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The Impact of Changing Distance-Learning Delivery Formats

in Physical Therapy Professional Education

by

Lance Derek Gerber

A dissertation

submitted in partial fulfillment

of the requirements for the degree of

Doctor of Education in the Department of School Psychology and Educational Leadership

Idaho State University

Spring 2021

Committee Approval

To the Graduate Faculty:

      The members of the committee appointed to examine the dissertation of Lance Derek Gerber find it satisfactory and recommend that it be accepted.

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Rick Wagoner, Major Advisor

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Human Subjects Committee Approval

June 11, 2020

Lance Gerber
Physical Therapy
MS 8045

RE: Study Number IRB-FY2020-262 : Perspectives of Physical Therapy Students and Faculty of the impact of switching between distance learning formats in response to COVID-19 pandemic

Dear Dr. Gerber:

Thank you for your responses to a previous review of the study listed above. These responses are eligible for expedited review under OHRP (DHHS) and FDA guidelines. This is to confirm that I have approved your application.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You may conduct your study as described in your application effective immediately. The study is subject to renewal on or before June 11, 2021, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 108-282-4723; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP Human Subjects Chair

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Dissertation Abstract--Idaho State University (2021)

Introduction: In early 2020, the COVID-19 pandemic caused a majority of in-person higher education, including physical therapy professional education programs, to shift content delivery formats allowing for social distancing to decrease spread of the virus. The purpose of this investigation was to discover physical therapy student and faculty perceived impact from changing to a hybrid program format from a previously utilized synchronous videoconferencing distance-education delivery format.

Methodology: A qualitative case study design was chosen for this investigation bounded by the time of switching formats due to the pandemic. Physical therapy students and faculty participated in an agreement survey and semi-structured interviews. Survey and interview data was coded and analyzed to form categories and themes of discovered perspectives.

Results: Students and faculty perceived, after changing learning formats, student proficiency of hands-on skills were negatively affected, cross-campus student and faculty interactions improved, and faculty found their teaching improved as they worked to engage students in the new format. Students and faculty felt changing formats would not result in detrimental effects on students' overall learning nor on their career potential as physical therapists.

Discussion: Switching distance-education formats allowed physical therapy students to continue progression of their education. Although an expedited change of formats was successful during the COVID-19 pandemic, a methodically planned, pedagogically based, and well-researched approach in changing formats would likely improve results together with emphasis placed on the following educational traits learned from this investigation. Physical therapy educators utilizing

distance-education models should consider and adjust timing of hands-on skill instruction to match didactic content to encourage better connection and clinical application. Educators should reflect on their current teaching and content delivery methods to discover possible improvements for engagement and to ensure focused content. Educators must also foster more interaction with students, especially at a distance, who may feel alone in their education. Interaction between distance-separated cohorts can reduce feelings of competition and inequality between campus locations and create improved learning environments and communities.

The Impact of Changing Distance-Learning Delivery Formats

in Physical Therapy Professional Education

Chapter I: Introduction

Technological advances in higher education have been introduced at a rapid pace often without concomitant evidence of their effectiveness (Forde & Gallagher, 2020; Kirkwood & Price, 2013; Sandars et al., 2015). As technology progresses it often finds its way into education (Amirault, 2012). Innovation in education technology has been driven by what is popular, by the latest fad, or by increasing convenience to students and/or educators (Kirkwood, 2014; Sandars et al., 2015). Education programs and educators face internal and external pressure to adopt technology to keep up with other like programs utilizing the latest technologies (Amirault, 2012). Programs feel pressure from students who expect a level of advanced technology when making enrollment decisions (Amemado, 2014; Amirault, 2012; Guze, 2015; Kirkwood, 2014; Mellander, 2012). Institution leaders, faculty, and teaching support personnel face difficult tasks of selecting and implementing forms of technological advances in their courses and programs to increase pedagogical potentials (Amirault, 2012). These selection and implementation processes likely repeat as technology progresses in search of a "best" educational model or format.

Often referred to as the "Ivory Tower," higher education institutions are forced to become flexible and dynamic in adapting to advances in technology. Technology is alluring to educators, administrators, and students alike (Amirault, 2012). Newer innovative methods claiming benefit must be analyzed for effective use of pedagogy through investigation (Colbert & Chokshi, 2014; Kirkwood & Price, 2013; Taneja et al., 2018). Integration of technology-enhanced learning should be completed only after examination of the educational environment to determine how the environment is altered positively or negatively with newer forms of technology (Amirault,

2012; Kirkwood, 2014; Kirkwood & Price, 2013, Sandars et al., 2015). Unfortunately, technology often serves as a motivation and driver for changing instruction rather than a tool instructors use to teach more effectively (Kirkwood & Price, 2013; Colbert & Chokshi, 2014). Application of technology cannot replace the process of studying how innovation contributes to educational achievement (Kirkwood, 2014) which is not dependent on the medium by which the education is carried (Clark, 1983). In addition, financial costs of changing to technology-enhanced forms of content delivery must be considered as funding for higher education decreases (Amirault, 2012).

Healthcare education faces internal and external pressures to embrace technology. This pressure is heightened due to increasing usage of advancing technology in healthcare practice (Colbert & Chokshi, 2014; Curnow, 2017; Guze, 2015). Unfortunately, innovation in healthcare education is often driven by economic and popular trends that do not follow educational theory (Colbert & Chokshi, 2014; Sandars et al., 2015). Technology-driven education in doctoral level physical therapy programs is rare, but has been suggested as needed for future improvement and innovation (Wojciechowski, 2015). Formats for distance learning in physical therapy include online course design, hybrid-learning formats, and synchronous videoconferencing between distance-separated locations (Divanoglou et al., 2018; Lazinski, 2017; Volansky, 2019). It will be imperative for educators to show evidence of efficacy and positive impact on learning as programs and educators embrace distance learning and other technologies in hands-on education programs like physical therapy (Guze, 2015; Volansky, 2019).

Many investigations, seeking to determine efficacy of distance learning in education, compare distance formats with face-to-face formats (Hortos et al., 2013; Oz, 2010). An emerging form of content delivery is synchronous videoconferencing. The effectiveness of synchronous

videoconferencing has been shown in several fields of study including medical and allied health disciplines (Ahmet et al., 2018; Carter & Heale, 2010; Hortos et al., 2013; Kunin et al., 2013; Moridani, 2007; Oz, 2010; Sadoski & Colenda, 2010). Synchronous videoconferencing has shown to be an effective method of providing needed education to students in rural locations, and has been effective in decreasing costs to students and institutions (Divanoglou et al., 2018; Doggett, 2007). Even though there is a lack of evidence of the effectiveness of synchronous videoconferencing delivery in doctor of physical therapy education, there are at present six doctor of physical therapy programs in the United States utilizing this technology to link host and satellite campuses for content delivery. These programs are located at the University of Oklahoma (University of Oklahoma Health Sciences Center College of Allied Health, n.d.), Shenandoah University in Virginia (Shenandoah University, n.d.), Texas Tech University (Texas Tech University Health Sciences Center, n.d.), Central Michigan University (Central Michigan University of Health Professions, n.d.), the University of Kentucky (University of Kentucky College of Health Sciences, n.d.), and Idaho State University (Idaho State University Physical Therapy, n.d.).

Program level hybrid models have emerged as a distance-learning alternative to traditional face-to-face delivery in physical therapy education (Lazinski, 2017; Volansky, 2019). Many courses, within physical therapy programs may use hybrid (flipped or blended) models of content delivery. These models utilize electronic or online delivery capabilities outside of the traditional classroom. Electronic or online learning is followed by in-person sessions to further apply and/or develop understanding of content (Eddow, 2017). Hybrid programs in physical therapy education are designed to deliver their entire curriculum in a blended manner (Lance, 2012; Luyegu, 2018; Volansky, 2019). Students learn all didactic content at home and then travel

to campus locations to attend periodic weekend or longer intensive sessions. Intensive sessions allow for learning, practice, and performance of practical hands-on skills that are crucial to physical therapy (Cherry & Blackinton, 2017; Lazinski, 2017). Complete program delivery through hybrid methods began at Nova Southeastern University initially accredited in 2011 (Commission on Accreditation in Physical Therapy Education, n.d.; Nova Southeastern University, n.d.). South College, initially accredited in 2017 (South College, n.d.), Baylor University with initial accreditation in 2019 (Baylor University, n.d.), and the University of Southern California (USC) hybrid program, initially accredited in 2017 (University of Southern California, n.d.; Volansky, 2019) have joined Nova Southeastern University in developing accredited hybrid programs of physical therapy education (Commission on Accreditation in Physical Therapy Education, n.d.). Additionally, Franklin Pierce University, with campuses in New Hampshire and Arizona have recently applied for accreditation to move to a hybrid format which they plan to begin in 2021 (Franklin Pierce University, n.d.). Although gaining in popularity due to flexibility of living and studying at home, there is little published evidence of the educational efficacy of these hybrid models.

Comparing distance-learning formats with face-to-face methods is common, although not widely studied in physical therapy (Eddow, 2017; Fritz et al., 2019; Manton, 2016). Comparing two forms of distance learning is not as common. Investigation between two forms of distance learning in doctor of physical therapy education utilizing the same student cohort and faculty is difficult. Most programs will not change delivery formats during a program of study. In the spring of 2020, a worldwide pandemic forced higher education institutions to make changes to the "status quo" of content delivery. As "social distancing" and "stay at home" orders became the norm, in an attempt to slow the spread of the COVID-19 virus, institutions began to operate

mostly through online content delivery (Centers for Disease Control and Prevention, n.d.; Lederman, 2020). While physical therapy programs moved to online delivery, most programs were switching to online from face-to-face delivery formats.

The doctor of physical therapy program at Idaho State University transitioned from a synchronous videoconferencing format to an online, hybrid-delivery method. Like most physical therapy programs, the Idaho State University physical therapy curriculum included didactic and extensive hands-on practical skill content. Hands-on skills, similar to the didactic content, were taught in-person at each campus location. An instructor at one location would instruct the skills, for both the students at the instructor's location and those at a distance, through synchronous videoconferencing technology. Secondary instructors and lab instructors, at each location, assisted in supervising the practice of the skills. Teaching of hands-on skills, which is accomplished in-person, was rendered improbable due to the switch to online delivery and the need for social distancing. Practical skills needed to be taught and practiced after students and faculty could again meet in-person for instruction. Didactic content, without associated hands-on practical content, was emphasized during online delivery, and plans were made to teach the practical skills later in intensive hands-on sessions; in essence, the program changed to a hybrid model of instruction (Lazinski, 2017). This unusual and extreme circumstance, of distance-learning delivery change with the same cohort of students and their faculty, allowed an opportunity to gain student and faculty perspectives on such a change and a unique comparison of two distance-learning formats.

Statement of Problem

While searching for best practices and models of teaching, technology is often looked to as a panacea in education improvement (Colbert & Chokshi, 2014). Advances in technology

have allowed for increased usage of distance learning in higher education (Guze, 2015; Volansky, 2019). Internal and external factors and motivations push institutions of higher education to embrace newer forms of technology (Amemado, 2014; Amirault, 2012; Guze, 2015; Kirkwood, 2014; Mellander, 2012). Technological advances in education abound without concomitant evidence of effectiveness (Colbert & Chokshi, 2014; Sandars et al., 2015). Institutions adopt them based more upon their features than on pedagogical principles (Colbert & Chokshi, 2014).

Distance learning has increased in utilization and popularity (Colbert & Chokshi, 2014; Curnow, 2017; Guze, 2015; Sandars et al., 2015). Traditional higher education models utilize face-to-face learning taught in single campus-based locations. Distance learning expands the walls of brick and mortar facilities, and allows students more flexibility in education location and format (Amirault, 2012). Although flexibility and reach are increased, debate about effectiveness of distance learning continues (Amirault, 2012; Sandars et al., 2015). Studies have compared face-to-face learning to distance-learning formats (Bertsch et al., 2007; Cherry & Blackinton, 2017; Eddow 2017; Fritz et al., 2019). Few studies have compared two distance-learning formats together with a consistent cohort of students (Fritz et al., 2019; Young et al., 2010). Clark (1983) professed that teaching methods determine learning not the medium used. However, changing between delivery media is likely to impact student learning as faculty teaching methods may change out of necessity to fit new delivery formats.

More evidence is needed to support increased technology use in higher education (Amirault, 2012; Sandars et al., 2015). This is also true in doctoral level physical therapy education (Koehler, 2016; Manton, 2016). A majority of physical therapy programs in the United States continue to utilize traditional face-to-face methods for content delivery (Commission on

Accreditation in Physical Therapy Education, n.d.). Due to increasing demand for increased

numbers of physical therapy programs, limited educational space, and increasing costs of

physical therapy education without comparable increases in beginning physical therapist salaries,

several programs have moved to distance-learning platforms in attempt to decrease external

pressures programs face (Shields & Dudley-Javoroski, 2018). Unfortunately, there is little

evidence of efficacy, appropriateness, preference, and benefit of program-level distance-learning

models in physical therapy education. This study will contribute to the minimal existing evidence

by investigating the impact of changing between two separate distance-education formats felt by

a cohort of doctor of physical therapy students and their faculty.

Purpose of the Study

The purpose of this exploratory qualitative case study was to obtain student and faculty

perceptions of the impact an unusual circumstance of expeditiously switching between two forms

of distance-learning formats, without extensive planning, had on physical therapy professional

education. Students and faculty from the Idaho State University Doctoral Program in Physical

Therapy were invited to participate in this investigation. Idaho State University's physical

therapy program has two campus locations. The home campus is located in Pocatello, Idaho and

the distant campus is in Meridian, Idaho. A synchronous videoconferencing format was utilized

to deliver content between locations. The COVID-19 pandemic in 2020 created circumstances

that necessitated institutions of higher education to deliver content online to decrease the

possibility of community spread of the virus (Centers for Disease Control and Prevention, n.d.;

Idaho State University Coronavirus, n.d.). Idaho State University's physical therapy program

moved to online delivery to allow students to continue their progress in the physical therapy

program. This switch created a content-delivery media-format change from synchronous

videoconferencing to a hybrid format of delivery (Lazinski, 2017). The hybrid format included didactic content presented online while hands-on practical content was delayed until classes could resume face-to-face in physical locations. For a professional program to change its format of delivery in the middle of a study program was rare and unusual in higher education.

An exploratory qualitative case study design was appropriate for this investigation. The case study design informed the investigator of student and faculty perspectives of the impact of switching distance-learning formats (Yin, 2018). This case study included in-depth investigations bounded in time and activity in a real-world context of higher education during the unusual and unprecedented phenomenon of forced change of educational-delivery format (Yin, 2018). Data collection was completed utilizing a web-based agreement survey sent to all first-year doctor of physical therapy students. Purposive semi-structured interviews of first-year doctor of physical therapy students and faculty followed (Miles et al., 2014). Data accumulated was coded, compared, and emerging categories and themes were reported (Saldaña, 2016). Student and faculty interviews along with the more wide-reaching agreement survey data provided triangulation through multiple variables and data collection procedures (Creswell, 2014; Yin, 2018).

Theoretical Framework

The theoretical framework supporting this study comes from Richard Clark's theory of instructional design (Clark, 1983). Clark's theory is based on his work demonstrating that the use of media or technology itself does not provide educational achievement. Achievement is more reliant on education delivery and pedagogy than the medium on which it is carried. Clark led the charge in bestowing credit to media in bolstering educational achievement. He stated:

The best current evidence is that media are mere vehicles that deliver instruction but do

not influence student achievement any more than the truck that delivers our groceries

causes change in our nutrition. Basically, the choice of vehicle might influence the cost or

extent of distributing instruction, but only the content of the vehicle can influence

achievement. (Clark, 1983, p. 445)

In this analogy, the method of content delivery is most important for educational achievement,

not which medium, or technology, is utilized to deliver the content. Clark emphasized the cost of

delivery and its reach. These are both qualities that factor into decisions about distance-learning

technologies. Clark stated when educational achievement is improved after a medium change,

this improvement is due, not from different media format, but due to different content delivery or

pedagogy employed with new media-usage formats. Thus, it is not media, but change in the

teaching that changes learning (Clark, 1983). In 1994, Clark defended his position by professing

that "media will never influence learning" (Clark 1994, p. 21).

Clark's assertions have been debated since his seminal report was published in 1983, yet

his base assertions that it is the delivery and not the carrier of delivery that affects educational

achievement have not been disproven (Koehler, 2016; Martin, 2016; McDermott, 2016; Selhorst,

2016; Steere, 2017). According to Clark's work, changing distance-learning formats within a

current program in physical therapy education should not adversely affect educational

achievement of physical therapy students. This assumes that teaching delivery and pedagogy are

preserved. It is beyond the scope of this study to measure educational achievement or program

effectiveness, but utilizing the assumptions of Clark's instructional design theory, of equal

achievement despite media differences, is important to discover perspectives of students and

faculty on the impact of changing distance-delivery formats.

Research Questions

As advances in distance-learning technology continue, it is imperative to seek evidence and information about the impact of distance-learning formats in physical therapy education (Volansky, 2019). This case study provides comparative perspectives from students and faculty forced to make a change between two forms of distance learning due to the worldwide COVID-19 pandemic in early 2020 (Idaho State University Coronavirus, n.d.). This study capitalized on a rare opportunity of studying two distance-learning formats with the same cohort of students and faculty members (Yin, 2018). Most explorations comparing distance-learning formats either compare face-to-face content with a particular distance-learning format, or study two separate cohorts with different formats (Hortos et al. 2013; Jones et al., 2010). Two distance-learning formats were compared in this study with the same group of students: synchronous videoconferencing utilized initially by Idaho State University's doctor of physical therapy program and a hybrid delivery model necessitated in order to decrease spread of the COVID-19 virus. This investigation included survey and selective semi-structured interview data to answer the following research questions:

Q1. What are student perspectives of the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Q2. What are faculty perspectives on the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Student and faculty perspectives of the experience of switching delivery systems, positives and negatives between formats, and overall impressions of the modes of delivery assist in adding

evidence for the utility of these distance-learning methods in physical therapy education. This exploration adds to current sparse evidence of distance learning used in physical therapy education (Manton, 2016; Volansky, 2019).

Significance of the Study

Distance learning has increased in prevalence in higher education and is emerging in doctoral of physical therapy education. It is imperative to learn student and faculty perspectives of its use and utility (Manton, 2016; Volansky, 2019). Opportunity to investigate faculty and student perspectives during an unusual event of switching from one form of distance education to another in the middle of a professional education program is unprecedented. Most comparisons of distance-learning formats occur between face-to-face learning formats and distance formats (Hortos et al. 2013; Jones et al., 2010). These comparisons often involve separate cohorts or faculties. Understanding the impact of this change on faculty and students can inform educators and programs of the viability of either form of medium for content delivery. According to Clark's information technology theory, as education delivery remains consistent, the medium used, should be of no effect to achieved learning (Clark, 1983).

Information obtained from this dissertation adds to current sparse evidence in physical therapy education of two forms of distance education, synchronous videoconferencing and hybrid program design (Divanoglou et al., 2018; Lazinski, 2017; Young, 2010). This information provides physical therapy educators, currently utilizing these models, with added insight of student and faculty perspectives regarding these models. This dissertation may assist other programs seeking to embrace distance-education methods with additional information in the selection process of which methods are feasible for their institutions. Faculty and administration

at Idaho State University have more insight into student and faculty perspectives toward the use of synchronous video-conferencing formats, but also gained insight into hybrid program benefits.

Searching for the most effective and best methods of educating students in physical therapy is likely a never-ending quest (Manton, 2106). Learning the perspectives of students and faculty, due to the unusual circumstance of changing formats and its impact, is valuable for educators to learn both about change and about distance-learning format differences. Distance learning has increased the potential for higher education to increase its reach as students are not required to be co-located with their instructors (Amirault, 2012; Colbert & Chokshi, 2014; Curnow, 2017). Unfortunately, institutions often adopt technology-driven educational changes without assuring their consistency with educational pedagogy or without concomitant evidence of effectiveness (Colbert & Chokshi, 2014; Sandars et al., 2015). In physical therapy education, examples of programmatic distance-education formats are few and evidence of their effectiveness and success is sparse (Koehler, 2016; Manton, 2016). Outcomes of this study add to limited evidence of distance-learning formats in doctoral level education in physical therapy. Physical therapy education programs may gain justification from student perspectives for newer delivery formats that appeal to digitally adept students and assistance in competing for these students' interest (Manton, 2016; Volansky, 2019).

Summary

Distance-education models possess many popular and appealing features for faculty and students (Amemado, 2014; Kirkwood, 2014; Luyegu, 2018; Mellander, 2012). Education programs in health care fields have increased usage of distance education (Guze, 2015).While these innovative formats are popular and in demand they are often utilized in higher education without evidence of pedagogical benefit (Colbert & Chokshi, 2014; Sandars et al. 2015). It is

important for educators and institutions of higher education to demonstrate evidence of efficacy and utility in their choices to use technological advances in education (Amirault, 2012).

