. It is always better to consult other professionals if you are unsure of a present symptom or need reassurance for a treatment plan.

G8.OT.1   As a future OT, I will use what I learned from the IPE workshop to enhance client care and build strong teams of healthcare professionals. I feel that I have a deeper understanding of the roles and responsibilities of PTs and SLPs as a result of the workshop and can work better with them as a result. I think one of the main themes from the workshop was mutual respect among the therapy professions that will be key to client care in future practice.

G8.OT.2   My new knowledge enables me to understand each profession utilizes its own scope and frames of reference, yet the combination of the three professions together create the strongest treatment plan.

G8.PT.1   This IPE workshop will impact my future practice as a physical therapist by simply giving me a greater understanding of the other professions. Now that I understand just how much occupational therapists and speech language pathologists can offer our patients, I feel much better educated to refer out when the patient may be better suited to see the other clinicians.

G8.PT.2   My new knowledge and experience from the interprofessional workshop has really opened my eyes to all the different service that are available to patients. Now that I am aware of everything that occupational therapists and speech therapists do I will be eager to refer my patients in order to help them even more. It will also help me know how to communicate with other professionals in a respectful and effective manner.

G9.SLP.1   My new knowledge of and experience with interprofessional collaboration will be very useful as I begin my career. I will be working in a pediatric clinic with speech, OT, and PT, so I hope to collaborate on shared patients and deliver the best plan of care.

G9.SLP.2   The experience I gained from this workshop will help me be a better clinician in being more confident in my area of expertise as well as being more knowledgeable about what other professionals do. Attending the workshop opened my eyes to how to make interprofessional collaboration a positive experience for both myself and my future patients. Engaging in the IPE workshop the second time around made me realize how far I have come since the first workshop in my understanding of what IPE really is and how I can make it happen.

G9.OT.1   I know when I work with PTs we will have to focus on what goals each of us want to work on because if we do not collaborate the goals could be very similar. I also will know each profession will be working closely with each other throughout the day. It is important to understand the patient's whole plan of care and not just from my (OT poc) perspective.

G9.PT.1   The most beneficial aspect of the workshop was getting to collaborate with my group while discussing treatment of specific patient cases and how we could help one another. I believe that the experience and the knowledge I gained will cause me to be quicker in referring patients for other forms of therapy and also feel more comfortable discussing treatment options with the other therapists.

G9.PT.2   I believe that going forward my new knowledge will help me treat my patients more efficiently and more effectively. I now have a better grasp on OT and speech. I will be able to better assess when a patient needs OT or speech. Just by having a better grasp of each profession I believe I will be better able to co-treat when given that opportunity.

G10.SLP.1   I believe this exercise helped us consider how healthcare professionals need to manage their use of time and word limitations to best communicate a patient's needs/details to other clinicians. From my personal experience, time management has been a continuous challenge during practicum, as I regularly feel pressed to complete multiple tasks within a limited time frame. I predict that, as a future-clinician, this exercise with better serve me by improving my workplace productivity, while also becoming a better interprofessional communicator.

G10.SLP.2   With the information I have learned from the workshop, I will be able to treat my patients more effectively. I now feel more confident about the referral process to other disciplines. Learning about the other professions will allow

me to look at my patients from different angles instead of just from a speech mindset. I will implement their techniques into my therapy sessions. Finally, I enjoyed how well my group got along. It makes me hopeful to work with different disciplines when I graduate.

G10.OT.1   The case study activity was an enriching opportunity as it provided a holistic approach from various disciplines to enhance a client's plan of care. I thoroughly enjoyed this experience as it allowed me to see the overlap of care between the disciplines. Obtaining that knowledge through this interprofessional collaboration will impact my future practice on many levels. It displayed the limitless amount of possibilities for a holistically-based care. It provided me with an awareness of the many areas that can be addressed by several disciplines, while also knowing when it is appropriate to refer to another discipline. As it was mentioned by a Speech Language Pathology student at the workshop, this experience was like a "connect-the-dot" activity. Everything made more sense after seeing all the disciplines working together towards the same goal of effective patient care. I have a greater appreciation for each of the disciplines and their roles within healthcare delivery!

G10.OT.2   I feel that my newly acquired knowledge and experience will shape my outlook on rehabilitation as a whole. It is so crucial to remember the reason I chose occupational therapy, which was to serve others (similar to my SLPS and PTS group members). Therefore, sometimes we must put our pride aside and recognize the path to rehabilitation does not always include all disciplines. In addition, we must be respectful and cognizant of all of the wonderful aspects each discipline has to offer. I feel that the first step toward this goal is education. I will contribute these lessons to my future practice by not only educating about occupational therapy but also about speech-language pathology and physical therapy.

G10.PT.1   My future practice will be more collaborative due to this increased understanding of OT and SLP. I feel I will be more confident in referring patients to these clinicians and I will be better prepared for co-treating with these professions.

G10.PT.2   The knowledge I gained at the workshop will help me remember that the rehabilitation process does not just involve physical therapy. It is important to put the patient first and work as team to do so. I think this opportunity will help me with future interprofessional collaborations because I am more aware of the role each health professional can play in the plan of care.

G11.SLP.1   Though I have worked closely with OTs in the past, I haven't had much experience with PTs. However, I now better understand the ways SLPs and PTs can collaborate, and I have been applying things I've learned in my practicum site this week. This week alone, PTs and I have exchanged information regarding visual fields, weight bearing status, positioning, and respiration to best treat our shared patients. I will continue to consider other professionals and the insights they can provide when planning treatments for my patients.

G11.SLP.2   I believe learning about other professions is imperative for the best patient care. I am interested in learning more about other fields going forward.

G11.OT.1   This experience will help me in the future by making me more aware of how to work with other professionals and how beneficial co-treatment can be.

G11.OT.2   I believe it will better me in terms of being relational and intentional with other professions and the full extent of their discipline. I also believe it will help me become a better team member. This knowledge has provided me with tools necessary to possibly lead this sort of training during FW and while on the job.

G11.OT.3   Having a better understanding of the scope of practice that the SLP and PTs follow is definitely going to serve me well during my upcoming level 2 fieldwork rotations, and in my future career as an occupational therapy Practitioner. I think that I am better equipped to communicate and collaborate with other disciplines in the future, as it was made evident during the IPE workshop that combining the different skill sets will bring the best outcomes possible for clients.

G11.PT.1   I have a better understanding of when I should refer a patient to OT and SLP. I am more comfortable with how to approach working with people in these fields too, because I am prepared for some of the old biases and misconceptions that our professions have about each other. It was helpful to talk through patient cases together to get an real picture of how we would work together in the clinic.

G11.PT.2   I think I will have a better understanding of how to split up therapy between the different professionals. There are some tasks that us at PT's cannot possibly get to in a short amount of time, so working with OT to do some of

those activities will further help the patient progress through therapy. Also, I will have a better understanding of when to refer patients to SLP and how SLP could co-treat with PT. I really don't think I knew a whole lot about SLP going into the workshop, mostly because I hadn't every really taken the time to think about the possible things they can do that would coincide with what we do as PT's.

G11.PT.3 I think this will impact me in the near future on rotation. This will help me when I have a rotation in the hospital and I work with the other professions day in and day out. I will be able to refer to them in the right way and also my communication with them will be much more fluid.

G12.OT.1 This workshop and the content discussed will be something I try to implement in daily practice. I will work even harder to respect and appreciate the uniqueness of each allied profession and to form good relationships with other professionals with whom I work. Moving forward, I hope that more educational programs can implement more opportunities for interprofessional learning, as I believe that the more opportunities given for collaboration and learning before entering the field as a practitioner will allow for greater interprofessional collaboration when practicing in the field. I personally think it would be beneficial to organize interprofessional workshops among future co-workers to help promote a greater understanding of the roles of each profession present.

G12.OT.2 I will reach out and seek professional advice from practices other than my own. The workshop helped expand my resource base, which is ultimately most beneficial to future clients.

G12.PT.1 This workshop just continues to allow me to not forget about other resources and what is available to patients healthcare needs. This knowledge can be applied to working with any team member be it in a treatment sense or a more business or financial sense. Playing to people strengths and weaknesses is always beneficial.

G13.OT.1 My new knowledge gained from the IPE workshop will help me make sure that team collaboration, understanding, and respect of other professionals and disciplines are part of my future practice. When individuals from different professions work together as a team, the quality of patient care and achievement of patient goals increases.

G13.OT.2   The knowledge gained from this workshop will help me when collaborating and working with other professionals in the future. It's important to take the time to understand what each discipline does and work together to provide the best quality of care to patients.

G13.PT.1   My new knowledge of the other professions will be extremely valuable during my upcoming practice during my first two rotations. I have been placed at a teaching hospital that focuses on interdisciplinary care, so this workshop is particularly valuable to help me understand the team mentality and approach.

G13.PT.2   I have a better understanding about what each profession is capable of doing and understanding this will help me treat the patient in a more well rounded approach. I never believed one profession is better than the other and that we can appropriately work together to treat our patient effectively. I will always remember to use my resources and collaborate with other healthcare professionals because of this workshop.

G13.SLP.1   (no response)

G14.OT.1   Most professional programs do not incorporate this type of event into their coursework. I feel as though I have gained more of an understanding about "real world" practice. Collaborating with other professions is a common occurrence in numerous practice settings, therefore it is nice to be aware on how to start dialogue for the betterment of our client and to better achieve their outcomes.

G14.OT.2   While most programs I don't think facilitate this kind of education, I do work in a rehab setting with PT, OT, and SLP. I think this event mirrored the real world slightly in the case studies and how we must work together when providing best care. I think this was good practice specifically for Spalding Students as we will be going to level 2 FW very soon.