Professional programs in physical therapy education have begun to embrace distance education in multiple forms (Lazinski, 2017; Volansky, 2019). Distance-education formats allow for greater geographical reach and increased flexibility for educators and students (Amirault, 2012; Luyegu, 2018). There is sparse evidence of efficacy of these programs in physical therapy education. The doctor of physical therapy program at Idaho State University utilized a synchronous videoconferencing format where students learn in two distance-separated campuses in Idaho (Idaho State University Physical Therapy, n.d.). During the worldwide COVID-19 pandemic in the spring of 2020, Idaho State University's program in physical therapy, like many others, were forced to move all didactic content to an online distance-education format with students learning at their homes (Idaho State University Coronavirus, n.d.). As physical therapy is a hands-on profession with hands-on training, this change created a need to further modify delivery to a hybrid-learning program delivery format. Hands-on skills were learned through intensive hands-on practical activities when the campus was able to again conduct face-to-face sessions (Lazinski; 2017; Luyegu, 2018).

Perspectives of students and faculty, who experienced this unusual circumstance of switching from one distance format to another, were obtained, analyzed, and triangulated to discover consistencies and themes (Cresswell, 2014, Saldaña 2016, Yin, 2018). These perspectives may be valuable for educators currently working in distance-education content delivery programs and for those who are considering adopting distance-education strategies.

Chapter II: Review of Literature

Technology is ever changing. It is common to strive to find better, more efficient ways to accomplish tasks. In education, study of best methods of content delivery for student engagement is ongoing. With changes in the mode and ability to deliver content, sage on the stage ideals of early education have changed to power points, video clips, memes, and other technology and computer driven methods to guide students more on the side. Are these new methods effective in delivering content to today's students? Kezar (2018) noted, "to change a method of teaching is not as simple as knowing the new mode of teaching one wants to put into practice; it also means unlearning the values associated with the existing mode of teaching" (p. 57-58). Introducing a new classroom or curricular model does not automatically produce results or allow teachers to teach effectively.

Davis (2011) related an experience he had after viewing a lecture in a "new" technology outfitted classroom:

As the group returned to their offices or headed off to class, a colleague commented, "Socrates could not teach here." I asked him for a clarification because I wanted to be sure that I completely understood his comment. The professor explained that with the addition of the new technology it appeared that the focus was not on teaching but on the equipment. He went on to say the technology might even have been an impediment to the instructional process. To his way of thinking distance education was no substitute for the face-to-face interaction; with which he had grown accustomed, nor was having all of the technology at one's fingertips a guarantee of better instruction. (p. 2)

Urges to accept new and "seemingly better" technology is a temptation that may stem from multiple motivations. All stakeholders involved in decisions to adopt new technology must determine if new models will fulfill desired results and consequences.

Defining technology in education could seemingly be an impossible or an all-encompassing process. Beginning with slate blackboards being replaced by dry erase marker white boards and now smart boards and tablets, technology has changed many facets of education. With advances in computer and telecommunication technology, education across distance is more widely available (Amirault, 2012). Clark's theory of instructional design professes that educational improvement is dependent upon content taught, not the medium by which it is delivered (Clark, 1983). Embracing this theory suggests that new technologies will not result in better education unless the content presented resulted in better education.

Focus of the initial portion of this literature review will be on the technology of distance learning. First, forms of distance learning and definitions will be presented. An investigation of the prevalence of distance learning courses will follow. Investigation of distance learning will conclude with possible motivations and benefits institutions may find in distance learning methods. After setting a background for technology and distance learning, a review of physical therapy education will follow focusing on curriculum requirements, competition in admissions to physical therapy programs, and cost and salary difficulties of physical therapy graduates seen in the United States today.

A second section of this literature review will present literature demonstrating the effectiveness of hybrid methods in medical and healthcare education. Then information focusing on physical therapy hybrid programs will follow. A similar investigation into institutions utilizing synchronous videoconferencing for medical and healthcare education and information

on synchronous videoconferencing in physical therapy programs will be presented. This review will present the limited literature that exists in describing synchronous videoconferencing and hybrid programs in professional physical therapy education. Although limited, there are recent examples of programs utilizing these technologies to expand the walls of brick and mortar host-campus locations for physical therapy programs.

Distance Learning

Definitions of Distance Learning

When discussing distance learning and its prevalence in higher education it is important to define terms. Seaman et al. (2018) defined distance learning as:

> Education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously.
>
> Technologies used for instruction may include the following: Internet; one-way and two-way transmissions through open broadcasts, closed circuit, cable, microwave, broadband lines, fiber optics, satellite or wireless communication devices; audio conferencing; and video cassette. DVDs, and CD-ROMS, if the cassette, DVDs, and CD-ROMS are used in a course in conjunction with the technologies listed above. (p. 5)

The authors continue with a definition for a distance-learning course as, "A course in which the instructional content is delivered exclusively via distance education. Requirements for coming to campus for orientation, testing, or academic support services do not exclude a course from being classified as distance education" (p. 5).

As this investigation is related to physical therapy education, it is appropriate to consider definitions from the accrediting body for physical therapy education. The Commission for the

Accreditation of Physical Therapy Education defines a distance-learning program in physical

therapy education as:

>   A program in which 50% or more of the required courses (not including clinical
>
>   education courses) are distance-education courses. Instruction occurs synchronously
>
>   and/or asynchronously, with regular and substantive interaction between students and
>
>   instructor(s) to achieve program goals and course objectives. (Commission for the
>
>   Accreditation of Physical Therapy Education, 2019, p. 21)

Distance learning can exist in many forms and has evolved. Amemado (2014) cited four

generations of distance learning. The first generation was that of printed material sent as a

medium of correspondence. Next came the multimedia age with radio, television, and video

joining print for educational purposes. The third generation began with the advent and rise of

computers. Widespread use and development of the internet ushered in the fourth generation that

increased available resources and capabilities for flexibility in distance-education delivery and

learning. This mode of delivery continues to develop with continuous introduction of new

applications. Through these developments massive open online courses (MOOCs) were

introduced to provide increased access to educational experiences via utilization of multimedia

internet capabilities. Amemado suggested MOOCs represent a newer and possibly fifth

generation of distance education.

   As generations of distance learning have progressed, questions remain of the

effectiveness of these educational methods. Tanja et al. (2018) reported:

>   Education plays an important and critical role globally in developing a skilled workforce.
>
>   For many decades, the use of textbooks has been the traditional method of instruction;
>
>   however, the emergence and implementation of teaching effectiveness assessment

techniques has revealed that most students do not absorb the course content up to the

expected level. As a result, many researchers have focused on advancing and improving

the existing learning methods, as well as introducing and experimenting with new

teaching styles. Unfortunately, researchers have been unable to agree on the effectiveness

of the new teaching methods; consequently, they require further investigation. (P.2)

It is not likely there is one proven delivery medium most effective in education. Clark (1994)

theorized that the medium used for education does not lead to achievement. The instructional

methods lead to educational achievement. He cited that there is often much enthusiasm about

new media that encourages adoption and reliance and that any influential method of teaching can

be carried by any technology medium (Clark, 1983; Clark, 1994). Kirkwood and Price (2013)

discovered most reports detailing adoption of technology failed to address specific educational

problems or lacked emphases on an educational focus. A majority of reports incorporated

innovation as experimentation. The authors reported they found educators asking, "'What can I

use this technology or tool for?' Rather than 'How can I enable my students to achieve the

desired or necessary learning outcomes?' or 'What forms of participation or practice are enabled

for learning?'" (p. 332). Emphasis has been placed on embracing technology as a motivation for

change, not the improvement of education of students. Technology itself does not lead to better

education (Clark, 1983; Kirkwood & Price, 2013).

While facing internal and external pressures to adopt technology and distance-learning

capabilities, institutions and programs have balanced innovation with ensuring fulfillment of

their educational missions (Amirault, 2012). Institutions also have a new 'breed' of students who

have vast experience with technology (Amirault, 2012, Guze, 2015). The push and drive to

adopt new technologies have often been accomplished without concomitant focus on pedagogical design and principles (Colbert & Chokshi, 2014; Sandars et al., 2015)

Distance Learning Statistics

Decreases in overall enrollments in institutions of higher education with concurrent growth in distance learning enrollments are reflected in the 2018 Babson Survey Research Group report on distance education in the United States. Between 2012 and 2016 overall enrolments in higher education decreased 3.8% or by a net of 804,240 students. The majority of this drop was experienced in for-profit institutions and public two-year institutions that lost 631,618 students and 951,700 students respectively. Public four-year and private non-profit institutions (two and four-year) grew in enrollments by 779,078 students. Over the same time interval, distance enrollments increased 17.2% or an increase of 933,715 students taking distance-education courses. A majority (68.9%) of distance learners were enrolled in public institutions according to 2016 data.

As the above data demonstrates, decreasing overall enrollments and increases in distance learning have resulted in decreased on-campus "traditional" (non-distance education) enrollments. Between 2012 and 2016, there was a total decrease in all sectors of higher education of 1,173,805 on-campus students. "On average, this translates into 250 fewer on-campus students for each higher education institution" (Seaman et al., 2018, p. 26). With increased technology and usage of distance learning, this trend has likely continued. At Idaho State University, from 2013 to 2019, overall enrollment decreased by 4,140 students or 21.7%. The percentage of students enrolled in distance-learning courses rose 6% over this same period of time, from 49% in 2013 to 55% in 2019. The number of student credit hours taken via distance rose by 18,480

hours. This represents a gain of 24.5% of total distance-credit hours or 34% of total credit hours taken in 2019 (personal communication Vince Miller, March 9, 2020).

There has been a large rise in the percentage of graduate students taking courses via distance learning. In 2013, at Idaho State University, this percentage was 43% and in 2019, this percentage had grown to 70%. However, between 2013 and 2019 the total number of graduate students decreased by 55.8% or by 2,899 students (personal communication Vince Miller, March 9, 2020). These statistics represent an overall decreased enrollment of graduate students, but shows an increased prevalence of graduate distance-education courses delivered at Idaho State University.

Motivations for Utilizing Distance Learning

With increased of distance-education technology, it is imperative that effectiveness of learning methods is ensured (Colbert & Chokshi, 2014; Kirkwood & Price, 2014). Continuous future expansion of distance-education technology is expected. In a 2018 Enrollment Management Report article entitled, "Six reasons the United State will continue to lose international students market share," Marguerite J. Dennis wrote about the impact of technology:

> There will probably be no greater impact on worldwide higher education than the integration of technology into educational delivery methods. The internet has rendered geography irrelevant, and digital options, especially in India and certain countries in Africa, are changing the way education is consumed.
>
> The high cost of studying in the U.S. and the reluctance of many U. S. colleges and universities to embrace online learning and massive open online courses will continue to erode America's market share of the globally mobile student. (Dennis, 2018, p. 3)

Increasing technology may be crucial for the future of education. With decreasing numbers of on-campus students and decreased utilization of traditional education face-to-face methods, institutions and the education system in the United States will need to adjust and may be motivated to include new and innovative methods of technology use (Dennis, 2018).

Motivations for introducing technology-enhanced learning are many. Decisions to utilize distance-technology methods may be student driven, geographically determinate, necessitated by situation, institutionally driven, or driven by institutional governing boards (Amirault 2012, Bazylchuk et al., 2018; Divanoglou et al., 2018; Mellander, 2012; Pugmire, 2020). Students growing up with constant access to computers, cell phones, and the internet have utilized emerging internet-based technologies for obtaining instant information for much of their lives (Colbert & Chokshi, 2014; Guze, 2015). The drive for increasing technology in classrooms is partially driven by changes in the habits and technology backgrounds of students (Colbert & Chokshi, 2014; Guze, 2015; Volansky, 2019). For most of these digital world students, utilizing technology is a way of life, not just a tool to use and it would be natural for students today to have comfort with and expect technology and digital means in the classroom (Colbert & Chokshi, 2014; Henderson et al., 2017).

Ability to access technology in a course affects the rapport students have with teachers as demonstrated by Stowell et al. (2018). Students were invited to view sample syllabi that only varied in the allowance for use of students' personal technology devices. Syllabi that included policies discouraging use of electronic devices had negative effects on student perceptions of the course and instructor. Other syllabi allowing or even encouraging use of technology resulted in positive student perspectives. Students today expect to use their devices in class. Many students

utilize technology frequently and, when it is present in the classroom, may not be as intimidated as those who do not use technology as frequently.

Situations at institutions of higher education may dictate distance-technology use. Space and access may influence the use of technology in content delivery. The University of Central Florida began online distance course use in the 1990s to reach students that far from campus. However, many students living closer to campus were attending these courses due to a decreased in face-to-face classroom availability (Mellander, 2012). At Brigham Young University, a proposal to require all students to take fifteen credits online was developed to reduce parking burdens on the campus and local community. As enrollment rises at Brigham Young University, the ratio of 1.73 students per available parking space will rise. Utilizing online course technologies may assuage some of the limited parking burden and thus improve relations with the neighboring community (Pugmire, 2020).

Government influence also affects distance-education practices. In Australia, much emphasis has been placed on providing education to rural locations. Distance education has figured heavily in a number of fields (Divanoglou et al, 2018) In the Ukraine, new methods of delivery have been utilized, including distance methods, to meet an emphasis of promoting "the demands of social and economic development of society" (Bazylchuk et al, 2018, p. 606). Healthcare education in the state of Idaho is primarily located in Pocatello at Idaho State University. Pocatello, Idaho is more rural with fewer health care resources than the bigger Boise metropolitan area. Idaho State University opened a satellite location in Meridian, Idaho (located within the Boise metropolitan area) to capitalize on health care resources and a larger population base. This expansion led to increases in enrollment of the programs housed at Idaho State University. The state board of education supported this move and expansion. Now a number of

programs, including physical therapy instruct in both the Pocatello and Meridian areas via distance-education technologies (Idaho State University Meridian, n.d).

Benefits of Distance Learning

There are a number of benefits that institutions cite for introducing distance-education technology. Increasing access, flexibility, and decreasing cost are common reasons given for adopting these delivery methods (Amirault, 2012, Bass, 2018; Divanoglou et al., 2018; Guthrie, 2019; Henderson et al., 2017; Lei & Lei, 2019; Kirkwood, 2014; Kirkwood & Price, 2013, Volansky, 2019). These justifications for innovation may display altruistic ideals, but, in reality, likely result in higher enrollments and in turn more funding to institutions that they would otherwise have difficulty achieving (Amirault, 2012). In distance learning, walls of brick and mortar facilities do not limit the number of students that can participate in a given course (Amirault 2012, Volansky, 2019). This in turn increases access to education. Technology also allows for recording of lectures and flexibility to view them multiple times at students' convenience (Volansky, 2019). As students can view lectures on a variety of devices and do work at a distance which includes their homes, in many cases, students are spared from carrying heavy textbooks to and from campus (Henderson et al., 2017).

Lei and Lei (2019) cited benefits of distance learning that included student access to course instructors. Students are able to catch up on missed coursework and watch recorded lectures if they were unable to attend the course. Instructors noted an ability to provide content that fit multiple learning styles and not just relying upon traditional face-to face models of instruction. For large section general education courses, which were often times poorly attended face-to-face, the distance model increased class attendance. The distance model was also able to decrease time in class as learning activities could be provided asynchronously outside of class

time. Course scheduling flexibility increased and the authors reported that student retention was improved in these courses. The authors were careful to point out that not all students may flourish in this type of setting. Students who are more active learners and self-motivated performed better than others.

Henderson et al. (2017) sought student perceptions of the benefits of technology-enhanced distance learning. Students reported that the most useful aspect of digital technologies, in their learning, was the "role of digital technology in organizing and managing the logistics of studying" (p. 1570). This proved to be timesaving and assisted students staying on track with course content to meet deadlines and assignment due dates. Interestingly, students did not relate benefits of being explicitly linked to learning activities more than just organization and management. The following table (see Table 1) outlines useful benefits for using digital technologies in higher education from the work of Henderson et al. (2017) p.1571, in order of most beneficial to least.

Table 1

Benefits of and Examples of Distance Education from Student Perspectives

Benefit of distance learning	Student examples of benefit
Organizing and managing the logistics of studying	Managing schedules, timetables, fulfilling deadlines and course requirements, 'keeping in the loop' with regards to university news and course information
Flexibility of place and location	Flexibility of location, ability to engage 'remotely' with academic work off-campus, engaging at a distance and not having to be 'present', being able to be mobile, portability of university work
Time-saving	Saving student time, quicker processes, more immediate outcomes, convenient scheduling of activities

Reviewing, replaying, and revising	Catching up on missed material, repeating viewing of materials to improve understanding
Researching information	Researching information for assignments; quantity and quality of information access
Supporting basic tasks	'Easier' writing of assignments; 'easier' and 'helpful' information management and retrieval of resources
Communicating and collaborating	Asking question and exchanging information; working with other students; sharing ideas; preparing group work
Augmenting university learning materials	Watching lectures, tutorials and talks from outside university; cross-checking and comparing with other sources; 'going elsewhere'
Seeing information in different ways	Visualizing concepts through video, animation or annotations; allowing real-time lecturer demonstrations and 'board work' in lectures
Cost savings	Saving money and expenditure

Note. Adapted from "What Works and Why? Student Perceptions of 'Useful' Digital Technology in University Teaching and Learning" by Henderson, M., Selwyn, N., and Aston, R. 2107, *Studies in Higher Education*, *42*(8), 1571. https://doi.org/10.1080/03075079.2015.1007946

Digital Divide

A challenge for all distance-learning formats comes from varying levels of digital proficiency and ability as well as unequal access to equipment and support experienced by students and instructors using these formats. While the internet provides many new opportunities to deliver and receive content, poor internet connection and insufficient equipment have negative effects on students' learning ability (Rowsell et al., 2017). Hegwer (2020) reported:

According to a 2019 Pew Research Center report, 44% of lower-income adults (those

with household incomes less than $30,000 a year) don't have home broadband services.

Nearly half (46%) of low-income Americans lack a computer, and 29% don't own a

smartphone." (p. 19)

Inequality exists in educational opportunity due to digital divide between students who have

technology that allows for uninterrupted content and those who do not. Those living in poverty

often do not have access to the same equipment and may not have the same technological ability

that other more affluent students have. Instructors and administrators who move to distance-

learning formats must be cognizant of digital divide that may exist. As technology has provided

means for greater access to education, for many caught in a divide, increased access to education

may be negated by inequality of technological ability (Rowsell et al., 2017).

Digital divide is not only attributed to insufficient equipment or evident only between

socioeconomic classes but also in gender, ethnicity, and environment. Male students, and those

with more technological-present upbringings, have greater ability than their female and

technological-absent counterparts do. Geographically, technologies may not be available in many

areas (Rowsell et al., 2017). As programs or institutions work to incorporate distance-learning

methods, consideration of potential digital divide is crucial. While digital technology has

demonstrated innovation, as shown by the existence of digital divide, it has not effectively

increased equity of access with increased quality and decreased costs (Hill & Lawton, 2018).

Professional Physical Therapy Curriculum, Admission, and Cost

Clinical doctorate degrees are granted by all professional level physical therapy

professional degree programs in the United States (Commission on Accreditation in Physical

Therapy Education, n.d.). The typical length of professional education for doctoral level physical

therapists is three years of graduate level education with programs varying between two and a half and four years. Students experience both didactic and clinical curricula with approximately 80% spent in didactic in-residence learning and 20% in clinical offsite environments. During didactic curriculum for the physical therapy profession, students learn basic sciences of anatomy, exercise physiology, biomechanics, kinesiology, neuroscience, and pathology. Basic science understanding is then applied through clinical reasoning and evidence-based practice in musculoskeletal, cardiovascular, pulmonary, endocrine, metabolic, and neurologic conditions (American Physical Therapy Association, n.d; Commission on Accreditation in Physical Therapy Education, n.d.; Idaho State University Physical Therapy, n.d.). Physical therapy curriculum also includes ethics, business management and communication content. Clinical components of the curriculum place students into clinical environments under the tutelage of clinical instructors to assist them in furthering the advancement of their clinical skills and education (American Physical Therapy Association, n.d).

Accredited physical therapy program availability has grown from 210 programs in 2017 to 253 programs in 2019 (American Physical Therapy Association, n.d.; Commission on Accreditation in Physical Therapy Education, n.d.). Even with increasing numbers of physical therapy programs, acceptance to accredited physical therapy programs is competitive and demand for physical therapy education is high. For applicants, a central application service is available to facilitate the application process (Physical Therapy Centralized Application Service, n.d.). This central application is the Physical Therapy Centralized Application Service (PTCAS). In the 2017-2018 admissions cycle, 18,359 students submitted 112,373 applications to the PTCAS system. There were 10,400 seats available for programs participating in the PTCAS system. Seven-thousand nine-hundred and fifty-nine students, or 43% of the students applying

for seats in doctoral level physical therapy programs, were not accepted (Physical Therapy Centralized Application Service, n.d.). In comparison, in the 2018-2019 admissions cycle for medical school applications, 59% of applicants did not have a seat available (Association of American Medical Colleges, n.d.) and 45% of dental school applicants in 2018 were not accepted for education (American Dental Education Association, n.d.).

The average number of seats available in individual doctor of physical therapy programs listed in the PTCAS system is 46 (Physical Therapy Centralized Application Service, n.d.). Prior to expanding to Meridian, the Idaho State University Doctor of Physical Therapy program accepted 24 students per year. This was far below the mean number of seats available in physical therapy programs. After expansion to Meridian, Idaho, the program now seats 48 students. This number is much closer to the mean number of seats and doubled the number of students who can be educated in the program. With high demand for therapy education, institutions of higher education may desire to develop physical therapy programs or work to expand their programs. According to a report from the Lumina Foundation, "It is usually easier and cheaper to add students to an existing college—by adding course sections, temporary instructors, portable buildings or leased space, etc.—than to start a new one from scratch" (Johnson, 2014, p. 2).

Students incur much cost for undergraduate and graduate education. Besides obvious costs of tuition and fees, students also often incur other significant costs. With difficulty in gaining acceptance to physical therapy programs, many students do not get their first choice for education and may be forced to uproot to an unplanned location adding cost to their education (Shields & Dudley-Javoroski, 2018; Thompson et al., 2011). In addition to required didactic content, the Commission for the Accreditation of Physical Therapy Education requires at least 30 weeks of full-time clinical experience (Commission on Accreditation in Physical Therapy

Education, n.d). Besides paying for tuition and educational costs of attending physical therapy programs, students are responsible for travel and living expenses while on full-time clinical experiences. As these costs can be significant, student financial means may limit opportunities for clinical experiences. The length of graduate level programs, tuition, fees, supply and textbook costs, affiliation costs, and rigor of programs (that make working outside of school for income rare) are tremendous burdens for many students (Shields & Dudley-Javoroski, 2018; Thompson et al., 2011).

Shields and Dudley-Javoroski (2018) reported that employment in physical therapy is expected to grow 34% in the ten-year period between 2014 and 2024. Salary growth rate between 2007 and 2016 for physical therapists was 2.02%. Growth rate for cost of entry-level physical therapy education was between 4.6% and 6.32% depending on type of institution attended (private versus public institution and resident versus non-resident status). Many graduates leave entry-level programs with high debt and are unable to meet benchmarks for standard loan repayment plans (Shields & Dudley-Javoroski, 2018).

This debt burden, which continues to rise despite lack of congruent rises in entry-level salaries, is very difficult for students and graduates of physical therapy programs. Average student loan debt for physical therapy students is estimated at $92,000. Therapists with ten years of experience, on average, only made $80,000 per year in 2013 (Shields & Dudley-Javoroski, 2018). It has been suggested that loan debt should not exceed starting annual salary (Jette, 2016). Sharon Dunn, President of the American Physical Therapy Association and Dean of Health Professions at Louisiana State University, spoke about physical therapy student debt at the National Physical Therapy Conference in June 2019. She quoted a survey of Doctor of Physical Therapy graduates from 2013-2015 that found, "…that 87% of graduates who had student loan

debt, their average debt was $107,000. For those who also had debt from undergraduate school, that average rose to $124,000. Meanwhile, the median income for an entry-level position is around $70,000" (American Physical Therapy Association, n.d., "2019 Presidential Address," para. 37). These numbers do not provide a positive outlook for the financial well-being of physical therapy entry-level clinicians. Institutions should investigate ways to provide a more economical product to assist students to learn skills without going into crippling debt. President Dunn continued, "Today the cost of education isn't just creating financial instability. It's dissuading and entire generation from a culture of lifelong learning" (para. 49).

It is imperative that physical therapy programs work to keep rising costs of physical therapy education at the forefront of their efforts in expansion, in establishment of programs, and in adoption of technology-driven instructional formats. Investigating alternative teaching models not requiring new construction of brick and mortar facilities that will not significantly drive up costs, but still provide access to education, is crucial (Shields & Dudley-Javoroski, 2018).

Hybrid Programs in Medical and Physical Therapy Education

Hybrid Programs in Professional Medical Education

Hybrid education, sometimes referred to as blended learning, is defined as a course that is a combination of online learning and traditional face-to-face learning (Penn State, n.d.). The definition is very broad and many models exist of hybrid education in courses. Literature lacks examples of medical or healthcare education programs utilizing hybrid methods for entire programs. Individual course designs use hybrid methods within programs, but not full programs. Most of these hybrid courses teach didactic content to be immediately reinforced at the next face-to-face class meeting. Full-program hybrid designs utilized in physical therapy programs teach didactic content to students at home via distance or online means. This teaching may go for

several weeks without face-to-face on campus meetings. Students then travel to the education-originating campuses periodically, during their programs, for lab intensives sessions to learn, practice, and solidify hands on skills (Lazinski, 2017; Nova Southeastern University, n.d.; South College, n.d.). Because this format is different between course and program usages of hybrid educational methods, direct comparison is difficult. Although general knowledge of hybrid course mechanisms is necessary.

Many professional healthcare fields use hybrid, sometimes referred to as flipped classroom designs, in individual education courses. Hybrid classroom methods have been used since the mid-1990s, and allow students to cover didactic content prior to class. Students are then engaged during face-to-face courses in more active learning activities with previously learned-at-home content (Hurtubise et al., 2015). Solidifying content through face-to-face sessions is helpful in learning (Martin et al., 2015). Examples of hybrid course design are found in different healthcare fields including nursing, athletic training, family medicine, pharmacology, orthopedics, and epidemiology (Bates, 2018; Giuliano & Moser, 2016; Hurtubise et al. 2015; Matsuda et al., 2017; Sohn et al., 2019).

Some faculty accustomed to traditional face-to-face methods of education experience difficulties when working in hybrid designs. Persky and McLaughlin (2017) evaluated literature to find common challenges to hybrid learning in medical education. These challenges for faculty included the following: "I have too much content to cover so I can't use the [hybrid] classroom" (p.235); "Students need to read this book chapter before class but they don't do it!" (p.236); "I don't know what to do in class if students are learning the information ahead of time" (p.236); "When facilitating class, I get anxiety because I feel I might lose control of the class" (p.236); "Students don't seem engaged—they are spending time on social media rather than engaging in

class activities" (p. 237). Persky and McLaughlin affirm with any new format, there are difficulties in implementation. Beyond implementation difficulties, student adjustment to new formats may also prove to be a difficulty. Zhenh and Zhang (2020) found students who engage in higher levels of self-regulation in learning obtain higher achievement in hybrid classroom designs. Faculty members may be hesitant to employ hybrid classroom methods due to difficulties in modifying course delivery and due to beliefs that students may not be able to self-regulate sufficiently for hybrid methods to be effective.

Hybrid Models in Programs of Professional Physical Therapy Education

Considering the aforementioned financial difficulties and challenges in physical therapy education, some institutions have worked to break traditional models and have established new models of entry-level physical therapy education. A number of programs established hybrid alternatives to traditional physical therapy education. This began with the hybrid programs at Nova Southeastern University in Florida (Lance, 2012; Luyegu, 2018; Nova Southeastern University, n.d.). South College (South College, n.d.), Baylor University (Baylor University, n.d.), and the University of Southern California (USC) (University of Southern California, n.d.) have joined Nova Southeastern University in developing alternative methods utilizing hybrid models of education. USC and Nova Southeastern University also have traditional physical therapy school offerings and Baylor University has sponsored a traditional physical therapy education program taught in conjunction with the United States Army for many years. South College has other offerings in healthcare but no additional traditional physical therapy program. Curriculum for these hybrid models utilizes at-home learning of content via technology and distance-learning capabilities. Students are required to attend weeklong intensive sessions at the campuses held several times during a semester (Lazinski, 2017, Luyegu, 2018). The hybrid

program at USC follows the same curriculum as the in-residence program with didactic content

taught concurrently. Tests are administered within twenty-four hours of each other in each group.

The tests have at least 60% of the same questions for each group. Weeklong intensive practical

sessions occur for distance students while the in-residence students are on short, two-week long,

clinical affiliations (personal communication Scott Freedman, February 27, 2020).

South College and Baylor University decrease the overall time of physical therapy

education in their hybrid models to two years allowing students to enter the workforce earlier

(South College, n.d; Baylor University, n.d). Length of time in the hybrid models varies. The

hybrid program at the University of Southern California is a three-year program and

interestingly, the Nova Southeastern program takes four years to complete.

Through these hybrid models, students may be able to decrease costs associated with

moving to the campus location during their time of learning. However, travel costs required to

attend on-campus hands-on intensive weeks may counter or exceed savings realized from

attending via in-home environments. Students would likely consider many possible benefits of

hybrid programs over traditional entry-level education programs. Students would likely be

interested in programs that did not require as much time, offered flexibility of living at home,

and offered a possible lower cost alternative. (Lazinski, 2107; Volansky, 2019). It is unknown

which of these factors would most attract students, but they all exist in hybrid program models

(Luyegu, 2018).

Tuition costs at different institutions vary. Differences exist between state run institutions

and private institutions. Physical therapy educational programs are no different in variance of

tuition and fee costs. Surprisingly, cost differences between hybrid programs and traditional

programs are not significantly different. In order to compare these costs, each of the highlighted

hybrid models above have been matched with similar programs in similar locations to compare tuition and overall costs of the education. Costs of housing and subsistence have not been compared. In two cases, University of Southern California and Nova Southeastern University, the institution offers both a hybrid and a traditional model for entry-level physical therapy education. At the University of Southern California, tuition and fee costs are identical for either model of education. The program costs an estimated $111,000 for the complete three-year program (University of Southern California, n.d.). Nova Southeastern University costs are similar in each model at $91,000 for the 3-year in residence program compared to $89,000 for the 4-year hybrid program. Monetary tuition and fee costs of the two programs are not significantly different (Nova Southeastern University, n.d.).

In comparing the other two institutions, South College and Baylor University, one is compared to a public in-state institution and the other to an in-state private institution. South College in Knoxville, Tennessee was compared to the out of state tuition rate at the University of Tennessee at Chattanooga (University of Tennessee at Chattanooga, n.d.). South College estimated program costs are $83,000 (South College, n.d.) for the two-year program and the University of Tennessee at Chattanooga tuition for three-years for out of state students is estimated at $79,000. Finally, comparing the private religious institution Baylor University in Waco, Texas with the University of the Incarnate Word in San Antonio, Texas (University of the Incarnate Word, n.d.) reveals Baylor's costs at $106,000 for the two-year hybrid program (Baylor University, n.d.). The University of the Incarnate Word's physical therapy program is a four-year in-residence program with the cost of $127,000 (University of the Incarnate Word, n.d.). Comparing per year costs for students at each institution reveals the following costs (See Table 2).

Table 2

Cost Comparison of Hybrid and Similar Location Traditional Physical Therapy Programs

Institution	Per year cost
Nova Southeastern University (hybrid)	$22,250
University of Tennessee at Chattanooga (out of state traditional)	$26,333
Nova Southeastern University (traditional)	$30,333
University of the Incarnate Word (traditional)	$31,750
University of Southern California (both hybrid and traditional)	$37,000
South College (hybrid)	$41,500
Baylor University (hybrid)	$53,000

Three of four institutions using the hybrid model reflect the highest per year costs. The fourth institution, Nova Southeastern University hybrid program utilizes a less common four-year doctor of physical therapy curriculum.

In choosing an institution based on cost, students must consider education costs along with costs of living, moving, travelling, and time when comparing different locations or models. Considering these costs with costs of education will inform students which model may fit their budget and individual circumstances. Costs between the models with added costs of moving or travelling seem to be congruent. The time cost benefit of two-year models would allow students to enter the work force earlier, but initial dollar costs per year may be difficult (South College, n.d.). There does not appear to be any obvious or all-encompassing cost benefit to the hybrid models.

Beyond length of program, where to live, and cost of education, students are often most concerned with educational quality and the ability of students from entry-level programs to pass the National Physical Therapy Examination (Federation of State Boards of Physical Therapy, n.d.). Students are interested in being able to pass the examination; especially on the first attempt. These are statistics that entry-level doctor of physical therapy programs are required to provide to the Commission for the Accreditation of Physical Therapy Education. They are not required to post them on their program websites, although some choose to do so. Utilizing available information, the national average for first-time pass rate was 92% in 2017 and 91.2% in 2018 (Federation of State Boards of Physical Therapy, n.d.). South College reported their first-time pass rate in 2017 at 64.5% and in 2018 at 74.7% (South College, n.d.). These percentages represent the first two cohorts of the program who have taken the examination. Although greatly improved in 2018, both of these averages are far below the national average. The national ultimate pass rate (passing after one or multiple attempts) average were 98.7% and 95.3% in 2017 and 2018 respectively (Federation of State Boards of Physical Therapy, n.d.). South College ultimate pass rate was 90.3% and 85.1% in the corresponding years (South College, n.d.) while the Nova Southeastern University hybrid program ultimate pass rate was 100% in both years (Nova Southeastern University, n.d.). Examining these numbers may suggest the shorter (two-year) South College program is less effective than the longer (four-year) program at Nova Southeastern University. The hybrid programs at the University of Southern California and Baylor University programs are relatively new and do not have national board examination statistics available (Baylor University, n.d.; University of Southern California, n.d.).

Recent research from Nova Southeastern University demonstrated students in hybrid programs achieved satisfactory psychomotor skill development despite decreases in face-to-face

learning exposures in their hybrid programs (Lazinski, 2017). In a qualitative analysis of student

perspectives between traditional and hybrid models, investigators found students in hybrid

models reflected problem-solving, self-initiation in learning, and organizational skills as being

crucial to develop in the hybrid models (Cherry & Blackinton, 2017). Selecting students with

attributes of high motivation, ability to be self-starters, and independent learners may prove to be

crucial in helping ensure success in a hybrid programs.

Hybrid program models of delivery offer advantages over traditional formats in physical

therapy education. The primary benefit is that students do not have to move to a new location for

their education program. Some hybrid programs allow for earlier entrance into the work force.

Individual students who prioritize location, cost, time to degree, and who are motivated and self-

starters may find these programs appealing. While entire programs running through a hybrid

model is appealing and innovative, the results on the National Physical Therapy Evaluation for

newer programs has yet to show equivalence with other traditional programs. Cost savings per

year have not been experienced when compared to similar regional physical therapy programs.

Hybrid formats allow for flexibility and convenience. Flexibility and convenience may prove to

be preferable for individual students.

Synchronous Videoconferencing in Medical and Physical Therapy Education

Synchronous Videoconferencing in Professional Medical Education

A precursor to modern synchronous videoconferencing was introduced at the 1964

World's Fair in New York City. The device was called the Picturephone. Fairgoers witnessed a

transcontinental videophone call from New York to California complete with sight and sound

(Schnaars & Wymbs, 2004). It would be decades before this new format of communication

would be available with technological advances at affordable cost. Now it is common to use

phones for videophone calls with devices carried in one hand. Allowing for both sight and sound, to be seen and heard, in real time over a distance has led to many innovations in communication and education.

Synchronous videoconferencing is a content delivery format allowing distance-separated students to receive education at the same time from an instructor located in one location. This format provides continuous and immediate interaction via audio and video between instructors and students over distance (Moridani, 2007). Emergence of computer and telecommunication technologies created the ability for this format (Amirault, 2012). Distance-learning formats via synchronous videoconferencing have been used in entry-level programs in many medical and healthcare related fields of study including education in surgery, emergency medicine, internal medicine, pharmacology, nursing, general medicine, and dentistry (Ahmet et al., 2018; Alnabelsi et al., 2015; Bertsch et al., 2007; Buxton 2014; Carter & Heale, 2010; Fritz et al., 2019; Hortos et al., 2013; Kunin et al., 2013; Moridani, 2007; Oz, 2010; Sadoski & Colenda, 2010). The use of synchronous videoconferencing in these healthcare related fields has shown value and success, but some studies have reported mixed perspective of its utility.

Technological glitches prove to be a prominent difficulty for students embracing synchronous videoconferencing in courses (Alnabelsie et al., 2015; Kunin et al., 2013). Equipment must work properly without difficulty during instruction for students to learn effectively. In a study reviewing instructor experiences of teaching an undergraduate nursing course with synchronous videoconferencing, Carter & Heale (2010) reported, "The success of educational videoconferencing depends very much on two variables: the teacher's and ideally the students' general comfort levels with technology, and the practice of instructional design with special consideration of the strengths and challenges of the technology" (p. 110). Although

issues with technology may also plague asynchronous delivery, deleterious effects of these difficulties are heightened in synchronous courses (Carter & Heale, 2010; Kunin et al., 2013).

Beyond occasional difficulties with technology, experiences with synchronous videoconferencing are positive. Ahmet et al. (2018) conducted a systematic review that studied effects of video delivery in surgical education. Their analysis was not limited to only video conferencing, but did include videoconferencing in their analysis. They learned "video feedback helps promote faster acquisition of skills and accelerates the learning curve as well as satisfaction." (p. 1156)

Because synchronous videoconferencing involves at least two distance-separated campuses, perspectives about differences in learning environments will affect the educational experience (Genn, 2001). Sadoski and Colenda (2010) studied perspectives of medical students learning through synchronous videoconferencing at Texas A&M College of Medicine. Consistent with other studies, problems with videoconferencing technology at the distance site were seen as problematic for the education experience. Cross-campus unity was deemed low by students. In addition, inequality of available local medical clinical resources was found to threaten the equivalence of the environment between sites. This information was helpful for authors to learn and propose future strategies to help mitigate and improve student perspectives and experience. Divangalou et al. (2018) found that distance-site students felt inequalities in environment due to differences in instructor to student ratio and unequal access to resources between sites. Students also felt an overall sense of competition between sites.

Educational achievement in synchronous videoconferencing has been compared in healthcare education. Results of educational achievement in healthcare education have been similar between students learning in traditional face-to-face locations and those over

synchronous videoconferencing at a distance. Moridani (2007) found pharmacy students in Texas performed equally well on exams in a pharmacotherapy course whether taught through asynchronous (pre-recorded lectures) or synchronous videoconferencing. However, those taught by asynchronous means were less satisfied in their experience. In medical education in Turkey and the United States, medical students performed equally well when taught through synchronous videoconferencing or in person (Hortos et al., 2013; Oz, 2010).

Hortos et al. (2013) investigated the effects of synchronous videoconferencing at Michigan State University of Osteopathic Medicine (MSUCOM). MSUCOM had increased student enrollment in reaction to provider shortages within the state. By adding two expansion synchronous videoconferencing-linked sites with 50 students each, the school was able to increase enrollment by 100 students. The authors compared scores on the Comprehensive Osteopathic Medical Licensing Examination (COMLEX) level one examination. COMLEX level one examinations are typically taken after the second year of Doctor of Osteopathy School and "emphasizes the scientific understanding of the mechanisms of medical problems and disease process" (p. 213). Student scores from distance sites were combined and compared with those from the host site campus taught via face-to-face delivery. The authors found through independent *t* tests, no significant difference between groups on COMLEX level one scores.

Fritz et al. (2019) compared exam performance of medical students between students experiencing face-to-face delivery, synchronous videoconferencing, and recorded video in Wisconsin. Consistent with Hortos et al. (2013), the authors found no significant differences between the host campus and distant campuses nor between the forms of educational delivery in pre-clinical basic science education coursework. A second observation demonstrated a majority of students preferred the synchronous video delivery. Interestingly, students who preferred

synchronous videoconferencing earned higher final grades than those who preferred recorded video.

Many healthcare fields experience an insufficient number of providers for the population in different parts of the United States. In Texas, the number of physicians to serve in rural locations and its large population is low. Sadoski and Colenda (2010) cited a 2006 report from the Association of American Medical Colleges stating that, nationwide, medical schools would need to increase the number of medical students by 30% by the year 2015. In order to increase numbers of students, institutions would need either to begin new medical programs or expand existing program enrollments. Sadoski and Colenda investigated enrollment expansion at Texas A&M College of Medicine. Prior to increasing enrollment, Texas A&M College of Medicine utilized a "2 + 2" curriculum design for their program. Students would take two years of coursework focused on basic sciences and foundational curriculum at the main campus in College Station, Texas. Then students moved to a remote campus location 85 miles away in Temple, Texas for courses focusing more on clinical coursework.

In order to increase enrollment, Texas A&M College of Medicine moved to a synchronous videoconferencing format with students on each individual campus for a continuous four years. Sadoski and Colenda compared the two-campus delivery design for equivalency of student achievement with the previously used "2 + 2" design. Investigators analyzed achieved grades in coursework and exams. They discovered no significant differences between those who learned at a distance compared with those at the main host campus site between the different models. They concluded that there was equivalence in experience and education within their measures.

Bertsch et al. (2007) discovered achievement on clinical examinations after learning content between in-person and over synchronous videoconferencing was equal in third-year internal medicine students. Scores on graded clinical skill examinations demonstrated no significant difference between groups at different learning settings. Authors cited the ability of cameras to provide close-up viewing as an advantage of synchronous videoconferencing over in-person learning. Disadvantages included decreased student and teacher interaction and technical challenges proved difficult if audio or video quality was not reliable. Alnabelsie et al. (2015) had similar results with students learning clinical otolaryngology emergencies content. Students learning via synchronous videoconferencing and face-to-face achieved similar improvements on pre- and post-instruction examinations. Students' satisfaction was slightly lower, but significant, in the synchronous videoconferencing group. This decreased satisfaction was due primarily to intermittent audio-visual problems.