G14.OT.3   The workshop was integrated at the perfect time during the OT program. I will definitely take the things I learned and apply them when interacting with other professionals during my level 2 experiences and beyond into practice. The block game helped to illustrate the frustrations that can come with communication and the importance of developing strategies to communicate efficiently. I will take these strategies and other tidbits gleaned from the experience when collaborating interprofessionally to deliver the best service outcomes possible to the clients that I will serve.

G14.SLP.1   I have learned from this experience that what little I know about most professions in just a small snippet of all it entails. My future practice will include open discussions among other disciplines about scopes of practice to work better as a member of a dynamic team.

G14.SLP.2   I hope to keep contact with the members of my group so I can reach out to them if I have need help addressing a particular profession, and I will also know who to ask for certain issues. I also think I will be a better collaborator because I have a greater understanding of OT's and PT's scope of practice. I will also know how to approach other professionals by suggesting ways to help the patient get the most effective treatment.

G14.PT.1   I think the IPE workshop helped me become aware of just how much I could use the other professions to help my patients. It also helped me realize that even though I may have an idea for treatment, referring them to a different specialty may be more beneficial for them than for me to try to figure things out on my own. As someone who doesn't like to leave out any details, I also realized the importance of communicating the important aspects in a concise manner to keep patient care efficient.

G15.PT.1   I believe that this experience will help me not only in my future clinicals, but also as a future health care professional. I now have a better understanding of what an OT and SLP does within their professions and how vital they are for our patients. I will have much more of an awareness of how I communicate to make sure that other health-care professionals know that I am listening/working with them. I will also now be more aware of learning from other professions and how I could maybe incorporate those new ideas within my plan of care.

G15.PT.2   My new knowledge will allow me to know when to refer, make sure that the patient is referred to the proper team members, and to know how to interact with other professionals, without stepping on toes. I also learned that I need to be aware of the age of the professional because that can determine how I communicate with them, refer, and work with the patient.

G15.OT.1   New knowledge obtained from this workshop will positively affect my future practice. Now possessing a deeper understanding of each profession will come in handy as I manage up SLP and PT to clients. Having an open mind from other professions further opens myself up to use techniques that they might use and apply it to my sessions. One I learned about was spatial learning. I found it to be very helpful and applying it into anything really is very practical.

G15.OT.2	The new knowledge I obtained through this workshop was seeing the different areas all the disciplines are different and overlap with similarities. I feel like I learned how to better communicate with other professions and holding each other accountable for our future clients.

Note. All student responses were taken directly from original source, and wording remained unedited to capture original thoughts. Student Participant was identified by group number, profession, and numerical identifier in group (e.g., Group 1.OT Student.Number 1[G1.OT.1])

Table T3

Question 3: How would you improve this IPE Workshop for future students?

Student Participant	Student Response to Reflection Question
G1.SLP.1	Having already participated in the previous IPE Workshop, I feel like the slight changes that were made already really improved the overall experience. Last time a faculty member from each discipline talked about different specializations or areas they can work in- I really enjoyed that and think it would be helpful to reimplement that rather than just having the students talk amongst themselves about the different areas. Maybe having a question/answer session during the large group would allow more topics to be discussed. Another consideration could be a group of faculty members also doing a case study to demonstrate how they would approach a patient collaboratively.
G1.PT.1	I believe the IPE session would be far more beneficial if we had a simulation that we had to complete as a team. For example, the PT students had the opportunity to work with respiratory therapy students in order to provide treatment with a patient scenario. This required more hands on work, and required the students to think on the spot and utilize appropriate communication skills. Although the case studies presented during the IPE workshop were beneficial, I suggest implementing a more realistic scenario
G1.PT.2	All of the previous ideas given by my group members would be extremely beneficial to incorporate. I also believe that some sort of life simulation would be great, whether it was an actual classroom experience or just a case at is acted out in our small groups. By doing this, we will be able to see a "real life" scenario of how a co-treatment between professions would actually go.
G1.PT.3	I also agree with the idea of a simulation. Also, a practice lab sometime in the semester would be helpful too, similar to what we did in our cardiopulmonary

class with the respiratory therapists. Other than that, it was a great experience and I learned a lot!

G1.OT.1 I really enjoyed having a faculty member present during the case study to allow for more insight from someone who has a lot of experience. As Student 1 mentioned, I think a case study completed by the faculty in front of the large group would be extremely beneficial. I would love to be able to listen to their thought processes and see how they would address the different scenarios. Overall, I thought the workshop was very informative and beneficial to my education.

G1.OT.2 I like the ideas mentioned above, about having faculty present a case study to the group and then describing their approach to treatment. I think this would be very beneficial for me to hear what someone with more experience has to say about the case studies! Though, like Student 4 said, it was really beneficial to have a faculty worker at the table while we were doing the case study among our groups to incorporate her professional, experienced insight. For future IPE workshops, I don't think that any changes need to be made. The whole session was engaging, I received valuable knowledge, and earning the certificate at the end felt rewarding.

G2.OT.1 I thought that the 30 min we had before beginning our activities felt a little repetitive because prior to this day, our group had already met one another in person. On a brighter note, I did like the rest of the workshop.

G2.OT.2 I enjoyed the workshop, but including more case examples of how to approach a scenario in the workplace where interprofessional collaboration was lacking would be helpful!

G2.PT.1 Overall, I enjoyed the workshop! My only suggestion for improvement is to require groups to meet in person once before the workshop to complete the IPE pre-work. This way, group members will already be familiar with one another; this will also eliminate 30 minutes in the very beginning and condense the overall time of the workshop.

G2.PT.2 I would improve this workshop by taking out the 30 minutes at the beginning to "chat" with our group and get to know them. I feel as though our team had already done this at our initial meeting to address the pre-workshop questions. Additionally, I think the intro could be shorter in general, as we all watched the webinar and know the definitions of IPE vs IPC, etc. This way we could get straight to the discussion, pictionary game, and other team exercises, which were more helpful to me than the intro lecture.

G2.SLP.1 There is nothing that I would change at this time about the workshop.

G3.OT.1   N/A… except maybe, somehow, find a way to let the poor speech students only have to attend once!

G3.OT.2   I have no suggestions for improvements. Although long, I feel that each aspect gave me new information about each discipline and allowed me to get to know the people in the group.

G3.OT.3   I have no suggestions for improvements. While the workshop was long, I believe the information provided is highly beneficial and important.

G3.PT.1   The only suggestion I have for this workshop would be to move the date to earlier in the semester (not a week before finals begin, preferably). The actual workshop was great and I wouldn't change any aspect within it.

G3.PT.2   The IPE could be earlier in the semester to prevent an increased amount of stress near finals time or thesis defenses. Also, I think it would be less strenuous on the SLP students to only have to attend the IPE once.

G3.SLP.1   I really enjoy this experience. I believe that having this experience earlier in the semester would be beneficial, or maybe one session at the beginning and one at the end.

G3.SLP.2   I think we could benefit from having working professionals from a variety of settings who aren't associated with the university come and give their insight and share their experience and maybe talk about some memorable times they've relied on each other.

G4.OT.1   Like Student X mentioned, I also thought the video was a little outdated. I think that it could also be beneficial for the in-class workshop if groups did more than 1 patient case study. Our case study went great, however I think it could be even more beneficial if we also had to figure out a case of a patient who was then in a completely different setting. This way we could understand even more the way roles may change for the disciplines in different settings. For example, IPR vs mental health; Acute care vs outpatient; Sub acute vs home health.

G4.OT.2   The layout of the workshop was successful in achieving its purpose. I do not have any suggestions on how to improve the workshop at this time, it was very beneficial.

G4.OT.3   I would have liked to learn more about what each profession did. It seemed like this topic was restricted to the several minutes we were able to describe our drawings. However, our group was very good at asking questions about uncertainties of each profession.

G4.PT.1   The only recommendation I have would be to schedule the event earlier in the semester if possible to avoid conflicts with finals/etc.

G4.PT.2   As Student X mentioned, I think that this workshop would be better placed earlier in the semester. Due to finals being at the end of the semester, I think it would be less stressful for the IPE to placed earlier in the year.

G4.PT.3   I think my group really benefited from meeting each other beforehand. While other students said it was easy to do the video chat, I think my group got to know each other a little bit better than the other groups because we met in person. I think it would be beneficial to encourage future students to meet with one another in person before the IPE workshop.

G4.SLP.1   I would work on the video, its poor quality/outdated. I had difficulty staying engaged (especially after the second time) and had to take frequent breaks. The video also focused a lot on the history of IEP. I think it would be more beneficial to discuss what each profession does and how they may interweave with one another.

G4.SLP.2   My opinion of the IPE experience did not change much from the first to the second time. It continued to be an excellent balance of fun and structure. However, I would have loved more time to discuss our individual scopes of practice with my team. I did not feel we were given enough time during the session to fully discuss everyone's field.

G5.OT.1   Overall, I think the IPE meeting was very successful, and the only difficulty was trying to get together a meeting with all of the individuals with all of hectic schedules.

G5.OT.2   For future students, I would do a few more case studies with each other because I felt that we really were able to learn from each other while doing them. I would also suggest maybe doing a mock plan of care for a potential client and seeing how each discipline will address the client's deficits and goals.

G5.PT.1   For future students, it may be beneficial to see how co-treatment could be coordinated and what that might look like in a therapy session.

G5.PT.2   The workshop was great, especially the large group case study part. I think this can be improved with more organized communication between group members and different professionals.

G6.PT.1   I think having other professionals like nursing and MD students would be beneficial as well so that they can learn what each discipline does and have a better understanding of it and so that we could learn from them as well.

G6.PT.2   I would have loved to have seen other professions there such as nurses or doctors to here their feedback. The whole experience seemed like it was going to be really long and boring, but I actually enjoyed it a lot more than expected.

G6.OT.1   I would like to see a role play scenario where students of one discipline take the role of a different discipline and see how much they know about how that disciple would go about treating.