Common themes emerged in reviewing experiences from other medical disciplines in synchronous videoconferencing. One of the most repeated themes was that student satisfaction was dependent on proper functionality of the synchronous videoconferencing technology. If audio or video was interrupted or disabled, satisfaction and positive perspective of learning decreased. A second theme was the trend for educational achievement to be equal between host and distance sites in different healthcare education disciplines. This was true for continuing education courses, for practical skills, surgical skills, and basic science knowledge in medical education. The results above support Clark's theory that the medium by which the education is carried does not change the educational achievement of the students (Clark, 1983). Whether the students were in the same room as the instructor for face-to-face content, or learning via synchronous videoconferencing, the educational achievement was similar.

Synchronous Videoconferencing in Professional Physical Therapy Curricula

Similar to hybrid program models, only a few examples exist of doctor of physical therapy programs in the United States utilizing synchronous videoconferencing in full program forms. All four institutions utilizing full program hybrid methods are private institutions. A majority of institutions with physical therapy programs utilizing synchronous videoconferencing are public institutions.

Presently, six doctor of physical therapy programs in the United States utilize technology enhanced learning methods through synchronous video conferencing to link host and distant satellite sites for content delivery. These programs are located at the University of Oklahoma (University of Oklahoma Health Sciences Center College of Allied Health, n.d.), Shenandoah University in Virginia (Shenandoah University, n.d.), Texas Tech University (Texas Tech University Health Sciences Center, n.d.), Central Michigan University (Central Michigan University of Health Professions, n.d.), the University of Kentucky (University of Kentucky College of Health Sciences, n.d.), and Idaho State University (Idaho State University Physical Therapy, n.d.). All of these institutions, except Idaho State University, have host campuses located in a more metropolitan area than the distance site and all other distance-site cohorts are smaller than their host sites.

At Idaho State University, the host campus is located in a more rural location of Pocatello, Idaho and the satellite campus is located in Meridian, Idaho. Meridian is within the metropolitan area of the largest city in the state, Boise, Idaho. Cohort sizes at each location of the Idaho State University physical therapy program are equal. Technology was introduced which included videoconferencing between the two locations. Videoconferencing technology allows content to originate from either location. Faculty at each location assist in both host and distant

campus content. All physical therapy program courses are presented in this format between both campuses (Idaho State University Physical Therapy Program, n.d.).

Idaho State University has yet to graduate their first class in utilizing the synchronous video conferencing delivery format so licensure exam passing rates are unavailable. However, prior to implementing synchronous videoconferencing, ultimate pass rate for the three years prior for Idaho State University graduates on the National Physical Therapy Examination was 100% (Idaho State University Physical Therapy Program, n.d.). Four of the five other institutions utilizing the synchronous videoconferencing format had 100% pass rates over the past three years, with the fifth, the University of Oklahoma, at 99.16% pass rate (Central Michigan University of Health Professions, n.d.; Shenandoah University, n.d.; Texas Tech University Health Sciences Center, n.d.; University of Kentucky College of Health Sciences, n.d.; University of Oklahoma Health Sciences Center College of Allied Health, n.d.).

Even though passing rates on the national board examination are high and demonstrate educational achievement in synchronous videoconferencing programs, there is a lack of investigational evidence of the effectiveness of this type of delivery in doctoral level physical therapy education. Few studies exist in the literature that provide student and faculty perspectives of synchronous videoconferencing in physical therapy education (Divanoglou et al. 2018; Jones et al. 2010). In other healthcare discipline education with more existing evidence, benefits and perspectives have been positive with synchronous videoconferencing formats when technology worked properly. One could expect similar benefits and positivity when considering its use in physical therapy education.

Much of the available literature for synchronous videoconferencing in physical therapy education comes from outside the United States. Synchronous videoconferencing is utilized to

provide education to rural areas. The Australian government has emphasized the availability of education in its many rural locations and has increased synchronous videoconferencing education throughout the country (Divanoglou et al., 2018). Divanoglou et al. compared student perspectives between host and rural satellite campuses of a physical therapy professional education program in Australia. Authors focused on perspectives of students who had completed their first year of this newly developed model of content delivery. Faculty were located at each site, although they were not in equal numbers. Not all courses originated from the host site as some faculty primary taught from the distance site.

In this qualitative study, authors found, through student focus group discussions, three emerging themes. The first was that students felt their learning was affected and influenced by the location they physically attended. Students at the distance site felt an inequality, as there was inconsistent faculty to student ratio and unequal access to resources between the two education sites. Not surprisingly, in each site, students interacted with those physically present better than they did with those at a distance. In addition, there was an overall sense of competition between campuses in learning and achievement. Finally, distance-site students did not feel off-camera instruction and interaction was equal between the two sites (Divanoglou et al., 2018).

A second theme that emerged from student focus groups was the format of content delivery with videoconferencing impacted both student learning and reception of delivered content. Some students were dissatisfied at the speed at which content was delivered; perceiving it as taking longer to learn. Engagement and focus on learning material was lower when received by viewing a screen. Viewing an instructor at a distance negated the effectiveness of non-verbal cues and interaction from instructors on screen. In some courses, students felt demonstrations were difficult to see at a distance. Occasionally technical difficulties became problematic to

content delivery and engagement. Overall, students appreciated the ability of learning from experts at both campus locations instead of only one. Another positive was that all lectures were recorded and students had access to view them outside of class time. Availability of online resources and use of a learning management system (Moodle) was judged an overall positive in the educational experience (Divanoglou et al., 2018).

The third theme evident from student focus groups was the two-campus content delivery format was driven by teaching process. This process was not always consistent between face-to-face classes and those watching a screen at a distance. Students felt one group was getting information the other was not, and faculty did not always have good coordination and communication with the distance site. Students sensed a double standard between educators in didactic and practical assessments (Divanoglou et al., 2018).

Jones et al. (2010) included an international element to synchronous videoconferencing in physical therapy education. Two modules in a pulmonary function portion of a curriculum were taught between an institution located in Canada and one taught in Hong Kong. Three groups were evaluated. The first group was taught with conventional face-to-face instruction. The second group learned by web-based modules with no in-class time. The third group had a combination of web-based and video-linked instruction sessions for discussion and learning. Student achievement was assessed by a post-test evaluation. Student feedback of the learning experience was also assessed.

The authors only found one difference in grades on post-tests between learning formats. This occurred in testing one module with the web-based only group in Hong Kong performing poorer than other groups. All other group post-tests between locations and formats showed no

difference. This demonstrated equal educational achievement in post-test measures between utilized mediums (Clark, 1983; Jones et al., 2010).

Student learning-style preference and cultural differences were apparent in student responses about the learning experience. Authors polled students at both the Canada and Hong Kong locations. Students at both locations enjoyed interacting with those at a distance and wished they had more time to get to know the foreign students. They enjoyed seeing how a different culture learned and studied. Many students in Hong Kong (62%) preferred video-linked methods due to the novelty of it and being able to interact with international students. Those in the web only group struggled with the volume of content and slow speed of technology in the web-based programs. Twenty-five percent of Hong Kong students reported they would learn best from traditional classroom environments and extra attention is required to follow video-linked lessons. Students in Canada felt time with video-linked experiences was too short and would have liked more time with students from Hong Kong. One problem noted by students at both locations was groups for the video-linked presentations were too large, which decreased the ability to interact well (Jones et al., 2010).

This study provided a method to interact across an ocean and to share expertise without an individual having to travel to a distant site. Authors supported the expansion of videoconferencing education, particularly in health-related fields, and demonstrated its value in helping cost conscious institutions provide content:

Videoconferencing has enabled knowledge and information in undergraduate and graduate education to be shared and transferred among distant sites, including those in different countries with different cultures. This has been an invaluable tool in health care both in clinical practice, rural health initiatives, and around the globe. Also, the

technology of teleconferencing facilitates the direct sharing of expert knowledge without the cost and logistics of having experts travel to international sites. With the tightening of department and university budgets, such visits are more difficult to fund. The technology has facilitated information exchange by reducing travel requirements even within a single urban area. (Jones et al. 2010, p. 1199)

Although increasing in prevalence, appeal, and popularity in physical therapy education, technology enabling alternate models of content delivery have yet to be investigated thoroughly to determine effectiveness and congruency with results from traditional face-to-face instructional models. With six doctor of physical therapy programs utilizing synchronous videoconferencing methods in the United States, it is surprising there is little available evidence related to its effectiveness or utility. Technology has provided opportunities for wider reach of content delivery. Even though synchronous videoconferencing in physical therapy education first began at the University of Oklahoma over twenty years ago, there are no published studies of quality demonstrating effectiveness of this format in physical therapy (personal communication Steven Chesbro, November 13, 2019). Currently six doctor of physical therapy programs utilize synchronous videoconferencing for content delivery and others have used this delivery in the past without validation of its efficacy. The effect that synchronous videoconferencing technology has on preparing students to be proficient in physical therapy practice is unknown.

Summary

Technology, with improvements in computing and telecommunications, allows for delivery of educational content beyond brick and mortar facilities in higher education (Amirault, 2012). Examples of distance learning exist in healthcare programs in medical, dental, pharmacologic, and nursing education (Carter & Heale, 2010; Fritz et al., 2019; Hortos et al.,

2013; Kunin et al., 2013; Moridani, 2007; Sadoski & Colenda, 2010; Sandars et al., 2015). These include online learning, synchronous videoconferencing, and hybrid (flipped) classroom designs. In these courses, the reach of distance learning has assisted in providing content to less populated areas and provided training for practitioners and students in underserved populations and areas (Amirault, 2012). Distance learning has allowed institutions to expand program size and reach without inherent difficulties of establishing new programs, which is shown to be more difficult than expanding existing programs (Johnson, 2014). According to Clark (1983), different formats of distance learning should have no negative affect on the learning achievements of students if the content delivered is consistent. Changes of education achievement seen with the introduction of newer technologies or different mediums on which the content is covered would result from a change in pedagogy or content delivered (Clark, 1983).

Doctor of physical therapy education programs have begun to embrace distance-learning formats through synchronous videoconferencing and hybrid program models. There are few examples of each of these models. Increasing the reach of education and working to decrease cost to students are motivations for developing distance learning and other innovative models. Reaching underserved and rural areas for education boosts healthcare services in those areas and serves a public good (Nixon, 2012). Costs of physical therapy education continue to grow, even as salaries for physical therapists have remained mostly stagnant with only small gains (Shields & Dudley-Javoroski, 2018). Finding models that decrease cost to students will serve both the private and public good for students and for their future patients (Nixon, 2012).

As physical therapy education delivery continues to evolve, investigation is imperative to demonstrate the feasibility and effectiveness of current advanced technological delivery models. Without validation and consistent results on national board examinations, physical therapy

education risks moving, without ensuring quality and development of effective clinicians, towards appealing and popular models of education that could prove ineffective. Research demonstrating consistent achievement and seeks students' perception of delivery formats will assist in justifying the establishment of newer models of content delivery in physical therapy education. It will also add to sparse available literature on programmatic distance-learning formats in physical therapy education.

In searching for efficient and effective education, distance-learning models are compared to face-to-face models. Achievement of students in most investigations is similar between face-to-face and distance-learning models. There is rarely an opportunity to discover the impact a change between one distance-learning model to another has on a single cohort of students and faculty. In early 2020, the COVID-19 pandemic created a need for institutions to move to online distance-learning formats (Idaho State University Coronavirus, n.d). Idaho State University's doctor of physical therapy program moved content from synchronous videoconferencing to online delivery of didactic content. As many skills in physical therapy are hands-on in nature, it was determined to delay hands-on sessions until after students and faculty were able to return to campus for practical skills. This, in effect, turned the delivery model into a hybrid program of learning. Students would learn content at home and then, during face-to-face sessions, would apply, practice, and solidify learned content and skills (Lazinsky, 2017).

According to Clark's (1983) theory of instructional design, students and faculty should not expect a change in student learning if pedagogy remains consistent. Clark theorized through research that educational achievement is not based on the medium by which it is carried. When learning outcomes increase after a change in media delivery, increases are due to changes of

teaching, not the change in delivery medium. The same teaching over different media, results in the same learning according Clark.

This literature review has presented information that is important when considering student perspectives on the impact of changing distance-learning formats. Although not directly affecting student perspectives of delivery methods, understanding the difficulty of being admitted to physical therapy school, the cost and salary comparisons of the field, and noting the typical and emerging forms of content delivery provide background and perspective for the rigors and challenges of physical therapy education and practice. It is imperative to the physical therapy profession to investigate innovative models of delivery to assist institutions in expanding the reach and availability of their programs at decreasing educational costs (American Physical Therapy Association, n.d.; Shields & Dudley-Javoroski, 2018).

Chapter III: Methodology

Research Design

Despite a lack of concomitant evidence of effectiveness, advances in delivery methods utilizing technology in higher education have been introduced rapidly (Kirkwood & Price, 2013). It is difficult to ascertain which technology-enhanced method of education is most effective or preferred in education. Newer innovative methods that claim benefit must be analyzed for effectiveness through investigation (Kirkwood & Price, 2013; Taneja et al., 2018). The purpose of this qualitative case study was to obtain professional program student and faculty perceptions of their experience of switching between two forms of technology-utilized distance-learning content delivery formats. Doctor of physical therapy students at Idaho State University began learning via synchronous videoconferencing in two distance-separated locations in August of 2018. In an effort to decrease the likelihood of community spread of the COVID-19 virus during a pandemic in the spring of 2020, many institutions of higher education, including Idaho State University, changed delivery formats to online delivery (Idaho State University Coronavirus, n.d.). The Idaho State University doctor of physical therapy program switched to a hybrid, form of delivery for students. Content delivery included both asynchronous and synchronous online teaching creating a delay in learning and practicing hands-on practical skill content until classes could resume together in physical locations. Changing from one form of education delivery to another in the middle of a professional program is rare and unusual in higher education.

A qualitative case study design was selected as the most appropriate research design to gain perspectives of students and faculty regarding the impact of switching from synchronous videoconferencing to a hybrid-learning format (Yin, 2018). Case studies include in-depth investigation of contemporary phenomena bounded in time and activity in real-world contexts

and feature distinct situations with many variables and data collection procedures (Creswell, 2014; Yin, 2018). This investigation was bounded in duration as the content delivery was online and in the hybrid format only for a specific time during pandemic preventative measures. This investigation was specific in regards to teaching methods utilized, location, and the student cohort investigated.

Qualitative case study design was preferable to other designs for this research. Grounded theory was not appropriate as research aims were not to derive theory from experiences or perspectives of participants (Ravitch & Carl, 2016). Meaning was not derived from direct observation of study participants in their environment and data collection did not include interaction in that environment by the investigator. Thus, ethnography was also not appropriate for this study (Creswell, 2014; Ravitch & Carl, 2016). A close alternative qualitative approach to a case study design was a phenomenological methodology. This investigation did study the phenomenon of switching distance-learning formats as a shared experience of all participants of this study, and phenomenological methods were utilized in this investigation. (Ravitch & Carl, 2016). However, this study was bounded by a set population, timeframe, and circumstance, which created better fit with case study methodology (Creswell, 2014). Because the specific purpose of this study was to gain perspectives of change between two learning formats, case study design was more conducive to answer the research questions. If the goal of investigation was to discover the essence of the change of curriculum to the human condition, phenomenological methodology would have been more appropriate (Creswell, 2014; Ravitch & Carl, 2016). As a hypothesis was not developed and was not being tested in this study, quantitative design was not indicated (Yin, 2018).

Case study methodology allowed the investigator to best meet the purpose of this study, which was to explore the impact on students and faculty switching between two distance-learning content delivery formats that occurred at the Idaho State University Doctor of Physical Therapy Program in response to the worldwide COVID-19 pandemic. This investigation included a survey and selective semi-structured interview data to answer the following research questions:

> Q1. What are student perspectives of the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

> Q2. What are faculty perspectives on the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Data obtained and analyzed from these questions added knowledge and information to the understanding of learning preferences and perceived efficacy of distance-learning delivery methods. This study possessed the rare opportunity to study two distance-learning formats with the same cohort of students and faculty members. Most similar explorations of this context have compared either face-to-face content with a distance-learning format, or compared two separate cohorts learning through different formats (Hortos et al., 2013; Jones et al., 2010; Oz, 2010).

Population

The population studied in this investigation were current doctor of physical therapy students at Idaho State University in their first year of the program and their faculty. In spring of 2020, the COVID-19 virus caused numerous "stay at home" orders throughout the United States and the world. On 25 March 2020, Governor Little of Idaho declared a "stay at home" order

(Idaho Official Government Website, n.d.). To comply with the governor's order, Idaho State University, like many other institutions, transitioned to teaching all content online at a distance. Idaho State University was on Spring break when the governor made his declaration and classes resumed on 30 March through online delivery. This new arrangement lasted through the summer term (Idaho State University Coronavirus, n.d.).

The doctor of physical therapy program at Idaho State University expanded to two distance-separated campuses beginning in 2018. Content delivery format for the program was synchronous videoconferencing delivery to both campuses. The home campus, in Pocatello, Idaho, is located amidst a rural university campus environment with all common university amenities and services. The satellite or distance location is housed in the Sam and Aline Skaggs Health Science Center – Idaho State University, located in Meridian, Idaho. Although having limited student support services available at the Meridian campus, many student services or amenities are available either at the Pocatello campus or provided offsite in the local community. There are 24 seats available at each campus location for a total of 48 students

Requirements for entry-level training in physical therapy are stringent and acceptance into physical therapy schools is challenging. All students in the Idaho State University program have achieved at least a bachelor's degree from an accredited institution of higher education. Minimum program admission requirements include, 3.0 GPA (suggested to have a 3.5 to be competitive) overall and in the following course categories: anatomy; physiology; exercise science; chemistry; physics; statistics; medical terminology; and psychology. Standardized testing requirements include Graduate Record Examination total scores of at least 295 with verbal and analytical writing minimums of 148 and 4.0 respectively (Idaho State University Physical Therapy Program Admission Requirements, n.d). Applications for admission are

evaluated for competitiveness. In 2019, 243 applications were received for 48 seats. This represents a 19.7% acceptance rate (Physical Therapy Centralized Application Service, n.d.).

At the time of the "stay at home" order from Governor Little, the physical therapy program's distance-learning content-delivery format was changed. The change in format was from synchronous videoconferencing to an online delivery format. Crucial hands-on skills had to be learned and practiced at a later date when in-person instruction was allowed to resume. This format mirrored hybrid program formats of at home didactic content learning with later in-residence intensive practical content sessions. Students in the first-year cohort had learned through synchronous videoconferencing in the program for one and a half semesters. The last half of their second semester and the entire third term (summer) were conducted through online (hybrid) learning with intensive practical sessions held at the end of the summer semester. Students had three, weeklong intensive practical skill sessions covering hands-on skills that were delayed in orthopedic, biophysical agent, and clinical procedure content courses.

There are eleven full-time faculty members in the doctor of physical therapy program at Idaho State University. During the time of this investigation, there were four full-time faculty members at the satellite Meridian campus and seven at the home Pocatello campus. All faculty teach courses in the program through synchronous videoconferencing. Courses originate from either campus. At the time of the "stay at home" order, first-year students were enrolled in four courses and they enrolled in four courses during the summer. Students and faculty provided valuable information of their perspective and experience of changing formats. They also, through interview and survey data, provided evidence of comparison between the two distance-learning formats and the overall experience of changing formats.

Investigator Relationship

The primary investigator must disclose his relationship with the Idaho State University Doctor of Physical Therapy Program. He is a member of the faculty and serves as the assistant program director, and instructed two of the courses affected by the change to the new format (one course in the spring semester and one in the summer semester). Moving to the new distance-learning format was unplanned and unexpected. The primary investigator had no motive for this exploration other than for learning the impact and perspectives of students and faculty experiencing this change in educational model. This research is similar to previously conducted research of the student perspectives of the value and future utility of the Idaho State University Physical Therapy program's clinical practicum experiences (Gerber et al., 2021). No programmatic changes or alterations were expected to result from this investigation. Even as students and faculty members should have felt no pressure to answer questions a certain way, measures were taken to decrease the inherent power dynamic existing due to the investigator's position as instructor and administrator. One measure taken was the conduction of data collection after coursework, and grade submission, was completed to include an anonymous survey via the internet. To decrease influence during the interviews, interviewers from outside of the Idaho State University Physical Therapy program conducted student and faculty interviews. Interviews were transcribed and de-identified. All research participants were assured that they could cease participation in the study at any time without repercussion and there would be no reward for completion of the study.

Sample

The sample for this investigation included two separate cases, or populations (Miles et al., 2014; Yin 2018). The first case included first-year doctor of physical therapy students. The

second case was comprised of faculty members of the doctor of physical therapy program. After

receiving approval from the Human Subjects Committee of the Idaho State University

Institutional Review Board, an anonymous internet-based survey invitation was sent to all

members of the first-year doctor of physical therapy student cohort. Students were able to choose

to complete the survey or stop the survey at any time without repercussion for their grade or

standing in the program. The survey included statement of agreement questions comparing the

students' personal perspective of changing distance-learning formats during the program (see

Appendix A). Demographic data of campus location and personal living environment was asked

to compare location and gender. Survey data was analyzed for trends and was used to inform

interview conduction and coding.

Student interviewees were chosen by a purposive sampling method (Miles et al., 2014).