G6.OT.2   It would have been great to have social work students, nursing students, and some physicians or doctorate students present as well since we will be working with them in the future. Viewing a mock diagnoses (visual from youtube) and evaluation with several disciplines present would be another way for us to work together.

G6.OT.3   The case study approach was a great test for the interprofessional workshop. In future I would allow an hour more in the activity to allow for an exhaustive exchange of treatment plans and ideas.

G6.SLP.1   Having MD students at the workshop may be an effective next move.

G6.SLP.2   I think including an evaluation case study would be an interesting addition. It would be great to see how the other professions would evaluate the same client and interpret the results.

G7.PT.1   Finally, in regards to the next IPE, I found that the case studies could have probably gone 20 minutes less in time. After we got to know each other, I found that we were able to fly through breaking down the case and we were efficient in thinking of interventions and how to best collaborate with one another.

G7.PT.2   I wouldn't change much from the experience in the future, just make sure each group has a good faculty advisor. Our group leader was super encouraging and made it an impactful workshop!

G7.OT.1   I think the IPE workshop activities can be cut down to a more brief time frame. There was multiple bouts of down time (aside from movement breaks) that could've been used in a more productive manner. Overall though, I really enjoyed the experience and getting to know my group!

G7.OT.2   The only thing I would improve on in this workshop is having more time to talk about what each profession does in each setting. We only had a few minutes to discuss what each of our professions do overall, but I thought it would have been more helpful to discuss what they do in exactly each setting. I think this is important because each of our professions do something differently in each setting.

G7.SLP.1   I may improve this workshop by adding some more case studies. I found this to be the most beneficial part of the workshop and would have loved to collaborate with one another more in this aspect!

G8.OT.1   I would suggest including nursing and medical students in future IPE workshops to increase respect and understanding of the various professions.

G8.OT.2   I would improve the IPE workshop by including nursing, social work, and medical students to represent all professionals who will interact on a daily basis.

G8.PT.1   I would improve the IPE workshop by including other professions to become involved as it is apparent that many don't have a great understanding of what the tri-alliance rehabilitation team does for patients. I found it really beneficial to have discussion on what the other professions had to offer to our patients, and it was great to do a case study where we all put our heads together and collaborated to come up with a plan to best serve our patients.

G8.PT.2   The only thing that I think could make this workshop better is including nursing students as well. Nurses will interact with all three professions and be an integral part of patient care. After my acute care rotation I realized how important it is to have a good working relationship with nurses. It would be beneficial to educate nurses and us on what each profession was qualified to do.

G9.SLP.1   I would improve this IPE workshop by including more healthcare disciplines (nurses, doctors, social workers, etc). I think it would beneficial many disciplines to understand our role and for us to understand their role.

G9.SLP.2   For future students, I think it would be beneficial to come up with another way to introduce IPE rather than the lecture video. It was rather dry and all of the information was readily available in the powerpoint slides. Also, I think it would be great to invite other disciplines to participate in the workshop as well.

G9.OT.1   Introducing other health professionals may improve this IPE workshop. Like Dr. Mac said some medical doctors do not understand what us therapist do and how important therapy is.

G9.PT.1   I believe that the workshop could be improved by adding other healthcare disciplines. Another idea is that we could actually simulate reporting findings/summarizing treatment or asking questions to improve our communication techniques when working with other forms therapy.

G9.PT.2   My only delta on the workshop would be the timing of the event. Having it right before our finals week did not allow me to truly enjoy the event as much as I would have liked too (had upcoming practicals and finals on the mind). I still had a good time and put my best effort forward. A potentially less busy time would have been more beneficial for the Bellarmine physical therapy students, in my opinion.

G10.SLP.1   I had difficulty thinking about how this workshop may be improved to better serve students, as it was a truly valuable experience. However, I do believe that

more specific examples of how interprofessional education has been implemented would be particularly helpful. For example, having anecdotal evidence from current clinicians/professors would serve as more concrete examples of how interprofessional education can bring about change. As we have not yet worked independently as clinicians, the concept of interprofessional education remains fairly abstract, so more detailed examples of its use in real-world settings would have been more illustrative.

G10.SLP.2 I enjoyed this workshop and found it very beneficial! One way to make it better would be to include more disciplines such as nurses, doctors, etc. There is nothing else I would change! The schedule and activities were organized very nicely.

G10.OT.1 I thought the IPE workshop ran very smoothly, and I enjoyed the complex case study that our group had to decipher! I would suggest more personal experiences from faculty, in addition to more disciplines! This would be a great way for each disciple to acquire a deeper understanding and appreciation of the various roles. I also thought it was great how the OT students were able to partake in the workshop right before our first 12-week rotation! This was an additional preparation tactic on interprofessional education that I definitely appreciated! I have no additional suggestions at the moment! I thought, as a whole, the IPE workshop was a great opportunity for PT, OT, and SLP students to engage in together!

G10.OT.2 I feel that this workshop could be improved by more detailed examples of IPC. Also, I felt the most beneficial aspect of the workshop was the case study, perhaps more exercises similar to those could be incorporated.

G10.PT.1 I feel allowing for more disciplines would be helpful but I also think that if there where a panel of practicing professionals that could present at the beginning and answer questions, this could be helpful as well.

G10.PT.2 I think the addition of more disciples would be a good improvement for the future, for example nursing and MD students. I also think the case studies were really helpful to get a better understanding of the different roles each profession can assist with in the plan of care.

G11.SLP.1 The block building task was too small-scale for such a large group. You can't have 7 pairs of hands all working on the same set of small blocks. Some people end up not contributing much because there isn't space for everyone to work and teammates have it covered anyway. I would suggest a similar task with tumble forms or something a little more interactive where all members of the group could have roles. Additionally, I know transferring patients and toileting isn't in my scope of practice, but something I've learned from my practicum placements is that we're frequently expected to do things like that anyway. I really wanted some sort of quick lesson on safe transferring because I can't count the times I've had to do it regardless of the fact that I've had absolutely no training on it. How

can SLPs be expected to step up and be an equal part of the team when we can't even reposition patients for swallowing or help them stand to complete ADLs for functional cognitive tasks?

G11.SLP.2   More time to get to know one another/small talk! Overall, It was a great workshop!

G11.OT.1   I don't know that there are any ways to improve this experience. I think it was very helpful and informative and provided a lot of information in just one day.

G11.OT.2   The PT students mentioned having a panel beforehand that spoke to them about the different presenters professions. I feel like that would have been beneficial as a hole so that way there could be a Q&A to help us better prepare when not only working with PT and Speech, but other professions as well. Other than that, the time went by rather quick and I really enjoyed the experience and insight this workshop provided.

G11.OT.3   I can't think of anything that needs improvement. I had a great time during the workshop, learned a lot, and Bellarmine was a wonderful host. I definitely think that this workshop should be a part of all three program's curriculum for years to come, because interprofessional teamwork is necessary in all practice areas!

G11.PT.1   I think we could have used more time just to talk with each other and that going through patient cases in the small groups was enough. It felt like we lost the good conversations about patients that we were having when three groups got together to present on the cases.

G11.PT.2   I would allow more time to just talk to the other students. There was a quick facilitation of what type of specialities are available for each discipline, but not enough time to really allow everyone to answer. The activities were good though, I wouldn't change those.

G11.PT.3   I think overall it was good I have nothing to compare it to though. More time getting to know each other personally would be better. I think we got to really know each other at the start and wish we had more time to also.

G12.OT.1   I thought the IPE workshop was well-organized and relevant. I would improve this workshop by incorporating discussion about how we as students and future practitioners can help promote interprofessional collaboration in future fieldwork or employment sites and make a difference in changing false perceptions about the involved professions. For example, what are different ways we can help increase employee understanding of the various professions with whom he/she works? What is the best way to accomplish this---through handouts, in-service training, etc.?

G12.OT.2   Allow the students to work the cases themselves in order to facilitate more critical thinking. I felt our instructor provided a little too much guidance and we did not have the opportunity to create our own plan of care. It would be most beneficial if the instructors provided the case studies, allowed us to read them, reflect, and collaborate and then step in if it appears the group is struggling.

G12.PT.1   I can only really think of adding more health professionals to the mix and maybe work on more exciting problem-solving skills to help people identify their own and others strengths and weaknesses while working with a team especially among those who you barely know.

G13.OT.1   To improve the IPE workshop for future students, it may be nice to be provided with some printed resources about each discipline. These may include key points about what each discipline does. As a visual learner, this would help me retain what I learned during the workshop.

G13.OT.2   I do not have any recommendations at this time to improve the workshop for future students. I thought the IPE Workshop was both interesting and insightful.

G13.PT.1   I do not have any feedback for the workshop and found it both enjoyable as well as informative.

G13.PT.2   My only feedback is providing some visual aid or resources we can look at that discuss different aspect of our career as well as similarities. I think this would be a helpful resource to take our on our rotations in the program.

G13.SLP.1   I loved Student X's idea about providing printed resources. I think that would be beneficial to have as a reference when making referrals in the future.

G14.OT.1   One way that this IPE workshop could be improved would be to allow more time in small groups for students to explain their future profession. There were times when I felt rushed and as though I couldn't explain myself fully. Or it would be nice to have the faculty advisors give a basic introduction about each field and maybe a "random fact" that most people wouldn't know their field does. For example, many people in my group didn't know that Occupational Therapists can work in Mental Health settings.

G14.OT.2   I think having more time to just communicate and chat about our professions and personal experiences would help. The ice-breakers were fun but maybe another case study activity would be good so we could see more how our professions view problems and create solutions differently, and how the complement each other at the same time.

G14.OT.3   I think that time could be managed a bit more effectively. Although the time allotted at the beginning to "dialogue" with one another and complete ice-breakers proved to be beneficial, I think the time would be better suited

explaining each role and how they fit within the health-care team or by more thoroughly dissecting the case study. As we will working closely alongside these professions within practice, I would've liked more hands on work to better understand those relationships.