As family situation and home conditions differed for individual students in the cohort, sampling

attempted to produce a reflective sample of the cohort. Sampling took into account the following

demographics: ratio of male students to female students in the cohort at each location (home and

satellite), married students and unmarried students, students with children and without children,

and single parents. These demographics were chosen as the living situations (spouse and/or

children in the home) of the students were likely to have an impact on their environments in at

home distance-learning formats. Matching characteristics of students in each location was

attempted. In Pocatello, gender breakdown of the students was 15 males to 8 females and in

Meridian 14 males to 9 females. In total, the ratio is nearly two male students to every female

student. Four male students and two female students from each location were interviewed in an

attempt to be representative of the gender ratio in the cohort. Interviews followed a semi-

structured interview process to ascertain student perspectives of the impact of changing

educational delivery formats during the pandemic (Miles et al., 2014). The student interviews were conducted by a researcher from an outside higher education institution who was instructed on the semi standardized interview process and given instruction to ask follow-up questions as appropriate. This interviewer was employed to reduce the influence of power dynamic of the primary investigator as a faculty member in the program.

Selection of faculty interviewees was purposive and interviewees were chosen from full-time faculty members from the doctor of physical therapy program at Idaho State University (Miles et al., 2014). The department chair and program director, who taught courses during distance-learning format changes, were interviewed with three other faculty members who also taught courses interrupted by the "stay at home" order. Three of the five total faculty members interviewed were based on the Meridian campus with the other two from the Pocatello campus. Interviews focused on the experience of changing curriculum during the program from administrative and instructor perspectives. Interviews followed a semi-structure interview format to include opinions and perspectives of faculty members regarding the impact of changing distance-learning formats (Creswell, 2014; Miles et al. 2014). These interviews were conducted by a member of the Occupational Therapy program to reduce the possibility of a power dynamic or influence over responses due to the primary investigator's role as assistant physical therapy program director. Transcriptions of all interviews (student and faculty) were de-identified and saved in a secure folder on the ISU.BOX server.

Data Collection

Two forms of data collection were employed in this qualitative case study. This assisted with triangulation of data to increase trustworthiness of the investigation (Creswell, 2014; Yin, 2018). The first form of data collection was through an agreement survey. This survey was an

anonymous internet-based survey sent to all members of the first-year doctor of physical therapy

students at Idaho State University. The researcher using common student-cited benefits and

difficulties discovered during the literature search developed the survey. Pilot testing of the

survey was conducted utilizing a different cohort of students than the one that was studied in this

investigation. Twenty-four students from this cohort participated in the pilot testing of the

survey. The survey used agreement statements about the impact of switching between distance-

learning formats in their education in a closed survey format to force standardized answers.

Survey methods allowed for sampling from the entire student cohort to give overall insight of the

impact of changing the educational format mid-semester and mid-program. Survey data was

compiled and combined category totals were used as descriptive numbers in aggregate for

evidence of agreement trends. Trends were used to form interview structure, inform coding

methods, and to compare in analysis with interview-derived themes.

The second form of data collection was from semi-structured purposive interviews

(Creswell, 2014; Miles et al., 2014). Interviews followed a semi-structured outline format to

focus the topic on the impact of the distance-learning format change while also allowing for

responses that added richness of experience. Semi-structured questions assisted in asking

questions in an unbiased manner while also obtaining desired information (Yin, 2018) to learn

what perspectives students and faculty had toward the change of distance-education formats.

Interviews were conducted via videoconferencing and recorded for ease of future transcription.

Transcriptions were de-identified.

Data Analysis

Interview transcripts were analyzed to form emerging codes (Saldaña, 2016). Coding

represents a discovery technique, which helps in problem solving but does not rely upon set

formulas in analysis (Saldaña, 2016). Preliminary coding of topics of communication within the program in each delivery format, technology functionality and workings, convenience of education, and effects of changing formats on student performance assisted in deriving meaning and building codes. After preliminary coding, additional coding revealed emerging codes that were grouped, merged, and synthesized with preliminary codes to form categories or subcategories. Coded data was provided to all research participants for member checking (Miles et al, 2014). All participants affirmed their individual coding accurately reflected their beliefs and perspectives. No editing of coding was required. Categories were merged to develop themes that may prove a basis for theory formation (Saldaña, 2016). Developing theory was beyond the scope of this case study investigation, but explanatory or informative categorical and thematic information adds value to sparse existing literature on distance education in physical therapy. However, if analysis does provide sufficient evidence of thematic elements, future investigation could seek to develop theory utilizing different research designs and methods (Creswell, 2014; Ravitch & Carl, 2016; Miles et al, 2014).

Case study research relies on multiple forms of data collection to increase quality of investigations (Yin, 2018). Data in this case study design was derived from both interviews and a survey for comparison. Faculty interviews were compared together with student surveys and interviews to compare for agreement and triangulation of information. Triangulation of data from multiple data sources and formats improves clarity and convergence of information (see Figure 1) and strengthens qualitative validity and trustworthiness (Creswell, 2014; Ravitch & Carl, 2016).

Figure 1

Research Conceptual Design
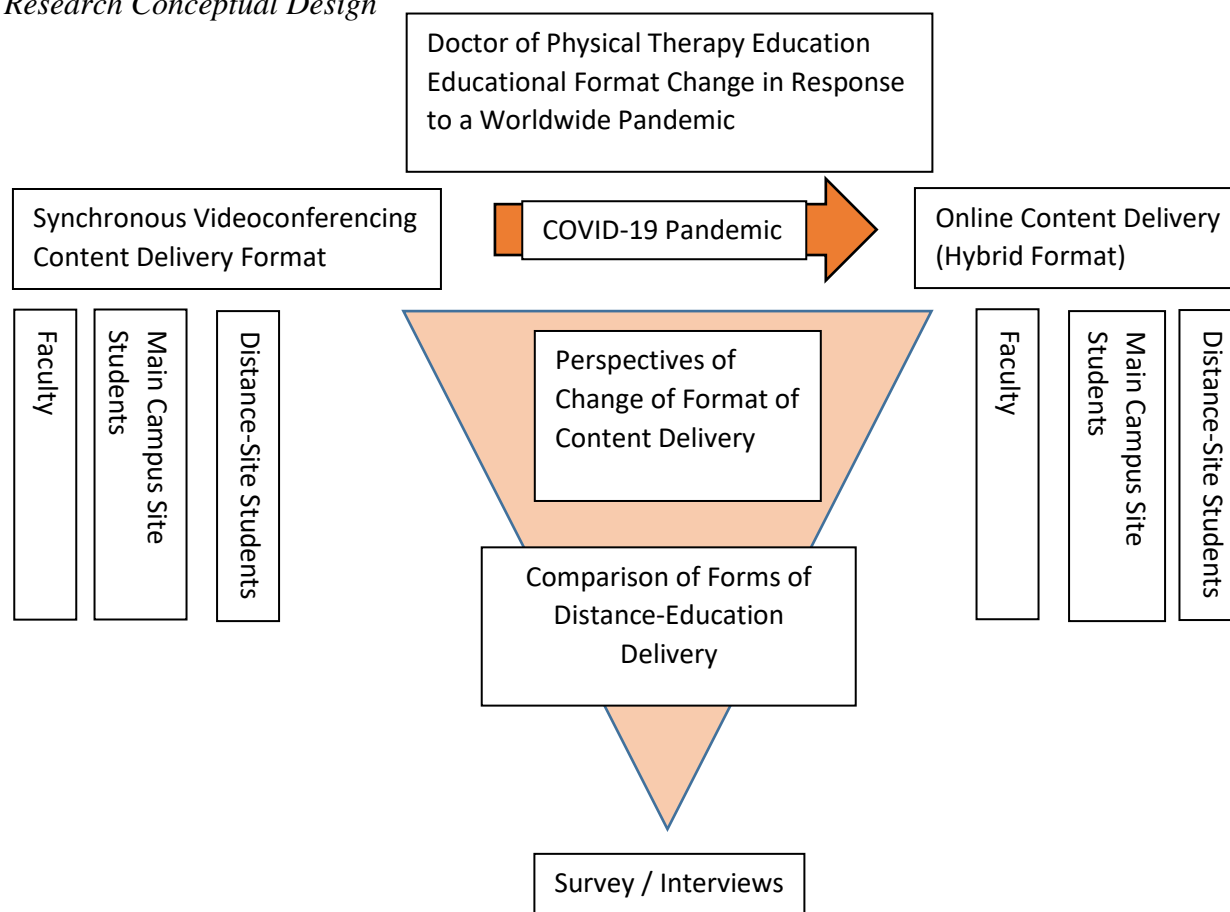
Assumptions

In this case study investigation, assumptions included that those participating in research interviews and surveys accurately represent the faculty and student cohort from which they were selected. It was assumed that survey and interview participants provided honest, accurate, and truthful answers and responses reflective of their perspectives of changing distance-learning formats. In addition, study participants did not simply respond to questions "how the investigator wants them to respond." It was assumed that the research design and mitigation measures decreased possible power influence from the primary investigator and allowed participants an ability to express their true perspectives without hindrance.

Limitations

A limitation to this investigation was the relationship the primary investigator has to the Idaho State University Doctor of Physical Therapy Program. As this research could be considered "Backyard Research" (Creswell, 2014), special effort was taken to avoid any appearance of coercion or influential bias in results of the study. As the investigation is not designed to prove one method of distance education better than another, but simply to gain the perspectives of students in the situational forced change of formats, the investigator nor the physical therapy program had motives for or definitions of favorable study results. In order to decrease the possibility of influence on participant responses during interviews, due to the position that the primary investigator as instructor and assistant physical therapy program director, the interviews were conducted by two faculty members from outside of the physical therapy program. Interviews were transcribed and de-identified.

Research participants may have felt confined by the bounds of the investigation. While the aim of the investigation was specifically focused on switching of distance-learning delivery formats, many other factors could have affected student perspectives during this time of changing from on-campus to at-home learning. Stress or fear of contracting the COVID-19 virus or its symptoms, personally or in the family, may have contributed to reactions to the change in content delivery. Purposive sampling based on gender and living environment (single, married, married with children, or single parent) was chosen to attempt to capture a variety of situations, environments, and experiences (Miles et al. (2014). Research participants may have desired to discuss details of experienced difficulties outside of those directly related to the educational format change.

The goal of this investigation was not to form a theory or to prove an assumption or hypothesis. This caused difficulty with generalizability of the study (Yin, 2018). If generalization was the goal of this investigation a more rigid and specific adjustable variable quantitative design would have been more appropriate (Creswell, 2014). As the aim of this study was to provide information on (not to prove which was best) two emerging technological formats of distance education in physical therapy; the inability to show generalizability may be considered as only a minor limitation.

Delimitations

Delimitations are used as means to define scope and to set boundaries of a study (Joyner, Rouse, & Glatthorn, 2018). The Idaho State University doctoral program in physical therapy had another class of students in the second-year affected by the switch in distance-learning content delivery formats. The second-year cohort of students had an extra year of experience with synchronous videoconferencing content delivery. Because of prolonged exposure to synchronous videoconferencing, they were not chosen for analysis in this investigation. Discovering existing differences between the first-year and the second-year cohort was not a purpose of this study and combining data from each year would not be consistent with investigative purposes. The second-year cohort of students also had been on an 8-week full-time clinical experience prior to the switching of distance formats. As all settings and learning opportunities for students are different during full-time clinical experiences, it would be impossible to demonstrate homogeneity in their education and educational experiences after rotations. Thus, students in the second-year cohort were not included in this investigation due to prolonged experience with one of the distance-learning formats and the heterogeneity of learning experiences at this point of their education.

Ethical Assurances

Ethical practices to assure student protection in this research were followed. These measures included submission to and project approval from the Human Subjects Committee of Idaho State University's Institutional Review Board. In addition, all participants gave consent for participation in data collection and had the option to remove themselves from the study at any time without repercussion to academic standing or employment status. Students were assured that their participation in the study was voluntary and would not benefit nor hinder their standing in the doctor of physical therapy program or any of its courses. Survey data was obtained by anonymous web-based survey methods (Qualtrics, Provo, UT 2020). All interview data was de-identified during transcription, analysis, and reporting.

Summary

During the spring term of 2020, a worldwide pandemic caused most United States institutions of higher education to transition to online teaching methods to decrease the chance of community spread of a virus. Changing delivery formats at the Idaho State University Doctor of Physical Therapy program represented a change from one form of distance education to another. Prior to the change, the Idaho State University physical therapy program utilized a synchronous videoconferencing format between two distance-separated campuses. The format change necessitated delivery modification to an online/hybrid delivery format. Distance education in many forms has increased in popularity and use throughout higher education without widespread evidence of its effectiveness or benefits over other forms of content delivery (Amirault, 2012; Forde & Gallagher, 2020; Kirkwood & Price, 2013; Sandars et al., 2015). Most comparisons of distance-learning methods are conducted between face-to-face delivery and distance-learning formats (Hortos et al., 2013, Jones et al. 2010). This case study was unique in its ability to study

student and faculty perspectives of the impact of switching between two distance-learning formats. Information from this study adds information to help to determine effectiveness and feasibility of distance-learning formats.

The purpose of this investigation was to explore the perception of the impact, on students and faculty of the Idaho State University Doctoral Program in Physical Therapy, of switching between two distance-learning content delivery formats in response to the worldwide COVID-19 pandemic. Case study design was chosen to incorporate both survey and interview data from students and faculty experiencing this change in distance-learning format (Yin, 2018). This case was unique in content and bounded by time, event, and included the faculty and students in the first-year cohort of the Idaho State University physical therapy program. Both synchronous videoconferencing and hybrid learning models are distance-learning formats that are rare and not widely utilized in United States physical therapy education (Commission on Accreditation in Physical Therapy Education. 2019). In discovering student and faculty perspectives of the impact of changing between formats in the middle of an educational program, this investigation provides information to educators of perceived differences and feasibility of these distance-learning formats. The efficacy of both formats together experienced by a single cohort of students was assessed. The results provide evidence for using distance-learning formats to add to present sparse literature on distance education in physical therapy education (see Table 3 for a summary of qualitative data collection procedures).

Table 3

Qualitative Case Study Design Data Collection

Human Subjects Committee	Submit and receive Human Subjects Committee approval for research

Informed Consent		**Obtain informed consent from participants**
Anonymous Agreement Survey		**Administered via web-based survey methods; students of 1st year cohort**
	Data Analysis	*Tabulate responses in aggregate for students and faculty for comparison with interview data*
Student Interviews – Purposive Sampling		**Pocatello Students (4 males/2 females) – 2 single students, 2 married students, 1 student married with at least one child, and 1 single parent student** **Meridian Students (4 males/2 females) – 2 single students, 1 married students, and 3 married students with at least one child children**
	Qualitative Data Analysis	*Transcription and de-identification of interviews.* *Coding of interviews and synthesis to categories of responses. If present, develop core themes.*
Faculty Interviews- Purposive Sampling		**Department chair** **Physical therapy program director** **Three faculty members who teach 1st year physical therapy students**
	Qualitative Data Analysis	*Transcription and de-identification of interviews.* *Coding of interviews and synthesis to categories of responses. If present, develop core themes.*

Chapter IV: Results

As doctoral-level physical therapy education programs have worked to decrease external pressures of limited educational space and increasing costs of education without comparable increases of entry-level salaries, many programs have turned to distance-learning platforms for content delivery. Program-level distance-learning platforms have limited evidence of efficacy in professional physical therapy education (Koehler, 2016; Manton, 2016). This investigation attempted to add evidence by examining student and faculty perspectives regarding the unusual occurrence of a physical therapy program switching from one format of distance delivery to another during the COVID-19 pandemic in 2020.

Prior to the COVID-19 pandemic, the Idaho State University physical therapy program utilized a synchronous videoconferencing format to deliver content between campuses located in Pocatello and Meridian, Idaho. During the spring semester of 2020, the program shifted to a hybrid content-delivery format in response to governmental stay at home directives designed to decrease spread of the virus (Idaho Official Government Website, n.d.). In this hybrid delivery model, students stayed at home for didactic content delivery, and hands-on practical skill instruction was delayed until classes could resume in person, several months later. These crucial hands-on practical components of several courses were delivered utilizing intensive laboratory sessions conducted over the course of one week for each delayed course.

A qualitative case-study design was chosen to answer the following research questions in this investigation:

Q1. What are student perspectives of the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Q2. What are faculty perspectives on the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Learning the perceived impact of delivery format change on students and faculty, gave evidence of educational challenges faced, enabled comparison of two distance-learning models' efficacy and effectiveness, and provided perspectives of learning and achievement between models. Educational achievement between technology media should be similar according to Clark's (1983) theory of instructional design that states learning is independent of the medium on which it is presented.

Survey and interview data were collected from first-year students and full-time faculty from Idaho State University's Doctor of Physical Therapy program during the summer and fall semesters of 2020. The Idaho State University Institutional Review Board Human Subjects committee approved this investigation. All research participants gave consent to participate and were assured there would be no reward for participation nor adverse consequence for declining to participate. Subjects could remove themselves from the study at any time. The collected data were maintained on the password protected ISU.BOX server, which is HIPAA and FERPA compliant. No hard copies of data were created.

This chapter is organized as follows. First, survey methods and data will be presented. This will include survey demographics and perspectives of survey participants. Next, student and faculty interview methods and coded and categorized data will be presented. Finally, student preferences of distance-learning formats and participant identified positive and negative perspectives of each format will be displayed.

Survey Results

A survey was developed and utilized in this investigation to gain perspectives from the full cohort of first-year physical therapy students. Pilot testing of this survey was completed by administering it to the second-year cohort. Modification (mostly editorial) was completed after receiving feedback from this cohort. All students in the first-year cohort of Idaho State University's physical therapy program were invited to participate in the survey. The survey was an anonymous, internet-based 15-question survey seeking insight about student perspectives of changing from one format of distance learning to another (see Appendix A). Thirty-eight out of forty-six students completed the survey for an 82.6% response rate. The full cohort had 23 students at each location with nine female and fourteen male students in Meridian and eight female and fifteen male students in Pocatello.

Demographic information including gender and the students' attended campuses (either Pocatello or Meridian) were collected. There were 24 male students (12 from Meridian and 12 from Pocatello), 13 female students (7 from Meridian and 6 from Pocatello) who completed the survey. One student responded, "prefer not to answer" to the gender question. Survey participants' gender and location composition reflected similarly to the composition of the entire cohort. Nineteen students from each campus location completed the survey. Survey questions asked students to rate the impact that changing distance-learning formats had on several characteristics of their education experience on a range of impacts scale (significant and slight impacts either positive or negative, or no impact). For data analysis, all positive and negative impact perspectives, either significant or slight, were combined and totaled (see Table 4 for results of the survey).

Table 4

Agreement Survey Results

		Overall n=38	Female n=13	Male n=24	Meridian n=19	Pocatello n=19
Impact on stress	**No change in stress**	18.4	15.4	20.8	5.3	31.6
	Increased stress	60.5	46.2	66.7	84.2	36.8
	Decreased stress	21.1	38.5	12.5	10.5	31.6
Impact on educational quality	**No change in quality**	10.5	15.4	8.3	5.3	15.8
	Increased quality	18.4	23.1	16.7	5.3	31.6
	Decreased quality	71.1	61.5	75.0	89.5	52.6
Impact on external distractions	**No difference in external distractions**	7.9	15.4	0.0	5.3	10.5
	More external distractions	73.7	61.5	83.3	84.2	63.2
	Fewer external distractions	18.4	23.1	16.7	10.5	15.8
Impact on convenience of education	**No difference in convenience**	15.8	23.1	12.5	15.8	15.8
	Greater convenience	63.2	76.9	58.3	57.9	68.4
	Less convenience	21.1	0.0	29.2	26.3	15.8
Impact on ability to learn	**No change in ability to learn**	26.3	30.8	25.0	15.8	36.8
	Greater ability to learn	18.4	23.1	16.7	5.3	31.6
	Less ability to learn	55.3	46.2	58.3	79.0	31.6
Impact on life challenges	**No change in life challenges**	63.2	30.8	66.7	84.2	42.1
	More life challenges	18.4	30.8	12.5	15.8	21.1
	Fewer life challenges	18.4	15.4	20.8	0.0	36.8
Impact on educational achievement	**No change in achievement**	26.3	30.8	25.0	21.1	31.6
	Greater achievement	21.1	23.1	20.8	10.5	31.6
	Less achievement	52.6	46.2	54.2	68.4	36.8
Technical literacy	**No lack of technical literacy**	63.2	46.2	70.8	63.2	63.2
	Lacked technical literacy but no negative effect	36.8	53.9	29.2	36.8	36.8
Impact on efficiency of learning	**No change in efficiency of learning**	10.5	15.4	8.3	5.3	15.8
	Greater efficiency of learning	47.4	46.2	45.8	42.1	52.6

	Less efficiency of learning	42.1	38.5	45.8	52.6	31.6
Impact on personal finances	**No change in financial standing**	73.7	76.9	70.8	84.0	63.2
	Better financially	21.1	15.4	25.0	15.8	26.3
	Worse financially	5.3	7.7	4.2	0.0	10.5
Impact on interaction with classmates	**No change in classmate interaction**	5.3	7.7	4.2	10.5	0.0
	Greater Interaction with classmates	13.2	7.7	16.7	5.3	21.1
	Less interaction with classmates	81.6	84.6	79.2	84.2	79.0
Impact on interaction with faculty	**No change in faculty interaction**	18.4	15.4	20.8	15.8	21.1
	Greater interaction with faculty	18.4	30.8	12.5	15.8	21.1
	Less interaction with faculty	63.2	53.9	66.7	68.4	57.9
Impact on faculty accessibility	**No change in faculty accessibility**	52.6	53.9	50.0	57.9	47.4
	Faculty more accessible	21.1	15.4	29.2	21.1	21.1
	Faculty less accessible	26.3	30.8	20.8	21.1	31.6
Impact on career as a physical therapist	**No effect on future career**	31.6	30.8	33.3	26.3	36.8
	Positive effect on future career	29.0	38.5	25.0	21.1	36.8
	Negative effect on future career	39.5	30.8	41.7	52.6	26.3
Impact on overall education	**No impact on education**	36.8	38.5	37.5	36.8	36.8
	Positive overall impact	23.7	38.5	20.8	10.5	46.8
	Negative overall impact	39.5	23.1	41.7	52.6	26.3

Surveyed student perspectives of changing from synchronous videoconferencing to a hybrid format revealed four main categories of impact including negative impacts, positive impacts, no significant impact, and no clear measure of impact positively or negatively due to the change. Increased stress, decreased ability to learn, decreased quality of education, decreased educational achievement, a higher number of external distractions, and decreased interaction between students and faculty were all negative impacts found in overall student perspectives.

When comparing gender in these responses, a higher percentage of male students reported negative impacts in all aspects except for interaction with classmates. Greatest disparities of negative impact percentages between genders were discovered in increased stress (66.7% of males to 46.2% of females; see figure 2), increased external distractions (83.3% of males to 61.5% of females; see figure 3), and negative impact on quality of education (75% of males to 61.5% of females; see figure 4).
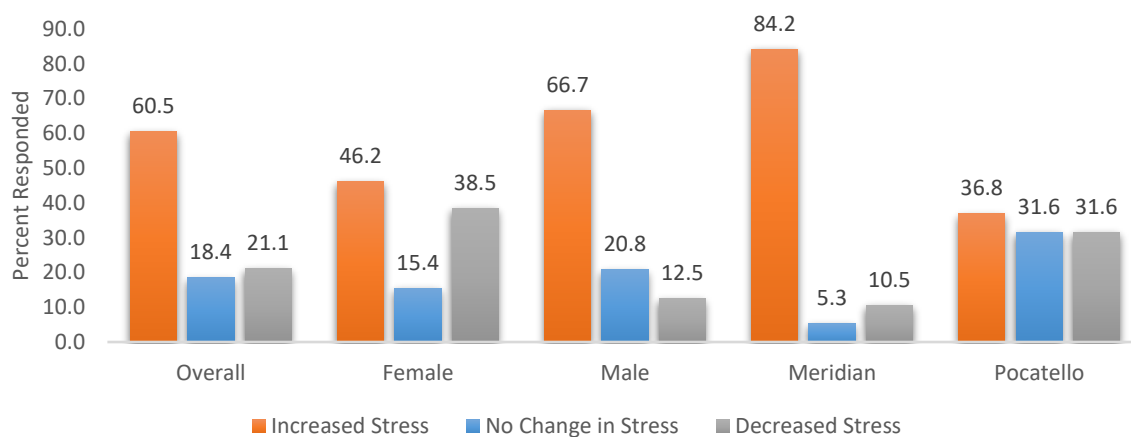
Figure 2

Impact of Format Change on Stress

Figure 3

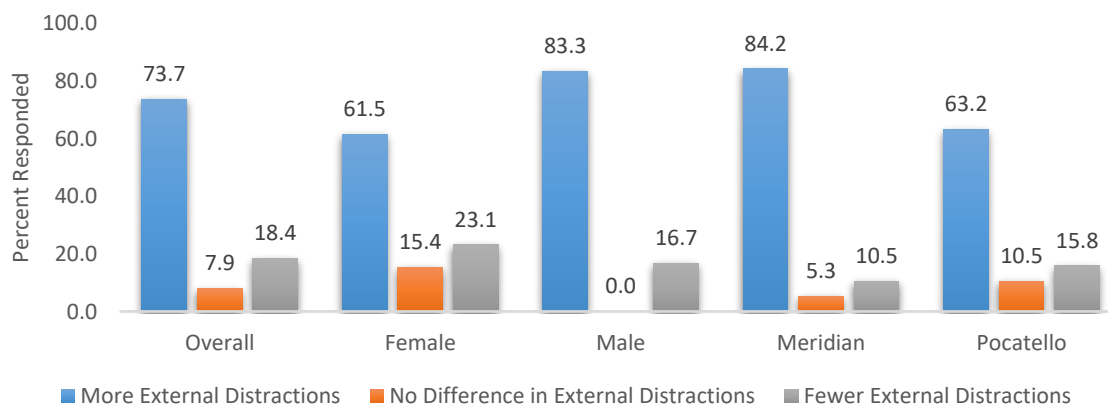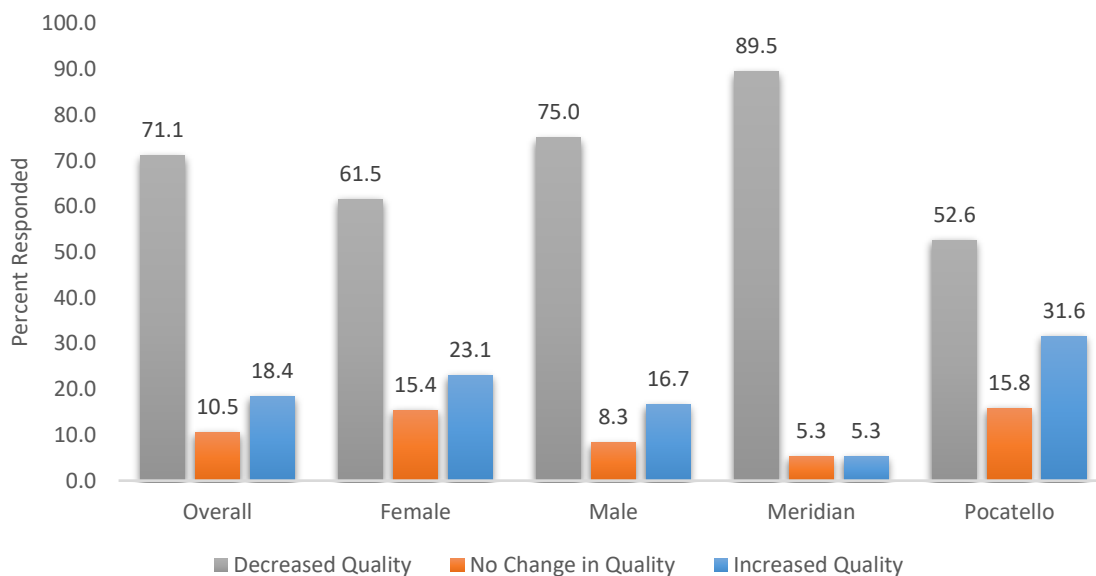*Impact of Format Change on Personal Distractions*

Figure 4

Impact of Format Change on Education Quality

When comparing campus locations, Meridian students reported higher percentages of negative perceptions in all negative impact areas. The largest differences were discovered in negative impacts of increased stress (84.2% of Meridian students to 36.8% of Pocatello students; see figure 2), decreased ability to learn (79.0% of Meridian students to 31.6% of Pocatello students; see figure 5), decreased quality of education (89.5% of Meridian students to 52.6% of Pocatello students; see figure 4), and decreased educational achievement (68.4% of Meridian students to 36.8% of Pocatello students; see figure 6). When considering impact on the ability to learn, a plurality of Pocatello students chose "no change in the ability to learn" at 36.8%, and both greater and less ability to learn were each selected by 31.6 percent of the students (see figure 5). Male and Female students at both locations perceived a decrease in interaction with fellow students and faculty after changing distance learning formats (see figures 7 and 8).
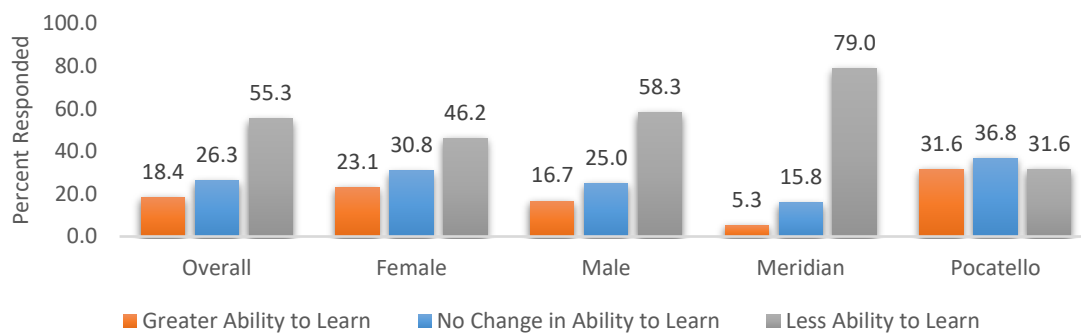
Figure 5

Impact of Format Change on Students' Ability to Learn

Figure 6

Impact of Format Change on Educational Achievement
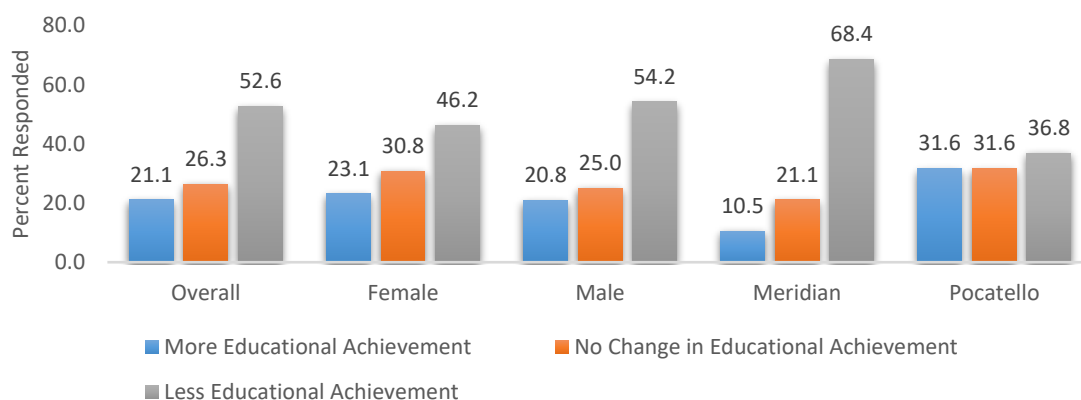
Figure 7

Impact of Format Change on Interaction with Classmates
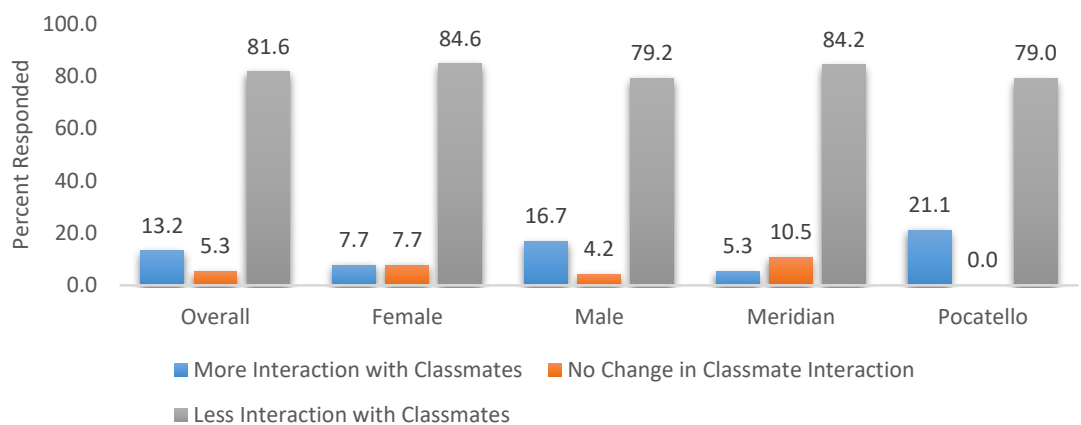
Figure 8

Impact of Format Change on Interaction with Faculty
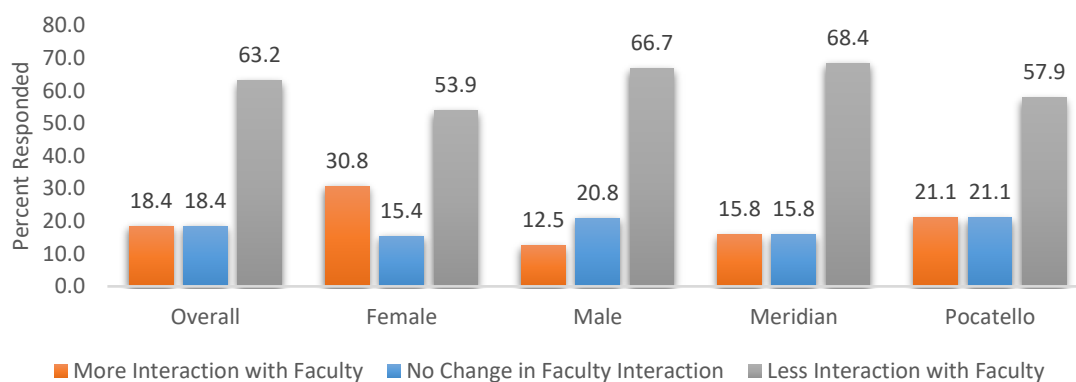
There was only one surveyed area that was viewed as having been positively impacted by changing distance-learning formats. Students found convenience of learning was improved with switching to the hybrid model of education (see figure 9). Overall 63.2% of students reported more convenience with hybrid learning, while 21.1% reported it being less convenient, and 15.8% reported no change in convenience. Eighteen point six percent of female students selected more convenience than their male counterparts and 10.5% more Pocatello students perceived increased convenience than their Meridian counterparts did. No female students felt the hybrid model was less convenient and a majority of those who did were male students in Meridian.

Figure 9

Impact of Format Change on Convenience of Education
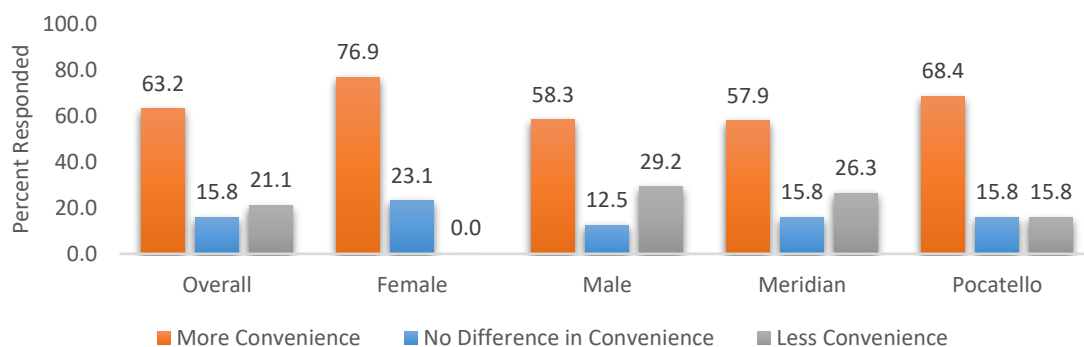
Students felt little to no change in three of the surveyed categories with changing formats. These categories included the impact on the accessibility of the physical therapy faculty (see figure 10), number of life challenges (see figure 11), and effect on personal finances (see figure 12). Just over half of the students (52.6%) felt the physical therapy faculty were as accessible as prior to changing to hybrid learning, while about one quarter of the students each felt faculty were more and less accessible. Life challenges did not change for 63% of students with the other 37% splitting equally between more and fewer life challenges. However, female students were equal at 30.8% for no change in challenges and an increase in challenges. Meridian students reported no fewer life challenges, but only 15.8% reported more. The majority of students (73.7%) did not have a change in financial standing with the change. Twenty-one percent of the remaining 26.3% reported being better financially after the change. Students did not perceive technological literacy, or lack of literacy, as a negative effect on their learning. Nearly 37% of students reported lacking technical literacy for learning at home online, including 54% of female students, but no students lacking literacy felt this had a negative effect on their learning (see figure 13).

Figure 10

Impact of Format Change on Faculty Accessibility
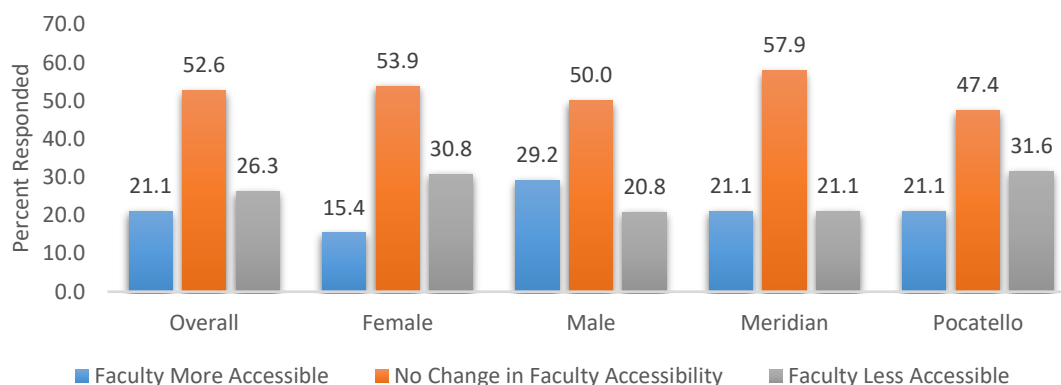
Figure 11

Impact of Format Change on Life Challenges
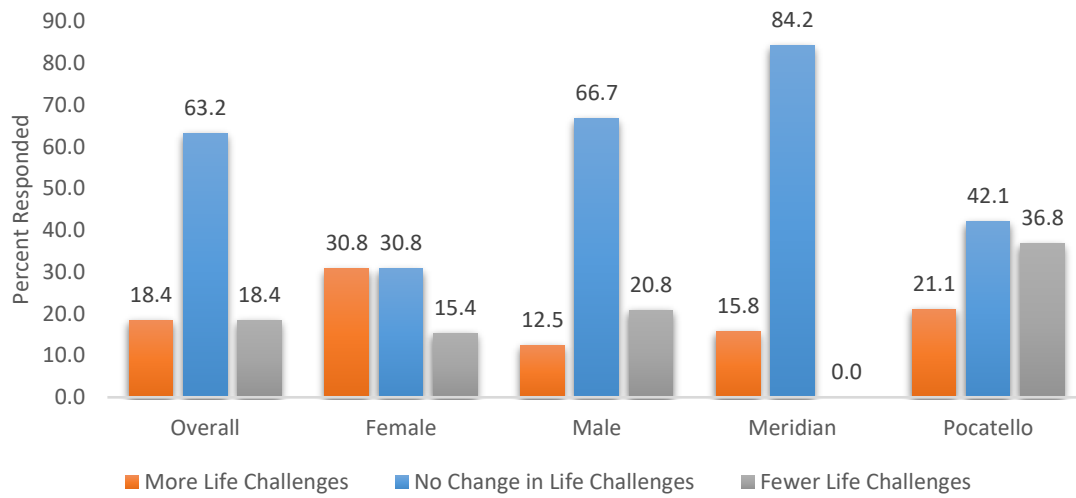
Figure 12

Impact of Format Change on Financial Standing
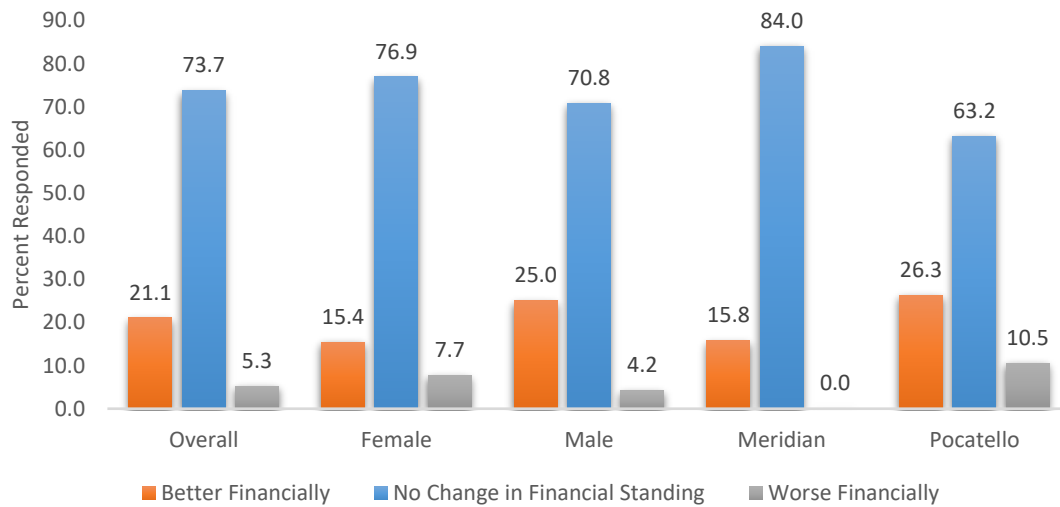
Figure 13

Student Perception of Technical Literacy and Effect on Learning after Format Change
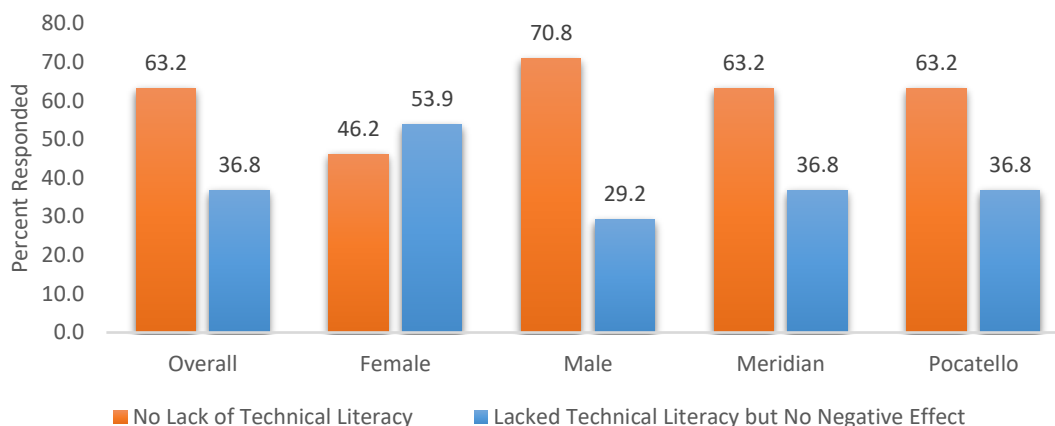
Finally, students were mixed on the impact of switching distance-learning formats on three surveyed areas. These areas included the impact on the efficiency of learning (see figure 14), the overall impact on their education (see figure 15), and the effect of the change on their future careers as physical therapists (see figure 16). In considering the efficiency in which the education was presented, 47.4% of the students felt the hybrid model was more efficient while 42.1 percent thought it was less efficient. This was similar across genders, but Meridian students felt it was less efficient than Pocatello students did. The next two categories both related to achievement. One may expect achievement to be similar according to Clark's theory of instructional design (Clark, 1983), but this theory may not accurately reflect how students view their personal achievement. Thirty-nine percent of students overall perceived changing distance-learning formats would have a negative impact on their overall education, but nearly 37% felt there would be no change. This was similar when investigating impact of the change on students' future careers with 39.5% of students perceiving a negative impact with 31.6% perceiving no impact. Of note, 29% of students felt the change would have a positive impact on their future careers. Over half of the students attending in Meridian perceived a negative impact on both their

education and future careers. Forty-seven percent of Pocatello students felt the change would have positive impact on their education and 36.8% of Pocatello students each felt there would be either no change or a positive change on their careers as physical therapists.