G14.SLP.1   I would love to see more medical professions represented in the group. I think it would be beneficial to have medical and nursing students involved as well. I would also agree with my team members when they say having more time allotted for just open discussions about our professions would be beneficial. Several times we would just be getting into a good discussion about one particular discipline when time would be over for that portion of the workshop, interrupting the continuity of conversation.

G14.SLP.2   I think it would be a great idea to have one case study that everyone has so when it's time for the larger group to come together the students will be able to compare and contrast their answers. It could also be beneficial to have a small introduction explaining the main focus of each profession and to discuss which profession address what when the scope of practices overlaps. This could be addressed after the Pictionary activity.

G14.PT.1   I think it would be beneficial to have more time to talk as groups about our professions at the beginning. We are all so passionate about our professions and advocating for our skills and abilities that we weren't able to get an adequate amount of information from all three specialties before the next activity.

G15.PT.1   I would recommend having more time discussing case studies, because I feel I learned the most during this time about how other professions think and what they do for their patients.

G15.PT.2   I thought that the workshop was a bit longer than it needed to be. I felt like my group and I were reiterating the same points as the day was closing and had a pretty good understanding of what should be expected of us, how to change the way PT, OT and SLP's communicate with one another, and how to build a relationship that is worthwhile. However, I did enjoy the workshop because I was able to learn more about SLP and because more aware that insurance companies, facilities may only look at PT's note rather than OT and SLP-therefore, I not only should be an advocate for my own profession, but also their profession.

G15.OT.1   I would improve the IPE workshop by starting earlier and possibly combining the icebreakers into a group lunch. Also state on the directions to the location the Allen Hall building is not on the main campus, yet it is across the street. (This might of just been a miscommunication era)

G15.OT.2   I would recommend improving the IPE workshop by adding more time for the case studies and discussion time. During this activity I learned a lot about the

other disciplines and what they can do with different patients/diagnosis and believe future IPEs would benefit from more time and in this group discussion.

Note. All student responses were taken directly from original source, and wording remained

unedited to capture original thoughts. Student Participant was identified by group number,

profession, and numerical identifier in group (e.g., Group 1.OT Student.Number 1[G1.OT.1])

Appendix U: Content Analysis of Student Responses to Reflection Questions for Case 2018

Table U1

Content Analysis of Student Responses to Reflection Question #1a for Case 2018

Memos and Notes

Question 1a: What did you find beneficial or like the most from the IPE Workshop?
Themes: 1a.1.2., 1a.1.6., 1a.2.2., 1a.3.5.
Observations: Overall very positive tone; thoughtful responses; at least one student from each group responded in favor of case studies; common occurrence for groups to respond similarly; some self-interest statements versus team orientation

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (group #, profession, student #)
1a.1. Workshop components	1a.1.1. Small/large group discussions	Enjoyable (2 comments)	5PT2, 9OT1
	1a.1.2. Case studies	Overall positive responses about case studies (35 comments)	1SLP1, 1PT1, 1PT2, 1PT3, 1OT1, 1OT2, 2SLP1, 3OT2, 3OT3, 4OT2, 4PT1, 4PT2, 4SLP1, 4SLP2, 5OT2, 6SLP2, 7SLP1, 8OT1, 8PT2, 9SLP1, 9OT1, 10SLP2, 10OT2, 11SLP1, 11SLP2, 11OT2, 11OT3, 11PT2, 12OT1, 12OT2, 13OT1, 14SLP2, 15PT1, 15OT1, 15OT2
	1a.1.3. Games	Block activity ("ice breaker"), Pictionary; "games" (8 comments)	2OT2, 4PT3, 4SLP1, 9PT2, 10OT1, 11OT2, 12OT2, 12PT1
	1a.1.4. Workshop setting	Safe/comfortable place to learn (2 comments)	2PT2, 11PT3

	1a.1.5. Interprofessional faculty	General appreciation (2 comments)	5PT1, 6OT3
	1a.1.6. Structured and unstructured dialogue	Opportunities for relationship building/networking (overall appreciation getting to know one another and being around the other; 28 comments)	2PT2, 2SLP1, 3SLP2, 4OT1, 4PT1, 4PT3, 5PT2, 6PT1, 6PT2, 6SLP1, 7PT2, 9SLP2, 9OT1, 9PT1, 11OT3, 11PT2, 11PT3, 12PT1, 13OT1, 13OT2, 13PT1, 13PT2, 13SLP1, 14OT1, 14OT2, 14PT1, 15PT1, 15PT2
		Appreciation of dialogue/discussion (general appreciation talking/sharing information; 17 comments)	1PT3, 1OT2, 2OT2, 2PT2, 3OT1, 5PT2, 6OT3, 7PT2, 9SLP2, 10PT2, 11OT1, 11PT1, 11PT3, 13SLP1, 14OT2, 14SLP1, 15OT2
	1a.1.7. Other notable aspects of the workshop	Fun/enjoyable/beneficial (11 comments)	1PT1, 3OT1, 3OT2, 3OT3, 3PT1, 9PT2, 10SLP1, 10OT1, 12PT1, 13PT1, 13SLP1
		Appreciation for/of group dynamics (7 comments)	1SLP1, 3OT1, 3PT2, 7PT1, 7SLP1, 10OT2, 12OT2
		Closer "real world" experiences (2 comments)	1SLP1, 7SLP1
1a.2. Learning about, from, and with each other	1a.2.1. Overall	General sweeping and supportive comments about IPE (32 comments)	1SLP1, 1PT2, 2OT1, 2PT2, 3OT2, 4OT3, 5OT1, 6PT1, 6PT2, 7PT1, 7PT2, 7OT2, 8PT1, 10SLP2, 10OT1, 10OT2, 10PT1, 10PT2, 11OT2, 11OT3, 11PT2, 11PT3, 13OT1, 13OT2, 13PT1, 13PT2, 13SLP1 14OT1, 14OT2, 14OT3, 14PT1, 15PT1

1a.2.2. Discussing roles/ responsibilities	To include coordination of roles; expectations of others (12 comments)	1SLP1, 1PT1, 3PT2, 4OT1, 4OT2, 4PT2, 4SLP1, 5PT2, 10PT1, 11PT2, 14SLP2, 14PT1
	Approaches (noun/verb)/what each profession "does"/ specializations (27 comments)	1SLP1, 1PT3, 1OT1, 1OT2, 2OT1, 2OT2, 2PT1, 2PT2, 3OT1, 3OT2, 3OT3, 3PT2, 3SLP1, 4PT1, 4SLP2, 5OT2, 6OT2, 7OT1, 7OT2, 8OT2, 8PT1, 8PT2, 11OT1, 11OT3, 13OT1, 13OT2, 15PT1
	Similarities/overlap (23 comments)	1SLP1, 1PT1, 2OT1, 2OT2, 2SLP1, 3OT2, 3OT3, 3PT1, 5OT2, 5PT1, 6OT1, 6OT2, 7OT1, 7OT2, 8OT1, 8PT1, 9SLP2, 9OT1, 10SLP2, 11OT2, 11PT2, 13OT1, 15OT2
	Uniqueness/differences (10 comments)	1OT2, 2OT2, 2SLP1, 3OT1, 3PT1, 8OT1, 10SLP2, 11OT2, 11PT2, 13OT1
	Scopes of practice (specific mentions; 14 comments)	1PT2, 2SLP1, 3PT1, 4PT2, 4SLP2, 6OT1, 7OT1, 7SLP1, 8PT2, 9SLP2, 10PT1, 11SLP2, 11OT1, 13PT1
1a.2.3. Discussing perspectives/viewpoints	(same; 15 comments)	1PT2, 3SLP1, 4OT1, 6SLP1, 6SLP2, 8PT1, 9SLP2, 10OT2, 11SLP1, 11SLP2, 11PT1, 12OT1, 13OT1, 14OT1, 14SLP1

	1a.2.4. Treatment planning/plan of care	Interventions; maximize treatment (11 comments)	1PT1, 1PT2, 3PT1, 4PT2, 5PT1, 6OT2, 7SLP1, 10SLP2, 10PT2, 11SLP1, 11OT2
		Goals (4 comments)	1OT2, 5PT1, 6SLP2, 9SLP2
	1a.2.5. Promotion of own profession	Opportunity to educate others about own profession (9 comments)	2OT2, 4PT2, 5OT1, 6OT1, 7OT2, 8OT2, 14OT3, 14SLP1, 14SLP2
1a.3. Collaboration	1a.3.1. How/when/who to collaborate	To include decision making; referrals (10 comments)	1PT2, 4OT1, 4OT2, 4PT1, 5OT2, 6PT1, 6OT1, 8OT1, 8OT2, 15PT2
	1a.3.2. Communication	General importance of communication (8 comments)	4PT2, 4PT3, 5PT1, 7PT1, 8OT1, 9PT2, 11OT2, 15PT1
		Efficient word choice (1 comment)	10SLP1
		Strategies for communication (6 comments)	2OT1, 4SLP1, 10OT1, 10OT2, 11OT3, 14SLP2
		Mention of listening/hearing (14 comments)	1PT1, 1PT2, 1OT2, 3OT1, 3PT1, 4OT1, 4SLP1, 6OT3, 6SLP2, 8OT2, 8PT1, 11OT2, 11OT3, 13PT1
	1a.3.3. Benefits/ importance/acts of collaboration	(same; 19 comments)	1PT1, 2PT1, 3OT1, 3OT3, 3PT1, 3PT2, 3SLP1, 4SLP1, 4SLP2, 6OT2, 6SLP1, 7OT1, 7SLP1, 8OT2, 9SLP1, 9PT2, 10PT2, 14PT1, 15OT1
	1a.3.4. Teams and teamwork	Working as a team; importance of teams and teamwork (16 comments)	4OT2, 4SLP1, 5OT2, 5PT1, 6PT1, 6PT2, 7SLP1, 8PT2, 10SLP2, 10PT2