Figure 14

Impact of Format Change on Efficiency of Learning
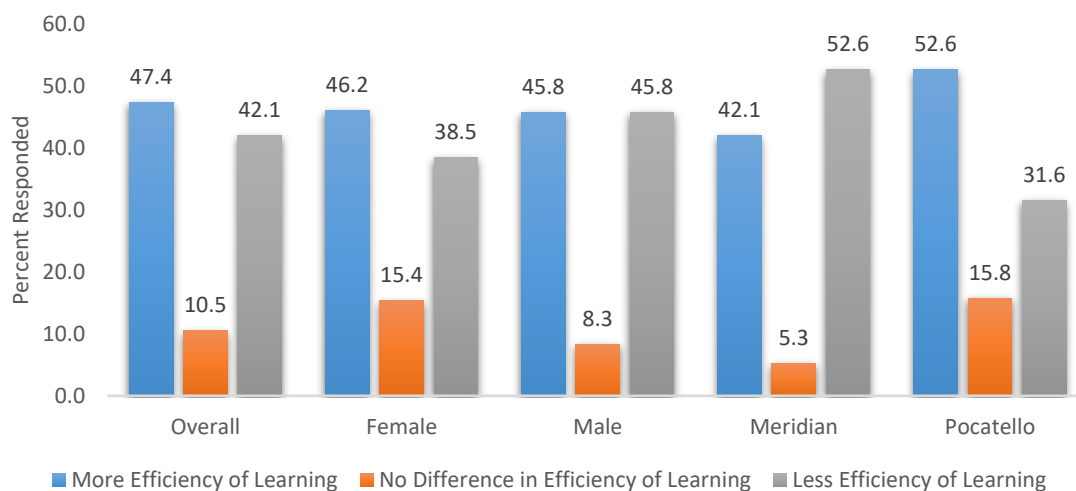
Figure 15

Overall Impact of Format Change on Education
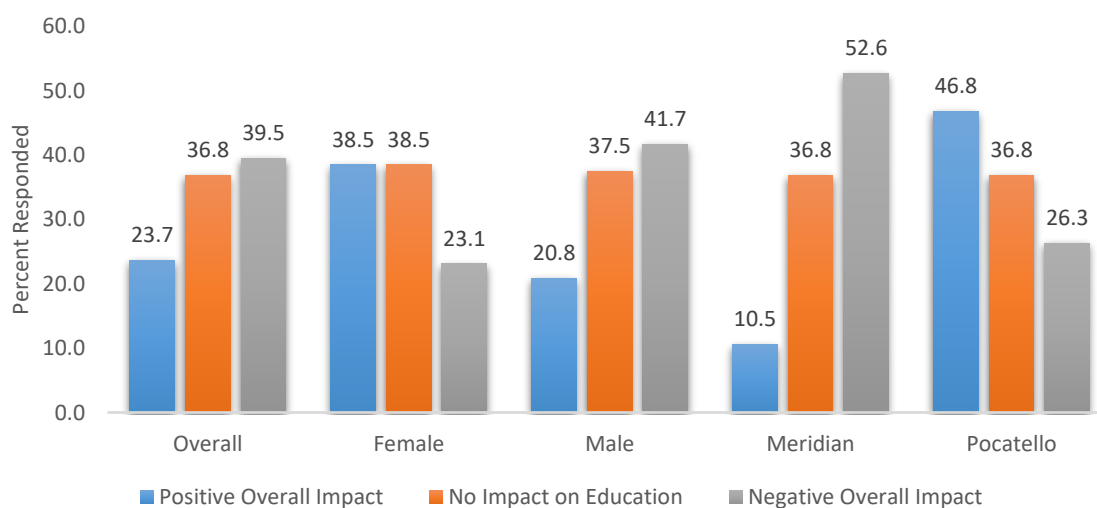
Figure 16

Impact of Format Change on Future Career in Physical Therapy
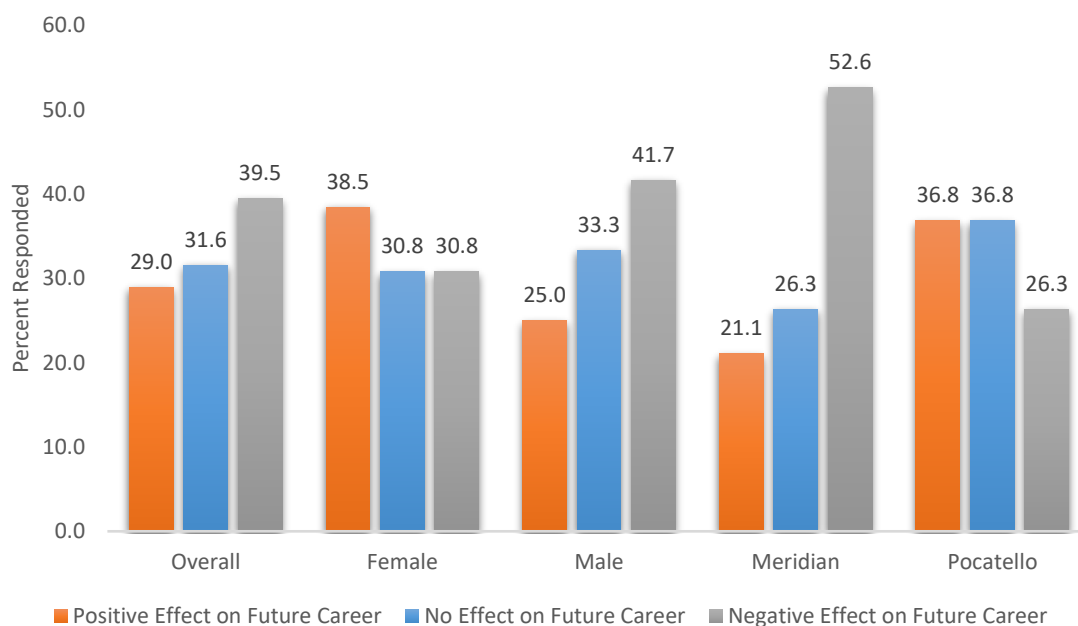
Interviews

Student and faculty interviews provided further investigation of the impact of changing

distance-learning formats from synchronous videoconferencing to hybrid content delivery in

response to the COVID-19 pandemic. Interviews provided rich dialog and allowed research

participants to express views that survey data may have been closed to. Interviews were

conducted with a sampling of students and faculty members from each campus of the Idaho State

University's Doctor of Physical Therapy program. As the primary investigator is the assistant

physical therapy program director and an instructor of two of the courses presented during the

time of the study, interviewers external to the physical therapy program conducted both the

student and faculty interviews. Utilizing external interviewers was important in decreasing an

actual or perceived power dynamic between the primary investigator and research participants.

Interview questions focused on experiences and perceptions of the impact of changing distance-

learning content-delivery formats (see Appendix B for semi-standard interview questions for both students and faculty). All interviews were conducted and recorded over ZOOM from which interview data was transcribed for analysis and coding. Student interview results are presented first followed by interview results from faculty.

Student Interviews

Twelve students were interviewed in this investigation. Six students (2 females and 4 males) were interviewed from each campus location. As the composition of the full cohort is approximately two males to one female, this ratio was selected in attempt to reflect cohort demographics. Within this gender ratio at each campus, single and married students, including single and married parents, were interviewed to include the variety of students' living arrangements. Student responses were coded then compiled into four categories with associated subcategories. These categories reflect the effects of changing distance-learning formats on the following aspects of students' education: learning experience, learning outcomes, physical therapy program interaction, and stress (See Table 5). These categories are described in detail below.

Table 5

Student Interview Coded Categories and Subcategories

Category	Subcategory
Effects of changing learning formats on students' learning experience	• Technology difficulties had minimal adverse effects on learning • Quality of didactic instruction not decreased • Students had to learn more on their own in the new format • Flexibility of the hybrid format was more convenient • More distractions in the hybrid format affected learning

Effects of changing learning formats on students' learning outcomes	• Decreased quality, volume of instruction, and curricular connection with hands-on skills • Minimal change in learning or performance • Minimal adverse and possibly a positive effect on future careers as physical therapists
Effects of changing learning formats on program interaction	• Faculty availability unchanged, but in-class interaction decreased • Decreased same site peer interaction • Interaction with opposite site campus students and faculty improved
Effects of changing learning formats on stress	• Students had varying amounts and sources of stress with the change

Effects of Changing Learning Formats on Students' Learning Experience. Students

discovered more flexibility in education with the hybrid delivery format. They were able to learn

at their own pace and convenience. A common feeling from the students was expressed in the

following statement from an interview participant, "I think the positive aspects are more

flexibility and not necessarily having to be on campus all the time." As many lectures were

recorded, students had freedom to view them on their own time and repeat them as often as

desired. One student reported, "The ability to juggle family responsibilities and kids, and at the

same time, still be able to keep up with the course content was really helpful." Another student

was appreciative of being able to help his wife who was also studying online in a different

education program. He commented, "It's been nice to be able to listen in but still be able to have

my daughter here and make sure she is supervised while my wife works on things." Several

students appreciated the time saved by not having to travel to be physically present on campus.

"I did like not having to drive 20 minutes to campus," was a response from one student, and

another related the following, "I really liked not having to drive down on Friday mornings to be

here for a two-hour lecture, and then having to drive all the way home. I personally would be driving for as long as the lecture."

With convenience of being at home for classes came an increase of distractions to learning. Increased distractions came from family members, pets, home maintenance (including cleaning), and media. Trying to focus on school in the home environment was a challenge for many students encapsulated by the following response:

> The one thing that was the trickiest to manage was just trying to figure out how to be at school at home. Just in the home environment, you have distractions or family members around and things. Trying to carve out time and designate the same structure that you have when you are at campus was harder at home.

Technology at home added some disruption and distraction; however, a majority of students reported having no difficulties due to technology. For a few students, who had multiple household members needing to use Wi-Fi for school and work at the same time, slow internet was an inconvenience. This was particularly true after the initial transition to the hybrid model. A married student with school-aged children reported, "A few times there would be days when the internet, especially early on when everybody was all of the sudden going to everything being online, that the internet would be really slow or Zoom would cut out." Another student, who opted to live with his parents during the "stay at home" period, had a similar experience, "I was living with my parents and I have many siblings who were also going to school online. So that put on a lot of weight on the Wi-Fi." Other students who reported unreliable Wi-Fi at home travelled to campus to utilize the university supplied Wi-Fi. This eliminated some home distractions and provided technology capabilities. Overall students reported only minor and temporary inconveniences from technology. Digital divide was not a limitation for the

interviewed students (Rowsell et al., 2017). All were able to gain internet access whether at home for most students, or on campus for a few.

When considering the quality of the education received, students reported they did not perceive a decrease in the quality of didactic content or ability to learn this content. However, some students initially thought their education quality was being cheapened by the change of formats and from not going to campus. The following comments related to initial versus final student perceptions about the quality of education:

I felt like most of the classes through the end of spring finished off how they would have if we were synchronous. I feel that my education is not being hindered as I initially thought with going into COVID. And, with the transition to the hybrid model, I still felt like I learned quite a bit.

After working in the new format for a time, students reported their learning was different, but the quality was not decreased. A few students found the quality of content was better as one student reported:

Honestly, I think for the most part, making a switch has been beneficial to me. Because it has allowed me to manage my time much more effectively, and I feel like I've gained more time by not having to be locked into the campus schedule time.

Even though students perceived quality of their education did not decrease with didactic content, they felt the quality of the hands-on practical content was negatively affected by changing formats. This will be described in the next category.

Effects of Changing Learning Formats on Students' Learning Outcomes. Student responses were grouped according to their perceptions of how their learning was affected by changing distance-learning formats, with hands-on learning cited most often. Students felt there

was little connection of previously learned didactic content with delayed hands-on content. This lack of connection resulted from having to delay practical lab sessions and only utilizing end of term intensive lab sessions in their courses. Students perceived the delay and disconnection of content as negatively affecting the quality and volume of hands-on instruction they received. A student reported, "I think that the other piece I would say is that the quality of the hands-on education was definitely diminished," and "I feel like with the hands-on skills, I could have learned those better spread out over a longer period of time, instead of lab intensives."

Because of COVID-19 restrictions, students only worked with one lab partner for all practical skills in all clinical courses to limit the possibility of widespread virus infection. Not being able to work with multiple partners and with different body types and sizes was perceived as a decrease in quality. Inability to work with different partners was not related to the delivery format change but due to virus concerns. Although having decreased quality and experience with hands-on content, students felt they would gain this missed experience when they entered full-time clinical experiences as related in the following response:

> I feel like only getting hands-on materials with one student isn't going to transfer well as we go into the clinic. But, I feel as we get into the clinic and into our first rotation, we'll kind of knock the cobwebs off as we get our hands on some real-life patients.

Even with a decrease in quality, volume, and connection with hands-on skills, students felt this would not cause long-term decreased learning performance. Changes in distance learning formats was not perceived as detrimental to overall education performance or future physical therapy career potential. A majority of students reported their achievements and grades had not suffered. Students reported, "It seems to me that my grades haven't been suffering from going to the online format in any way," and "I would say not at all, to be honest. I believe I've

had all A's previous to the switch. I believe I still have all A's and I feel like I've worked just as hard before and after." One student had initial difficulty with the transition, but worked to overcome:

> When that happened my exam scores were not great...So I have had to feel that I need to try at 200%, where before I may have only been trying at 110%. So now I think my grades are where they need to be, for who I am as a student, as if I was meeting in-person.

> Overwhelmingly, students did not feel the change of formats would negatively impact their future careers as physical therapists, and many saw possible positive effects. These effects were from experiences of using technology in learning. They felt this practice with technology would prepare them for future trends in healthcare, including telemedicine and telehealth visits. A perspective of the positive effects include:

> During the pandemic, PTs were trying to switch to and then fight for reimbursements in Telehealth and things like that. I think it actually sets us up pretty good, because I have seen different various technology. I have been taught instruction about physical therapy techniques or interventions or procedures via that kind of telecommunication method.

Another student added:

> I think for now I will be better prepared for doing Zoom calls and working with patients and different things like online participation…I think definitely I'd be able to do more of the online examinations or different things like that based on need.

> **Effects of Changing Learning Formats on Program Interaction.** As may be expected when moving from an in-person distance format of synchronous videoconferencing to one of being at-home for online instruction, students perceived a decrease in interaction with same

campus-site classmates. Common phrases used were, "we lost camaraderie of classmates" and "feeling less connected." COVID-19 restrictions added isolation for students, as they felt unable to get together physically. A student commented, "About half of my classmates I don't really see or talk to on a regular basis nowadays. Just trying to follow COVID procedures." Another student reported, "When the switch happened there was isolation and I had to study on my own which is very tough." This was a difficult consequence of the forced delivery change due to COVID-19, as this student iterated, "I think that's really the only negative I've noticed. I feel less connected to my classmates now unless they're close friends."

Even with decreased interaction between students at the home education site, students found interaction with students at opposite site campuses increased. This increase occurred as group assignments mixed students from both campuses, which had not occurred previously in the synchronous videoconferencing model. Students reported enjoying getting to know opposite site students better, which led to more cohort unity as reported by this Pocatello campus student:

> I think with the Meridian and Pocatello campuses, the switch was better for intercampus mingling, if that makes sense. I feel we were much more unified with the Meridian campus than we were before. That is something that is a good bonus of everything that has happened.

A Meridian campus student spoke of barriers removed between campuses:

> In terms of the Pocatello classmates, I think it has helped kind of remove barriers between the Meridian and Pocatello campuses. Because you could feel a wall there during the synchronous learning. Now that we have been on Zoom, whenever we've had breakout sessions, they've been made up of Meridian and Pocatello students and that's

just kind of gotten rid of those barriers, and I feel we are more unified as a class of 2022

cohort.

Two other students reported the following about being more connected and close to the opposite

campus, and voiced a desire to continue with cross-campus interaction: "I feel more connected to

the Meridian campus because when we were synchronous we didn't really talk to the Meridian

campus once," and "I feel like I've learned more about the Meridian students and got closer to

them through this whole process. It would be cool to incorporate more across campus stuff…"

Benefit of increased cross-campus interaction was a strong positive message resulting from

learning students' perspectives of changing delivery formats.

Similar to increased interaction between students on different campuses, students felt

they had more interaction with opposite campus professors after the switch of distance learning

formats. Perceived faculty availability was unchanged, but students did miss spontaneous and

informal interaction with the faculty in the classroom. In addition, many students lamented

difficulty in asking spontaneous questions during asynchronous lectures and this was viewed as a

downside to the hybrid format. However, Zoom allowed frequent opportunities to meet with

faculty members easily (including those on opposite site campuses), which allowed opportunities

to ask these questions. A student commented, "As far as instructors go, I still felt like I had

plenty of access to them to ask questions and do things as needed to get feedback from them."

Effects of Changing Learning Formats on Stress. Students experienced varying

degrees of stress from a variety of sources after the change in learning formats. Stress

experienced during this investigation was not solely a result of changing learning formats. Many

students felt stress due to the worldwide COVID-19 pandemic that caused adjustments in

learning formats. Many students worried their education would be delayed. Students were

appreciative of program faculty for working hard to assuage the stress of changing education and from non-education circumstances. These efforts may have decreased stress to some measure. One student summarized this in the following way, "I think the ability to continue [learning], the flexibility that the professors were able to give us to continue, given all of the other mayhem that has been happening, probably reduced my stress to some degree." While being able to work to decrease the effects of stress, faculty were unable to eliminate stress.

Stress levels ranged from "no real added stress" to one student reporting having a panic attack. Four out of twelve interviewed students reported not having an increase of stress more than what they felt prior to changing formats. One student reported when asked about stress playing a factor in his education, "Stress with the transition? No. Nothing out of the normal from just grad school. It felt the same level from synchronous to asynchronous." Other students felt stress with changing formats, with studying alone, and stress of perceiving the education would degrade in value. One student after being in the hybrid model for several weeks reported feeling a need to be with other students:

> I do feel like I have a breaking point, and I think my breaking point was in May. Right before we started the summer. I was like, 'Oh my gosh, I need to be in person so bad I can't do all of this on my own.'

The student who experienced the panic attack related her experience in the following way:

> I experienced a panic attack. I experienced my first type of panic. I didn't know what it was. I reached out to my classmates that I know have had panic attack issues to confirm what I was feeling. That was something I experienced pretty early at the end of March and beginning of April…I felt like I was going to get [cheated] in my education… I'm like 100% better than I was when I had that panic attack…My stress has been down…I

think the biggest impact going into hybrid with COVID, was the panic attack and then

losing contact with classmates.