			11SLP1, 11OT3, 12OT1, 14OT3, 14SLP2, 15OT2
	1a.3.5. Patient/client-centeredness	General orientation; importance of patient-centered care (28 comments)	1PT1, 1OT2, 2PT1, 3PT2, 4PT1, 4PT2, 4SLP1, 4SLP2, 5OT2, 5PT1, 5PT2, 6SLP1, 6SLP2, 7OT1, 7SLP1, 8OT1, 8PT1, 8PT2, 9SLP2, 10SLP2, 10OT2, 10PT2, 11SLP1, 11SLP2, 11OT3, 12OT1, 14SLP2, 15PT1
1a.4. Outcomes of IPC	1a.4.1. Appreciation/respect	Between one another; from one profession to another (4 comments)	2PT1, 5PT1, 10SLP2, 10OT2
	1a.4.2. Increased insight/ understanding	(same; 10 comments)	1SLP1, 1PT1, 1PT2, 1OT1, 5PT1, 10OT2, 11OT3, 13PT1, 15OT1, 15OT2
	1a.4.3. Improved clinical skills	(same; 1 comment)	12OT1
	1a.4.4. Carryover skills into future practice	(same; 5 comments)	6SLP1, 9PT1, 10OT1, 10PT2, 12OT1
1a.5. Reflections	1a.5.1. General comments	Reflect on self (3 comments)	3SLP2, 7PT1, 12OT1
	1a.5.2. Past experiences	Never or minimally exposed to IPC prior to IPE workshop (2 comments)	1PT1, 3PT1
		Basic, vague, or no ideas about IPC (2 comments)	1PT2, 1PT3

	Mention of attending previous IPE workshop (4 comments)	3SLP1, 4SLP2, 10SLP1, 13SLP1
	Awareness of previous biases or stereotypes (2 comments)	4OT3, 14PT1
	Lack of knowledge or basic ideas about other professions before workshop (4 comments)	2OT2, 2PT2, 3PT2, 7PT1
	Thought previous knowledge was vast, only to learn there was more to learn (2 comments)	14OT1, 14OT3

Note. Please refer to Appendix T, Table T1 for exact student responses organized in this form. Student participants were identified

by group number, profession, and numerical identifier in group (e.g., Group 1, OT Student, and Number 1[1OT1]).

Table U2

Content Analysis of Student Responses to Reflection Question #2 for Case 2018

Memos and Notes

Question 2: How will your new knowledge of and experience with interprofessional collaboration affect your future practice? (Only focused on future-oriented responses based on wording of survey question; may be best qualitative indicator of attitude changes for Case 2018.)

Themes: 2.2.1., 2.2.2., 2.2.8.

Observations: Overall positive tone; thoughtful responses; several self-interest statements versus team orientation; less common occurrence for groups to respond similarly for this question; some provided responses but did not answer the question; one

student indicated can lead an IPE; 13SLP1 had no response to this question; some unique perspectives (expressions of hope, observed shift in attitudes, considering age of team member, financial considerations)

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (group #, profession, student #)
2.1. Patient Care	2.1.1. General comments	Appreciation for or reference to patient care (11 comments)	1PT2, 1OT2, 2PT1, 3OT2, 3SLP2, 6OT2, 7PT1, 8OT1, 11OT3, 12OT2, 12PT1
	2.1.2. Effective care	Better serving patient/client (5 comments)	3PT1, 9PT2, 10SLP2, 14OT3, 14SLP2
	2.1.3. Holistic care	(same; 3 comments)	3OT3, 3SLP2, 10OT1
	2.1.4. Plan of care	Interprofessional; include others into (7 comments)	1PT1, 1PT2, 2OT2, 3PT1, 6OT2, 9SLP1, 9OT1
	2.1.5. Enhanced individual delivery of patient care	Learn from other professions to implement into own treatment to help patient (5 comments)	6PT2, 10SLP2, 13PT2, 15PT1, 15OT1
2.2. IPC	2.2.1. General comments	General references; importance of (22 comments)	1PT1, 1PT2, 2OT1, 3OT1, 3PT1, 3PT2, 4SLP2, 6OT2, 6SLP1, 6SLP2, 7SLP1, 9SLP1, 9OT1, 10OT2, 10PT1, 10PT2, 11OT3, 12OT1, 13OT1, 13OT2, 13PT2, 14OT3
	2.2.2. Referrals	Who/when/how/why (i.e., more knowledgeable about scopes of practice/specializations; 19 comments)	1PT3, 2PT1, 2PT2, 3PT2, 3SLP1, 3SLP2, 4PT2, 5PT2, 6PT2, 7PT1, 8PT1, 8PT2, 9PT1, 9PT2, 10OT1, 10PT1, 11PT2, 11PT3, 15PT2

2.2.3. Knowledge sharing	Seeking advice/counsel; sharing between professions (11 comments)	2PT1, 2PT2, 2SLP1, 3SLP1, 4SLP2, 5OT2, 5PT1, 6SLP1, 11SLP1, 12OT2, 14SLP2
2.2.4. Knowledge of/about other professions	(same; 4 comments)	8PT1, 9SLP2, 10PT2, 10SLP2
2.2.5. Teams and teamwork	General comments (12 comments)	1PT2, 1PT3, 1OT2, 2SLP1, 5PT1, 6OT1, 7PT2, 8OT1, 12PT1, 13OT1, 13PT1, 14SLP1
	Interactions and how to interact (7 comments)	2PT2, 3OT2, 6OT3, 11OT1, 11PT1, 14SLP2, 15PT2
	Productive/efficient (2 comments)	6PT2, 12PT1
	Co-treatments (7 comments)	3OT3, 6OT3, 6SLP1, 6SLP2, 9PT2, 10PT1, 11OT1
	Self-improvement (be a better team member; 3 comments)	9SLP2, 11OT2, 14SLP1
2.2.6. Relationships	General comments (5 comments)	2PT1, 3OT1, 5OT1, 11OT2, 12OT1
	Respect (6 comments)	3OT1, 3OT2, 8OT1, 7OT2, 12OT1, 13OT1
	Advocate for/educate about the other professions (3 comments)	3OT3, 10OT2, 15OT1,
	Continue contact with group (1 comment)	14SLP2

2.2.7. IPE	Importance of IPE in practice (2 comments)	11SLP2, 12OT1	
	Can lead IPE in practice (1 comment)	11OT2	
2.2.8. Communication	General comments about communication or carrying over into future practice (21 comments)	1SLP1, 1PT2, 1OT1, 2OT1, 2OT2, 3OT1, 3OT2, 3OT3, 4PT1, 5PT2, 6OT1, 7OT1, 8PT2, 9PT1, 10SLP1, 11PT3, 11OT3, 14OT3, 14SLP1, 14SLP2, 15PT1	
	Listening (2 comments)	4OT2, 15PT1	
	Awareness of Person factors (1 comment)	15PT2	
2.2.9. Expressions of hope or hopefulness about IPC and teamwork	(same; 5 comments)	3OT2, 6SLP1, 10SLP2, 12OT1, 14SLP2	
2.2.10. Generally positive, sweeping statements	No solid example of future application; comments about what was learned (9 comments)	4OT1, 4OT3, 4PT3, 4SLP1, 6PT1, 8OT2, 14OT1, 14OT2, 15OT2	
2.3. Self-interest	2.4.1. Comments worded with emphasis on self or benefit of own profession; less about collaboration or teamwork	Example: "my patients" (6 comments)	4PT2, 9SLP2, 9PT2, 10SLP2, 11SLP1, 14PT1
		Other professions to "help me" (2 comments)	11PT2, 14PT1
		Improve my productivity (1 comment)	10SLP1

Note. Please refer to Appendix T, Table T2 for exact student responses organized in this form. Student participants were identified by group number, profession, and numerical identifier in group (e.g., Group 1, OT Student, and Number 1[1OT1]).

Table U3

Content Analysis of Student Responses to Reflection Question #3 for Case 2018

Memos and Notes

Question 3: How would you improve this IPE Workshop for future students?
Themes: 3.3.1., 3.4.2.
Observations: Overall positive tone with appropriately constructive suggestions; groups continued to respond similarly; thoughtful responses; only one potentially negative-sounding response (11SLP1)

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (group #, profession, student #)
3.1. No suggestions for improvement	3.1.1. No suggestions	Engaging; learned a lot; keep as is (12 comments)	1OT2, 2SLP1, 3OT1, 3OT2, 3OT3, 3PT1, 4OT2, 7PT2, 11OT1, 11OT3, 13PT1, 13OT2
3.2. Faculty facilitators	3.2.1. Faculty to demonstrate IPC through case study discussion (as an example for students)	(same; 2 comments)	1SLP1, 1OT1
	3.2.2. Observations related to skill of small group facilitators	Enjoyed faculty during small/large group discussions (3 comments)	1OT1, 1OT2, 7PT2

		Faculty facilitator did not allow enough independent group discussion (1 comment)	12OT2
	3.2.3. More faculty-led discussion	About specializations, IPC, and related experiences (4 comments)	1SLP1, 10OT1, 14OT1, 14SLP2
3.3. Teaching/ learning interventions	3.3.1. Invite students from other health care professions	General comment or specifically suggestions nursing, social work, and/or medical students (18 comments)	6PT1, 6PT2, 6OT2, 6SLP1, 8OT1, 8OT2, 8PT1, 8PT2, 9SLP1, 9SLP2, 9OT1, 9PT1, 10SLP2, 10OT1, 10PT1, 10PT2, 12PT1, 14SLP1
	3.3.2. Workshop pre-work	Comments re: meeting before workshop (meet in person was beneficial OR was challenging; 3 comments)	2PT1, 4PT3, 5OT1
		Outdated video (3 comments)	4OT1, 4SLP1, 9SLP2
	3.3.3. Workshop activities	Mixed input about games (block game/ice breaker; Pictionary; 3 comments)	11SLP1, 11PT2, 14OT2
		More/modify case studies; (8 comments)	2OT2, 4OT1, 5OT2, 6SLP2, 7SLP1, 10OT2, 14OT2, 14SLP2
		Liked certificate of completion (1 comment)	1OT2
		More organization of and discussion opportunities during	1SLP1, 5PT2, 14OT3, 15OT1

		large group discussions (4 comments)	
		Overall good experience/learned a lot (16 comments)	1PT3, 1OT1, 2OT1, 2OT2, 2PT1, 3SLP1, 4SLP2, 5OT1, 5PT2, 6PT2, 7OT1, 10SLP1, 10SLP2, 10OT1, 11OT2, 15PT2
	3.3.4. New ideas for workshop	Simulations (varying types; 5 comments)	1PT1, 1PT2, 1PT3, 6OT1, 9PT1
		Practice labs; hands-on application; mock reporting (6 comments)	1PT3, 5OT2, 6OT2, 11SLP1, 12PT1, 14OT3
		Co-treatments (2 comments)	1PT2, 5PT1
		Printed materials/visual aid about each profession (3 comments)	13OT1, 13PT2, 13SLP1
		Advocacy/promotion strategies for IPC (2 comments)	12OT1, 15PT2
		Include community practitioner panel (3 comments)	3SLP2, 10PT1, 11OT2
		More realistic scenarios/examples (4 comments)	1PT1, 1PT2, 10SLP1, 10OT2
3.4. Logistical suggestions	3.4.1. Location	More directions (1 comment)	15OT1
		Good hosting facility (1 comment)	11OT3

3.4.2. Amount of time for workshop	Too long; parts felt repetitive; shorten day by 30 mins by removing time in beginning; shorten intro (8 comments)	2OT1, 2PT1, 2PT2, 3OT2, 3OT3, 7PT1, 7OT1, 15PT2
	More time needed to discuss/learn about each group member professionally and personally (16 comments)	4OT3, 4SLP1, 4SLP2, 6OT3, 7OT2, 11PT1, 11PT2, 11PT3, 11SLP2, 14OT1, 14OT2, 14LSP1, 14PT1, 15PT1, 15OT1, 15OT2
3.4.3. Timing during semester	Sooner in semester (6 comments)	3PT1, 3PT2, 3SLP1, 4PT1, 4PT2, 9PT2
	Appropriate time in semester (1 comment)	10OT1
3.4.4. Number of times attended	Mention of attending workshop before; Change attendance requirement for SLP students from twice to once (3 comments)	1SLP1, 3OT1, 3PT2

Note. Please refer to Appendix T, Table T3 for exact student responses organized in this form. Student participants were identified by group number, profession, and numerical identifier in group (e.g., Group 1, OT Student, and Number 1[1OT1]).

Addendum: Group Membership by Profession				
Group 1 (3PT+2OT+1SLP=6)	Group 4 (3OT+3PT+2SLP=8)	Group 7 (2PT+2OT+1SLP=5)	Group 10 (2PT+2OT+2SLP=6)	Group 13 (2OT+1SLP+2PT=5)
Group 2 (2OT+2PT+1SLP=5)	Group 5 (2OT+2PT+0SLP=4)	Group 8 (2OT+2PT+0SLP=4)	Group 11 (3OT+3PT+2SLP=8)	Group 14 (3OT+2SLP+1PT=6)
Group 3 (3OT+2PT+2SLP=7)	Group 6 (2PT+3OT+2SLP=7)	Group 9 (2SLP+2PT+1OT=5)	Group 12 (2OT+1PT+0SLP=3)	Group 15 (2OT+2PT+0SLP=4)

Appendix V: Student Reflections for Case 2020

Table V1a

Question 1a: What did you find beneficial or like the most from this IPE learning experience?

Student Participant	Student Response to Reflection Question
20.OT.08	I found the real-life situations to be a very unique and effective form of learning that I have not experienced much within the classroom setting.
20.OT.10	I enjoyed watching the videos and stating my opinion and observations and then watching a second part to the video that made me stop and think about my previous assumptions. It showed me collaboration techniques that I can use in the future.
20.OT.11	I felt like I learned a lot, and saw scenarios that I will see in the future. It gave me another view to see how to and how not to act as a health care professional.
20.OT.13	I liked the videos and the reflection questions that went along with them. I felt like I was able to see the scenario and actually think through what I would do.
20.OT.16	I thought the videos were well-done and realistic scenarios. This made me take the learning experience more seriously. I also liked that real professionals from different disciplines provided answers to the open-ended questions so I could compare my answers to theirs.
20.OT.19	I liked how the IPE experience demonstrated how differing the views of other disciplines can cause conflict. I also thought it was beneficial that the IPE provided examples of how clients and their families wishes can be overlooked by medical professionals.
20.OT.20	I loved how interactive the case studies were, and the comparison of answers to professionals that answered the same question.
20.OT.26	Looking more into how to work in an effective inter professional team
20.OT.27	The videos and case studies
20.OT.31	The open-ended responses really allowed me to think and generate an in-depth and meaningful response to the questions
20.PT.23	I thought it was interesting to hear everyone's point of view on how they work hand in hand with other health care professionals.

20.SLP.08	Learning the true benefits of using IPE and seeing the negative impact that can be caused by not participating in IPE.
20.SLP.10	Sharing experiences about interactions with other healthcare professionals and how to deal with it
20.SLP.12	I enjoyed the interview project because I was able to learn about another discipline and how they interact with SLPs on a daily basis.
20.SLP.13	During this experience, I most appreciated the opportunity we had to gather as a class and discuss our own person interprofessional experiences from practicum, both the good and the bad experiences. I think this made the class feel more applicable to our clinic experiences and allowed us to share what we found beneficial and what we found difficult about working with other health care professionals. Furthermore, it provided the opportunity to troubleshoot how we could better work with other professionals in the future.

Note. All student responses were taken directly from original source, and wording remained

unedited to capture original thoughts. Student Participant was identified by Case year,

profession, and numerical identifier (e.g., Case 2020.OT Student.Number 1[20.OT.1]).

Table V1b

Question 1b: How has your attitude changed about interprofessional collaboration after this IPE learning experience?

Student Participant	Student Response to Reflection Question
20.OT.08	I now understand its importance within the health care system to effectively treat and communicate with the patients.
20.OT.10	I realize that that we are all really one big team and working together will not only benefit the patient, but our daily work days as well.
20.OT.11	It changed my attitude showing how important working as a team is for the patient's health.
20.OT.13	I think my attitude has become more positive about collaborating with other healthcare professionals. I feel more prepared to participate and communicate my ideas in meetings. I also feel like I know the basics of how to deal with issues/challenges that may arise.

20.OT.16	My attitude has not changed very much. I always thought interprofessional collaboration was very valuable. I learned this from personal experiences with the healthcare system and from past jobs I have worked in healthcare settings. I wish systems, particularly billing, were better to support more interprofessional collaboration in real life.
20.OT.19	Yes, my attitude has changed, because it made me aware to be more understanding of what each discipline does and why they recommend certain things for the client.
20.OT.20	I now realize how important communication will be as we go on our journey to fieldwork, and also in future jobs.
20.OT.26	No, just because I always thought it was important
20.OT.27	It has slightly improved
20.OT.31	This has helped me a lot after viewing incorrect scenes vs correct scenes and I believe this will help me a lot as a student going out on fieldwork
20.PT.23	It's about the same. Just need to be more aware to hide my bias's when it comes to working with others as everyone has something to bring to the table.
20.SLP.08	I see that to truly provide holistic care to our patients, we must participate in IPE
20.SLP.10	I've learned how important communication is across disciplines
20.SLP.12	I have a stronger appreciation for interprofessional collaboration after taking this course.
20.SLP.13	Since this experience, I have become much more open-minded about other professionals. I think prior to this experience, whenever I came across a difficult situation with another professional, I was tempted to have a victim mentality and assume the worst of the other individual. This course has motivated me to do my best to be part of the solution in interprofessional collaboration and to communicate better with other professionals to help alleviate any collaborative difficulties.

Note. All student responses were taken directly from original source, and wording remained

unedited to capture original thoughts. Student Participant was identified by Case year,

profession, and numerical identifier (e.g., Case 2020.OT Student.Number 1[20.OT.1]).

Table V2

Question 2: How will your new knowledge of interprofessional collaboration affect your future practice?

Student Participant	Student Response to Reflection Question
20.OT.08	I will be able to bring to the team knowledge about how to be an effective team member and lead my team as an example.
20.OT.10	It will allow me to have more effective communication and listen to others opinions.
20.OT.11	It showed me how to act as a team for when I become a practitioner.
20.OT.13	This new knowledge will give me the ability to put my best foot forward. It will also allow me to have accurate and informative communication skills. This is beneficial for my healthcare team and future patients.
20.OT.16	I thought the module on communication strategies was helpful. will attempt to monitor my communication style. I will try not to use mitigated communication styles.
20.OT.19	It will give me more of an open mind when working with other practices. It will also influence me to not be scared to ask questions and maintain effective communication.
20.OT.20	My new knowledge will affect my future practice by continuously communicating with other professions within the field, and also with patients and hearing what is most important to them in their progress to recovery.
20.OT.26	I will continue to think it is important and advocate for inter professionalism
20.OT.27	It will allow me to effectively work with other professions
20.OT.31	I will know how to work as a team member with different health care disciplines and I will show empathy and a positive attitude towards other team members

20.PT.23	It will allow me to work closely with other health professionals, to provide the best care possible.
20.SLP.08	I will not be hesitant to ask questions to my peers, create open lines of communication, and to foster an environment where everyone's voice can be heard.
20.SLP.10	It will give me a deeper understanding of the value of communicating across disciplines to better the patients outcome
20.SLP.12	I will now seek opportunities to collaborate with other professionals for the betterment of my clients.
20.SLP.13	I will be more open-minded with regards to the practices of other professionals, and I will do my part to learn about other professionals so that I can have a well-rounded understanding of their role in the workplace.

Note. All student responses were taken directly from original source, and wording remained unedited to capture original thoughts. Student Participant was identified by Case year, profession, and numerical identifier (e.g., Case 2020.OT Student.Number 1[20.OT.1]).

Table V3

Question 3: How would you improve this IPE learning experience for future students?

Student Participant	Student Response to Reflection Question
20.OT.08	Allow the students to reflect on examples that they have seen in their past experiences of good/bad communication.
20.OT.10	N/A
20.OT.11	I would want to learn about more about how to designate roles and different types of roles professionals can take.
20.OT.13	I would tell them to make sure they use the Google Chrome application to complete the IPE learning experience. This prevented glitches and freezing. I would also tell them to allow plenty of time to complete the course work so they're able to fully learn the material.
20.OT.16	I think it was great.

20.OT.19   I can not think of anything I would change about this learning experience.

20.OT.20   I honestly would not change a thing. I think it provided the right amount of information within each module, as well as receiving information from other professionals and how they would do the scenario differently.

20.OT.26   There is nothing I would change

20.OT.27   I would have an interactive portion where we actually work with other disciplines to complete an activity.

20.OT.31   There is nothing to be improved. It is wonderful!

20.PT.23   Hopefully, it can continue in person. If it has to be done online again, maybe try to get other professions on the call.

20.SLP.08   This last semester has been so strange having to transfer everything online. I think it would have been really awesome to get to actually collaborate with the PT and OT students.

20.SLP.10   I think it was done for my class

20.SLP.12   More interaction with other healthcare students! (I know this was difficult with the COVID-19 situation).

20.SLP.13   I would include a couple more group meetings where students are able to have an open discussion about their own interprofessional experiences in their practicum placements.

Note. All student responses were taken directly from original source, and wording remained unedited to capture original thoughts. Student Participant was identified by Case year, profession, and numerical identifier (e.g., Case 2020.OT Student.Number 1[20.OT.1]).

Appendix W: Content Analysis for Case 2020

Table W1a

Content Analysis of Student Responses to Reflection Question #1a for Case 2020

Memos and Notes

Question 1a: What did you find beneficial or like the most from this IPE learning experience?
Themes: 1a.2.3.
Observations: Neutral or positive tone; no comments about learning with other professions due to uniprofessional focus; the video case studies appeared to be impactful

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (profession, student #)
1a.1. Teaching/learning intervention	1a.1.1. Videos/case studies/scenarios and related questions	Realistic/real-life situations, interactive (8 comments)	OT8, OT10, OT11, OT13, OT16, OT20, OT27, OT31
	1a.1.2. Interview	Enjoyed interview (1 comment)	SLP12
	1a.1.3. Synchronous discussion	Sharing experiences; in-class discussion (2 comments)	SLP10, SLP13
		Hearing peers' points of view (1 comment)	PT23
	1a.1.4. Reflection	General reflection; awareness of previous assumptions (3 comments)	OT10, OT13, SLP13

	1a.1.6. Problem-solving opportunities	Sharing experiences; thinking through cases (3 comments)	OT13, OT31, SLP13
1a.2. Outcomes	1a.2.1. Learning about IPC and from other professions	General comments re: learning about/from other professions via learning assignments; (3 comments)	OT11, OT16, SLP12
	1a.2.2. Benefits of IPE	(same; 2 comments)	OT19, SLP8
	1a.2.3. Collaboration	How to collaborate (5 comments)	OT10, OT26, PT23, SLP10, SLP13
		Importance of or appreciation for others' perspectives (3 comments)	OT11, OT19, PT23,
		Collaboration challenges may happen (between professionals; overlooking patient input; 2 comments)	OT19, SLP8

Note. Please refer to Appendix V, Table V1a for exact student responses organized in this form. Student participants were identified by profession and numerical identifier (e.g., OT Student, Number 1[OT1]).

Table W1b

Content Analysis of Student Responses to Reflection Question #1b for Case 2020

Memos and Notes

Question 1b: How has your attitude changed about interprofessional collaboration after this IPE learning experience?
Themes: 1b.3.
Observations: Mostly positive tone; mixed responses about attitude changes (five reported improved attitudes; two reported having positive attitude in the beginning and at the end); some reported more about learning outcomes than attitude changes; no sub-themes present with responses from all three professions; communication and patient-centeredness appeared to be recognized

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (profession, student #)
1b.1. Attitude changes	1b.1.1. Yes	(same; 5 comments)	OT11, OT13, OT19, SLP12, SLP13
	1b.1.2. Some	(same; 1 comment)	OT27
	1b.1.3. No/not much	Both OT responses indicated their attitudes were already positive about IPE/C; PT did not indicate positive nor negative attitude (3 comments)	OT16, OT26, PT23
1b.2. Outcomes of IPE/C	1b.2.1. Improved patient outcomes	Enhanced patient care; holistic care; understanding others' recommendations for clients (5 comments)	OT8, OT10, OT11, OT19, SLP8
	1b.2.2. General benefits of IPE/C	Benefits of learning about others; what to do and what not to do (3 comments)	OT19, OT31, SLP13
	1b.2.3. Benefits the team	"benefit…our daily workdays…" (1 comment)	OT10
1b.3. Collaboration	1b.3.1. General	General comments about IPC (3 comments)	OT16, SLP12, SLP13

	1b.3.2. Communication	Communication with team and patients (5 comments)	OT8, OT13, OT20, SLP10, SLP13
	1b.3.3. Team/teamwork	Benefits of teamwork; generally working with other professions (3 comments)	OT10, OT11, PT23
	1b.3.4. Preparedness for challenges	"know how to deal with issues" (2 comments)	OT13, SLP13
1b.4. Personal perspectives	1b.4.1. Current/previous experiences	Undesirable experiences (2 comments)	OT16, SLP13
	1b.4.2. Biases	"hide my [biases] when it comes to working with others as everyone has something to bring to the table" (1 comment)	PT23
	1b.4.3. Future application of IPC	(same; 2 comments)	OT20, OT31

Note. Please refer to Appendix V, Table V1b for exact student responses organized in this form. Student participants were identified by profession and numerical identifier (e.g., OT Student, Number 1[OT1]).

Table W2

Content Analysis of Student Responses to Reflection Question #2 for Case 2020

Memos and Notes

Question 2: How will your new knowledge of interprofessional collaboration affect your future practice?
Themes: 2.2.2., 2.2.3.
Observations: Overall positive tone; communication appeared to be recognized as important

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (profession, student #)
2.1. Communication	2.1.1. Hearing/listening	With professionals and patients (3 comments)	OT10, OT20, SLP8
	2.1.2. General	With professionals and patients (7 comments)	OT10, OT13, OT16, OT19, OT20, SLP8, SLP10
2.2. Team-based orientation/IPP	2.2.1. Effective team membership	Team-orientation, team behaviors; be positive example (5 comments)	OT8, OT11, OT13, OT31, SLP13
	2.2.2. Collaboration	Importance of (4 comments)	OT26, OT27, PT23, SLP12
	2.2.3. Patient-centeredness	Including patients; enhancing patient outcomes (4 comments)	OT13, OT20, PT23, SLP10, SLP12
	2.2.4. Environment	"foster an environment" that promotes communication (1 comment)	SLP8
2.3. Soft skills	2.3.1. Having an open mind	(same; 2 comments)	OT19, SLP13
	2.3.2. General	Empathy; positive attitude (1 comment)	OT31

Note. Please refer to Appendix V, Table V2 for exact student responses organized in this form. Student participants were identified by profession and numerical identifier (e.g., OT Student, Number 1[OT1]).

Table W3

Content Analysis of Student Responses to Reflection Question #3 for Case 2020

Memos and Notes			

Question 3: How would you improve this IPE learning experience for future students?
Themes: 3.1.1.
Observations: Overall positive and appropriately constructive tone; only two mentioned COVID-19; seven out of 10 OTs said their learning experiences were good with no suggested changes

Themes	Sub-themes	Sub-theme Details or Comments (plus # of responses)	Student Responders (profession, student #)
3.1. Interprofessional learning	3.1.1. Collaborate with students from other health care professions	Interactive portions to complete activities (4 comments)	OT27, PT23, SLP8, SLP12
	3.1.2. Recommend in-person IPE	(same; 1 comment)	PT23
	3.1.3. Interprofessional input from asynchronous video modules	Good amount of information (1 comment)	OT20
3.2. No changes	3.2.1. No changes	No changes; N/A (5 comments)	OT10, OT19, OT20, OT26, OT31
	3.2.2. Learning experience was good	(same; 2 comments)	OT16, OT31

3.3. Teaching/ learning interventions	3.3.1. Opportunities for more reflection	On past experiences with communication (1 comment)	OT8
	3.3.2. More about roles	Types of roles and designating roles (1 comment)	OT11
	3.3.3. Opportunities for more sharing/discussion	Specific to experiences on practicums (1 comment)	SLP13
3.4. Logistics	3.4.1. Time required for assignments	Allow plenty of time to fully learn material; (1 comment)	OT13
	3.4.2. Amount of work was good	(same; 1 comment)	OT20
	3.4.3. Internet browser	Use Google Chrome (1 comment)	OT13
3.5. Reference to COVID-19	3.5.1. Transition to online	Acknowledged circumstances for online (1 comment)	SLP8
	3.5.2. Acknowledgment of COVID-19	Empathetic statement (1 comment)	SLP12

Note. Please refer to Appendix V, Table V2 for exact student responses organized in this form. Student participants were identified by profession and numerical identifier (e.g., OT Student, Number 1[OT1]).

Appendix X: Summary of Important Characteristics for Case 2018 and Case 2020

Summary of Important Characteristics for Cases 2018 and 2020

Characteristics	Case 2018	Case 2020	Commonalities (C) and Differences (D)
Student mix	$N = 119$; Pre-licensure graduate students of OT ($n = 41$, mid-program), PT ($n = 44$, mid-program), and SLP ($n = 34$, end of program; attended prior workshop); 15 interprofessional groups	$N = 95$; Pre-licensure graduate students of OT ($n = 42$, mid-program), PT ($n = 38$, mid-program), and SLP ($n = 15$, end of program; did not attend prior workshop); No interprofessional groups	C: All students of the tri-alliance were from the same respective programs. All students were at same level in their respective programs. D: Sizes of student groups were different, primarily due to the SLP student group being half the size for 2020 in comparison to 2018. Interprofessional groups were created for 2018 and not for 2020.
IPE learning experiences/settings/ people resent	Hybrid, interprofessional, emphasis on the in-person workshop; Outcomes were modeled after IPEC 2016 competencies	Primarily online, uniprofessional IPE-based teaching interventions; Outcomes were inconsistent across programs, but continued effort to teach about the importance of IPCP with respect to the IPEC 2016 competencies	C: Learning experiences intended to increase knowledge and improve attitudes about IPCP D: Formal learning outcomes; Learning environments; Teaching/learning interventions; Presence or absence of peers, faculty, and other people within respective environments
	1st Phase: Workshop prework; Individual online pretest IPAS and other tasks followed by virtual or in-person team meeting; Interprofessional student groups	OT: Uniprofessional individual-based online modules; Home (or other approved essential setting) due to social restrictions from pandemic; People in home or other setting;	

		OT faculty available per request	
	2nd Phase: Four-hour, in-person interprofessional workshop and posttest IPAS; Interprofessional students and faculty	PT: Uniprofessional, individual-based online modules followed by an online, synchronous class meeting; Home or other approved essential setting; People in home or other setting; PT faculty on conference call and available per request	
	3rd Phase: Post-workshop reflections; Individual online tasks; Asynchronous interprofessional groups shared comments on Google Docs®	SLP: Uniprofessional on-campus class meeting before pandemic and individual-based video simulations after university closures; On-campus before closures and on-line in homes or other approved essential settings after; People in home or other setting; SLP faculty present on-campus before closure and available per request after	
Time in academic calendar	April 2018; Typical curricular progression with typical course structure	April 2020; Atypical curricular flow due to COVID-19 restrictions resulting in university campus closures two weeks before previously scheduled workshop; All classes transitioned to synchronous/ asynchronous online learning	C: Same time in the academic year D: Presence of pandemic in 2020, which affected all societal operations, to include university operations

Modified IPAS pretest completion rate	N = 119 (100%) Context: Instructions indicated that the pretest IPAS was the first task to complete during prework, followed by introductory video and ending with group work. IPAS instructions included informed consent.	N = 74 (77.9%) Context: All students were provided with the same instructions from their program's faculty for taking the electronic pretest IPAS before their uniprofessional learning experiences. IPAS instructions included informed consent.	C: Completed before IPE-based learning experiences occurred; Voluntary participation D: Response rate; Prework requirements (Case 2018 was instructed to do the IPAS before other prework; Case 2020 had no other prework to complete.)
Modified IPAS posttest completion rate	N = 119 (100%) Context: Students were provided paper copies of IPAS at the immediate conclusion of the workshop before students left campus. Students were reminded that their participation was voluntary.	N = 24 (25.3%) Context: All students were cued to take the voluntary electronic posttest IPAS.	C: Completed after IPE-based learning experiences concluded; Voluntary participation D: Response rate; Faculty instruction (faculty request in Case 2018 versus faculty cue in Case 2020)
Reflection question response rate	N = 83 (69.7%) Context: Instructions were for students to provide post-workshop reflections for the final task of the IPE experience within one week after the workshop, which was imbedded in each program's courses occurring at that time.	N = 15 (15.8%) Context: Reflection questions were included at the end of the electronic posttest IPAS.	C: Questions 1a, 2, and 3 were the same D: Response rate; Question 1b was only used for Case 2020; Timing and instructions of reflection questions (Case 2018: within a week after the workshop as completion of learning experience for course; Case 2020: a part of the posttest IPAS only)
Outcomes of responses to	Good representation of each profession;	Imbalanced responses between programs;	C: Positive and appropriately

| reflection questions | Overall, positive and appropriately constructive; Detailed responses; Valued collaborative learning and the importance of collaboration in the future; Indicated attitude/perception changes; Recommended more students from other health care professions to attend | Some neutral but overall positive and appropriately constructive; Brief responses; Valued unique teaching interventions and the importance of collaboration in the future; Indicated attitude/perception changes; Recommended interaction with students from other health care professions | constructive responses; Valued importance of collaboration for future practice; Indicated attitude/perception changes; Recommendation of interactions with students from other health care professions

D: Detail supplied in responses; Balance of student responses between programs; Quantity of responses between Cases |

Appendix Y: Integrated Results Matrix for Comparative Mixed Methods Case Study

Integrated Results Matrix for Comparative Mixed Methods Case Study

Results from natural experiment	Results from case study	Merged outcomes
Case 2018, $N = 119$		
Modified IPAS pre/posttest completion rate: 100%	Response rate to reflection questions: 69.7%	High scores for pretest/posttest
Descriptive statistics: Pretest statistics: $M = 6.40$ ($SD = 0.39$), median = 6.49 Posttest statistics: $M = 6.50$ ($SD = 0.33$), median = 6.47	Themes: Positive or appropriately constructive detailed responses; Enjoyed interacting; Learned about, from, with one another; Importance of communication; Importance of patient-centered care; Invite students from other health care programs; Aligned with IPEC competencies	Good response rate for reflections Positive themes Quantitative and qualitative outcomes converged indicating positive attitudes and perceptions
Case 2018, $N = 24$		
Descriptive statistics: Pretest statistics: Median = 6.56 Posttest statistics: $M = 6.50$ ($SD = 0.36$), median = 6.45	No changes to qualitative analysis; Inability to match qualitative responses with survey results of the 24 students randomly selected due to student deidentification processes	Quantitative and qualitative outcomes converged indicating positive attitudes and perceptions
Case 2020, $N = 95$		
Modified IPAS pretest completion rate: 77.9%; Posttest completion rate: 25.3%	Response rate to reflection questions: 15.8%	Average scores for pretest/low scores for posttest
Descriptive statistics: Pretest statistics: $M = 4.59$ ($SD = 2.64$), median = 5.99 Posttest statistics: $M = 1.44$ ($SD = 2.67$), median = 0.00	Themes: Eighty out of 95 students did not answer the reflection questions; therefore, the theme was nonresponse.	Low response rate for reflections Theme was nonresponse Quantitative and qualitative outcomes converged indicating ecological factors affected likelihood of

	participation to accurately assess attitudes

Case 2020, $N = 24$		
Descriptive statistics: Pretest statistics: $M = 6.06$ ($SD = 0.78$), median $= 6.23$ Posttest statistics: $M = 6.36$ ($SD = 0.35$), median $= 6.42$	Response rate to reflection questions: 62.5%	High scores for pretest/posttest
	Themes: Positive or appropriately constructive mostly brief responses; Importance of collaboration; Importance of patient-centered care; Interact with students from other health care programs; Aligned with IPEC competencies	Good response rate for reflections Positive themes Quantitative and qualitative outcomes converged indicating positive attitudes and perceptions

Integrated quantitative results and qualitative findings		
Case 2018, N = 119 & Case 2020, N = 95 Mann-Whitney *U*-Test statistics: Pretest: $U = 2618.500$, $z = -6.745$, $p = .000$ Posttest: $U = 1042.500$, $z = -10.438$, $p = .000$ A statistically significant difference was found at pretest and posttest for Cases 2018 and 2020 with full sample sizes. *Cases 2018 and 2020, Ns = 24* Mann-Whitney *U*-Test statistics: Pretest: $U = 142.500$, $z = -3.001$, $p = .003$	Outcomes from cross-case synthesis (*Case 2018, n = 83 and Case 2020, n = 15*): Theoretical replication for Proposition 1 and literal replication for Revised Propositions 2 and 3; Importance of collaboration; Importance of patient-centered care; Include students from other health care professions; No negative themes	For the students in both Cases who *did* complete the full IPE-based learning experiences from pretest to posttest and through reflections, the quantitative and qualitative results converged, and positive changes in attitudes and perceptions were reported (Level 2a outcome). For the students in both Cases who *did not* complete the full IPE-based learning experiences, their nonresponses affected the ability to compare full cohort quantitative and qualitative responses to fully understand

Posttest: $U = 230.000$, $z = -1.197$, $p = .231$

No statistically significant differences in attitude changes at posttest

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Cases 2018 and 2020, Ns = 24

Independent-samples t test statistics:

Posttest only: $M = 0.13$, 95% CI [-0.07, 0.34], $t(46) = 1.29$, $p = .204$, with a small effect size ($d = 0.39$)

No statistically significant differences in attitude changes at posttest

attitude changes for the students of the tri-alliance in Cases 2018 and 2020. Therefore, their results diverged: Case 2018, $N = 119$ had positive outcomes, and Case 2020, $N = 95$ had unfavorable outcomes.

Note. Quantitative data from students' pretest and posttest modified Interprofessional Attitude Scale (IPAS) and qualitative data from students' narrative responses to reflection questions were integrated to provide a more comprehensive description of student attitude changes after their IPE-based learning experiences in the presence of their unique ecological factors present in 2018 and 2020.