A few students reported not dealing well with change, in general, that made transitioning to a

new format difficult. A student commented, "It was pretty difficult. I was pretty high stress and

I'm a person that doesn't really like change in the first place."

Although the change in learning formats provided stress for some students, others

experienced stress from circumstances of the pandemic or from others. One student reported the

greatest amount of stress he experienced came from his parents:

I would say this sounds bad, I'm 25, I was more stressed out with my parents. My

parents kept asking "What's going to happen? Do you feel like you're still getting the

same education, and how are you handling it?" I felt like I was always handling it well,

and they were more worried about me and just making sure I was still getting the best

education

Students had to manage stress inside and outside of their education. Some students had families

and children who had adjustments to learning and school schedules. A married female student

with school-aged children felt these effects:

Stress has a lot of effect on my life but it's also not occurring in a vacuum. Not only are

we switching educational models, but we are also in the middle of this pandemic. Our

kids are out of school. Our lives are in complete upheaval, and now we're trying to juggle

all of that at the same time.

She did relate that it was hard to separate overall stress, from all sources, to stress only related to

the changing of educational formats; other aspects of life were not equal to allow for fair

comparison.

Faculty Interviews

Five faculty members were interviewed for this investigation. Three faculty members (one female and two males) worked at the Meridian campus and two faculty members (one female and one male) worked at the Pocatello campus. All interviewed faculty members taught courses during the transition of learning formats. The department chair and program director were among the faculty interviewed.

Faculty responses were coded and classified into three categories. These categories described effects of changing distance-learning formats on the following aspects of student learning: content delivery, learning outcomes, and interaction with students (see Table 6). These categories are described in detail below.

Table 6

Faculty Interview Coded Categories and Subcategories

Category	Subcategories
Effects of changing learning formats on content delivery	- Increased potential for problems due to technology variabilities - Delivery required increased preparation, focus, and coordination - Improved quality of didactic content - Hands-on content learning decreased due to disconnect with didactic content - Increased flexibility of time and place of teaching and learning - Stress of unknown and change in teaching methods
Effects of changing learning formats on students' learning outcomes	- Student proficiency of hands-on skills decreased due to less instruction time and disconnect with didactic content - Minimal impact on overall student performance and future career achievement

	• Students may be stronger and more resilient having gone through this difficult time
Effects of changing learning formats on interaction	• Decreased interaction with and between local students • Increased student and faculty interaction across campuses

Effects of Changing Learning Formats on Content Delivery. Faculty had to adjust content delivery very quickly due to rapidly evolving circumstances of the COVID-19 pandemic in spring of 2020. Because of the urgency of change, there was not ample time to modify content for a completely new delivery format. Faculty learned quickly that although they had participated in a distance-learning format previously, the same methods did not translate perfectly to the new format. Adjustment was required. In addition, variability in technology became a larger issue with the hybrid model. Faculty recognized that in many ways delivery improved due to greater collaboration and preparation after initial stress and difficulties of changing formats passed.

Technology allowed the physical therapy program to continue offering content when all students and faculty were directed to "stay at home" by governmental and educational administration. The change created opportunity and impetus to learn new skills with technology to assist in teaching. One faculty member observed:

We learned from a technical standpoint to become more familiar with the technologies that are available and the pros and cons, frankly, of using those certain things…I think also trying to recognize using different tools within our learning management software.

While becoming more familiar with features and abilities of technology, faculty members realized some areas where technology offered increased flexibility over in-person or synchronous videoconferencing. One faculty member reported, "Often times I'd record my lecturers at like midnight or 1:00 in the morning when my kids were asleep." He also saw the

benefit of flexibility and benefit for students especially those with families, "I think one interesting thing is with the students that have family responsibilities and with distractions in school and childcare; it seems that most students preferred asynchronous delivery material where possible." All interviewed faculty members reported changing formats opened up possibilities to provide education in a more flexible way than previously accomplished. The program director explained this newfound flexibility with the following statement, "We should not put ourselves in a box and say, 'This class has to be taught in this classroom from this time to that time.' You can deliver the content from anywhere."

Changing formats, which included increased flexibility of content delivery, necessitated greater preparation. Although technology allowed for modification of content delivery, moving away from standardized technology previously experienced in synchronous videoconferencing, between two fixed locations, created greater variability in technology systems. Instead of one system, instructors and students were forced to rely on multiple and variable systems provided by their individual home networks. The possibilities of a network dropping or experiencing bandwidth difficulties was greater with utilization of multiple networks for content. Faculty and students could not rely on how it had always worked through one system. Preparation was crucial as related in the following statements from faculty members: "Technology is different for everybody…Technology is the biggest variable and it's highly variable… There's been times where it's dropped out, or the guy I teach with, his [network] has been so spotty at times students can't hear him." Another faculty member exclaimed, "We are always at the mercy of technological failures." The importance of increased preparation for possible technology problems was prevalent in faculty responses.

Beyond preparation for technological difficulties, faculty felt that increasing overall preparation for courses was imperative with changing learning formats. Faculty felt previous methods of delivery had to be modified to fit the new format; synchronous methods between campuses were different from synchronous teaching over Zoom. These differences necessitated moving to more online strategies, "I started to implement more truly online strategies of breakout rooms and leading questions and preemptive activities." These new methods necessitated increased preparation. All faculty members reported their preparation for each class increased. These preparations included creating videos, narrating PowerPoint lectures, developing learning activities, and other methods to engage students.

In the new model, faculty members reported having decreased ability to recognize when greater focus was necessary for further explanation of misunderstood concepts. This added further necessity for faculty to increase preparation, as they could not rely on student interaction to drive instruction. A faculty member summarized reacting to students, "I could not use spontaneity, classroom spontaneity or interaction…It's almost like being an actor. I rely on my enthusiasm in the classroom to keep students engaged. When I had to go online, I lost a lot of that."

Increased preparation and changing methods of instruction created added stress for some of the faculty. One faculty member reported decreased sleep due to the added stress of preparation and concern for meeting students' expectations. Faculty expressed concern for increased stress students may have been experiencing with the change. One faculty member recognized multiple sources of stress the students were likely feeling, "The psychological pressures of the pandemic and economic...So I feel like trying to be aware of the broader picture

and the larger experience these students were having." Faculty members felt great responsibility to provide quality education for their students in a somewhat stressful time.

Faculty learned much about their instruction through increased stress and effort in preparing and working to provide quality instruction for students. In many aspects, faculty felt the quality of content delivery was improved with changing formats. Increased preparation and modification of instruction to focus on pertinent specific content, increased quality as one faculty member related, "Quality was probably a little enhanced in that I was more focused on specific content that I really wanted to make sure that all the students understood." Beyond focusing on specific content, asynchronous learning tools were available for students to view lectures and lessons repeatedly for learning. Faculty felt this helped increase quality of instruction and student learning.

Although instructional quality was improved in some areas, faculty felt other areas suffered in the new model. Because of "stay at home" orders, there was inability to effectively instruct and practice crucial hands-on skills until later in the semester. Students received and were able to practice hands-on content through lab-intensive session at the end of summer semester after all didactic content had been completed. The quality of instruction was not perceived to be decreased by faculty members, but how well students learned and internalized hands-on skills was a concern. One faculty member reported, "I can't say that there was a quality decrease, but I think I'll always have a question mark in the back of my head of how well they had the psychomotor component." Another lamented not being able to tie patient cases to content as easily in hybrid methods.

Effects of Changing Learning Formats on Students' Learning Outcomes. A crucial aspect of education is how well students are able to learn and master content. Changing distance-

learning formats in the middle of an educational program may affect learning. As mentioned in the previous section, faculty members perceived quality of hands-on practical skill instruction was sufficient, but faculty had questions and concerns with the overall learning of these skills. Even having these concerns, faculty felt there will be only minimal impact on overall student performance and future career potential. The program director perceived that students may be stronger and more resilient having gone through the changes and modifications that COVID-19 forced. He remarked, "I think that what they've been through will help make them a more resilient group and probably not much will phase them early in their careers."

Physical therapy is a hands-on profession. The program delayed hands-on practical content until restrictions loosened sufficiently to allow for intensive in-person laboratory sessions. The hands-on instruction occurred after all didactic content had been presented. Because of this delay in teaching hands-on skills, faculty were unsure how well students have been able to tie didactic content together with practical hands-on content. One faculty member reported, students might not be linking content due to compartmentalization, "They might have a little bit more difficulty putting it into the bigger picture. They might have compartmentalized, but we'll see." Another faculty member commented:

> We had to put off a lot of lab content. So that is my biggest concern; their hands-on skills…I do have concerns about how well prepared these students will be and would I want them treating my mom or mother-in-law.

Although the students received hands-on content, a faculty member wondered about the effects of learning them in laboratory-intensive sessions:

> The only potential philosophical downside, that I can see, is that research suggests that memory comes from having to retrieve something over time. So, if you get it in just a big bout, and you don't ever have to retrieve it, that could be problematic.

Faculty perceived that students may have learning deficits in hands-on skill development, practice, and relating these skills to didactic content.

Even with the possible negative effects of changing learning formats on hands-on skill development, faculty felt students' learning and future abilities had not otherwise been affected. Faculty members perceived content delivery format had less to do with student performance than students' personal motivation and engagement. The department chair reported, "I learned no matter what, students that are engaged are engaged. Students that were engaged [and participated] in the classroom were the same students that were engaged online." Changing formats, with increased flexibility and potential for distraction may have had detrimental effects for some less engaged or motivated students. One faculty member observed, "I do worry at this stage of their development, in their professions, that maybe the temptation to not seek clarification in favor of watching TV or jumping back into that other class may have diminished their participation somewhat." Faculty recognized that onus for learning and understanding concepts shifted more to students in the new format. Those who sought clarification and opportunity for more learning performed better. However, faculty iterated that emphasis on engagement and students' personal responsibility is also crucial with in-person or synchronous videoconferencing formats.

No faculty members reported decreased overall academic performance by students in their courses. The program director was pleased and confident in the content delivered, saying, "I

trust that we have provided them with the basic knowledge, skills, and abilities that are needed to go out and practice…I would say it was successful."

Effects of Changing Learning Formats on Interaction. Faculty experienced a decrease of interaction with students after the physical therapy program changed distance-learning formats to a hybrid format due to "stay at home" orders during the COVID-19 pandemic. This decrease of interaction was most evident with students attending at the same campuses where individual faculty members taught. Engaging students in a physical classroom environment proved easier for faculty than through synchronous lectures over Zoom or other online means. Faculty felt they experienced increased interaction with students from opposite-site campuses over online distance-learning formats.

Inherently, in the synchronous videoconferencing format, a faculty member would have increased interaction with students physically in the room with the faculty member. Faculty reported being able to build relationships with those at a distance on the videoconferencing monitors to an extent, but it was much more difficult than with those being taught face-to-face in the room. With the hybrid model, teaching from home, faculty missed having students physically in front of them. Faculty reported, "You get to know the students when you're in front of them. This is limited over videoconferencing." Informal teaching is also limited. One faculty member reported feeling disconnected from the students in his course. He thrived on personal interaction that now was limited. In addition, this faculty member perceived students lacked important connection between classmates:

They are not going to be able to create the same level of closeness with their classmates. Classmate discussion and study groups, I think, are important to their putting the pieces together correctly and coming up with more true clinical application.

While experiencing decreased interaction with same-site students, faculty felt interaction with opposite-site students increased. This predominately resulted from seeing opposite-site students' names with faces during synchronous Zoom® sessions. In addition, faculty could interact better with these students in breakout rooms and small group activities. Previously in the synchronous videoconferencing format, these students were only visible collectively on video monitors. After changing formats, emphasis was spread to all students on the screen, and not just on the students in front of the professor in the classroom. One faculty member felt this was an unseen benefit of changing formats, when he reported:

> I really feel like one of the silver linings of this whole switch to the hybrid model is I can't see the Meridian students [same site students] as much anymore in person because they are off campus. Now I'm seeing both campuses equally. I've found this last semester a handful of Pocatello students are reaching out to me more.

This faculty member felt students had more freedom to engage with greater equal access to the professors, regardless of campus location, that was not present with synchronous videoconferencing.

Student Distance Education Format Preferences

Although not directly relevant to the research questions of this study, students were asked to share which distance learning format they preferred: either synchronous videoconferencing, or the hybrid model. Students were mixed with six out of twelve students preferring synchronous videoconferencing and four students preferring the hybrid format. One student liked aspects of both and was unable to choose a preferred format and one student did not respond to this question. Students preferring the synchronous videoconferencing model cited the following as reasons for choosing this format: having a set schedule, fewer distractions to learning, increased

ability to ask questions, ability to interact easier with instructors and classmates, and being

together with classmates for learning. Reasons given for preferring the hybrid model included

ability to personally flourish, retained information better, and enjoyed learning at home and then

coming together for practice. The student, who did not choose a preferred model, cited many of

the previously mentioned aspects as positives for each model (see Table 7).

Table 7

Student Distance Learning Format Preferences

Format	Number of students preferred
Synchronous Videoconferencing Format	6
Hybrid Format	4
No preference	1
No response	1

Note. n = 12 students

Positive and Negatives Perceptions of Distance-Learning Formats

All interview participants were asked what aspects they considered positives and

negatives of each of the distance-education formats. The purpose of this study was not to

determine which model was the most effective or better, however comparing the models was

informative. Much of this data is reflected in the coding and categories outlined earlier. This data

is presented as informational and is summarized in Table 8 and 9.

Table 8

Positive and Negative Perceptions of the Hybrid Distance-Learning Format

Hybrid Positives (Students)	Hybrid Negatives (Students)
Flexibility of schedule, time, and place	More distractions / easier to be distracted
Convenience of time and place	Harder to learn online
Content was focused / lectures succinct	Less time for content accrual

Watch recorded lectures repeatedly	Harder to ask clarifying questions
Intensive labs allow for hands-on practice	Less hands-on learning connections
Able to juggle other responsibilities	Non-education responsibilities distractions
Relationships better with opposite campus	Less same site peer interaction
Reduced travel time for learning	
Watch lectures at faster speeds	
Hybrid Positives (Faculty)	**Hybrid Negatives (Faculty)**
Flexibility and ability to teach from anywhere	Technology variability and difficulty
Faculty preparation improved	Lack of in classroom interaction with students
Between campus interaction improved	Didactic content without practical application
Professors got to know names better	Decreased student engagement / accountability
	Decreased hands-on skill practice and proficiency

Table 9

Positive and Negative Perceptions of the Synchronous Videoconferencing Distance-Learning Format

Synchronous Videoconferencing Positives (Students)	Synchronous Videoconferencing Negatives (Students)
Asking clarifying questions in real time	Difficulties of learning via a TV screen
Faculty in each site room	Less personalized instruction – Opposite site
Peer social interaction and camaraderie	Little interaction with opposite site students
Content connection with hands-on component	Less flexibility and convenience
Content presented to greater numbers	Technical difficulties
More structured schedule	Takes a lot more time
Multiple instructor input and expertise	
Demonstrated video conferencing technology	
Synchronous Videoconferencing Positives (Faculty)	**Synchronous Videoconferencing Negatives (Faculty)**
Moving around the classroom	Labor and time intensive
Faculty in both locations	Duplication of everything in two locations
Better student engagement	Reliant on technology
Coordination between campuses	Inequality between campuses:
	Get to know the local students better
	Local students can see better as cameras fixed

Summary of the Results

Combining results from student and faculty interviews and from student surveys revealed a number of themes. These themes included aspects of educational quality and achievement, interaction of students and faculty, distractions, and stress. When considering effectiveness of different learning formats, a primary interest was how learning changed when formats changed. With changing formats came utilization of different forms of technology. Clark's (1983) theory of instructional design must be considered when analyzing learning achievement with technology. Clark stated that it is not the media or technology by which content is carried that leads to learning. It is the teaching that leads to educational achievement. In this case study, it was anticipated that there would be no change in achievement or perceived achievement with changing distance-learning formats.

A majority of students did not perceive potential learning or achievement decreases due to changing learning formats. Survey results suggested that "quality of education" was decreased with the change; however, interview participants did not feel overall quality had decreased. They did perceive decreases in quality from delayed, rushed, and laboratory intensive instruction of hands-on skills; thus negatively affecting their skill development and learning. Faculty echoed student sentiments, agreeing that hands-on skill development suffered with changing formats, but did not feel the quality of their teaching had decreased. Changing formats and "stay at home" orders created practical-skill disconnect from didactic content due to delays in covering hands-on skills. Both faculty and students believed students would be able to overcome these delays and deficiencies in hands-on skills in the short-term, and changing educational formats would not create long-term negative effects on student achievement. In addition, faculty and a majority of

students agreed changing distance-learning formats would have no negative effect on the students' future careers in physical therapy. Clark's theory is supported by these perceptions.

Students and faculty both noticed decreased interaction between same-campus students and between same-campus students and instructors. Despite technological capabilities to communicate with classmates, students, based on each campus, felt they had less interaction with their same campus-based classmates after moving to hybrid-model instruction. However, because all students were learning from home in the hybrid model, students felt they had greater interaction through technology, with students on opposite campus sites. In addition, faculty reported missing physical, in-person interaction with students, but did enjoy interacting more closely with students at the distant campus via technology. In addition, faculty were able to learn students' names more efficiently and more effectively as students' names appeared with students' faces, on Zoom®, in online courses and meetings.

A positive result of changing formats was increased preparation required of faculty to develop effective course delivery. Faculty did not so much change the contents of their teaching, but had to be prepared for nuances the hybrid format presented. One major source of increased preparation was necessitated by having to be ready for unforeseen difficulties with varied technology capabilities students and faculty members possessed at their homes. Although technology problems and Wi-Fi bandwidth issues did not create serious problems during this study period, faculty and students had to be prepared for unforeseen problems. There were minor intermittent difficulties of "being dropped" from a meeting or audio cutting in and out. Students and faculty needed to know how to proceed when such events occurred. There was no evidence of digital divide within the investigated cohort. Interviewed students reported having necessary equipment and internet capabilities when matriculating into the physical therapy program. Most

students reported minimal or no difficulties with technology. Even though some felt their technological literacy was lacking, no students felt this negatively affected their learning experience.

Other sources of increased preparation were experienced in working to engage students differently in an online environment either synchronously or asynchronously in the hybrid model. As faculty worked to prepare and present content, they found previously utilized methods were not always most effective in the new environment. This realization caused reflection and discovery of methods that proved to be more effective than those used in past courses. Faculty felt their forced reflection and preparation encouraged them to be better prepared and more effective in teaching. For faculty, changing formats was positive in increasing preparation, in opening their eyes to new ideas and methods, and in increasing quality of their instruction.

Convenience of education increased with changing formats, but also resulted in increased distraction for students. Students felt more distracted outside of the classroom environment with easy access to non-educational interests and due to family and home responsibilities. Several students enjoyed the convenience of studying at their own pace at home, and not having to travel to campus.

In summary, changing distance-learning formats had significant impact on students' educational experience. The most significant and negative impact perceived by faculty and students was decreases in hands-on proficiency which is imperative in physical therapy examination and interventions. However, this identified decrease of hands-on ability and quality was not perceived as negatively affecting students' overall education and future career potential. Another drawback of changing formats resulted in students and faculty missing familiar interactions they had previously experienced. Distractions for learning also increased and made it

difficult for some students. Positives of changing formats included increased opposite-campus interaction between students and between faculty and students. In addition, faculty felt improved quality and preparation of their teaching. Faculty were able to consider newer methods beyond how they had always taught, and felt these positive benefits would help them teach better in the future. A final positive impact was that students were able and pleased to continue their physical therapy education on schedule, even as pandemic circumstances necessitated a change in their education and lives.

Chapter V: Discussion

This study was conducted to explore student and faculty perceptions of the impact of switching between two distance-learning formats in physical therapy professional education. This change in learning format was necessitated by institutional administrative and governmental "stay at home" orders issued in response to the COVID-19 pandemic in early 2020 (Gagnon et al., 2020; Idaho Official Government Website, n.d.; Idaho State University Coronavirus, n.d.). The research problem, methodology, and results of this dissertation will be summarized followed by a discussion of the results of this study and their broader implications for distance-based professional physical therapy education.

Research Problem

More evidence is needed to support increased technology use in higher education (Amirault, 2012; Sandars et al., 2015). When searching for best practices and models of teaching, technology is often looked to as a panacea in education improvement (Colbert & Chokshi, 2014). Technological advances in education abound without concomitant evidence of effectiveness (Colbert & Chokshi, 2014; Sandars et al., 2015). Institutions adopt technology based more upon features than on pedagogical principles (Colbert & Chokshi, 2014). Internal and external factors and motivations push institutions of higher education to embrace newer forms of technology (Amemado, 2014; Amirault, 2012; Guze, 2015; Kirkwood, 2014; Mellander, 2012).

Distance learning, a technological advance in education, has increased in utilization and popularity (Colbert & Chokshi, 2014; Curnow, 2017; Guze, 2015; Sandars et al., 2015). Traditional higher education models utilize face-to-face learning taught in single campus-based locations. Distance learning expands walls of brick and mortar facilities and allows students

more flexibility in education location and format (Amirault, 2012). Although flexibility and reach are increased, debate over effectiveness of distance learning continues (Amirault, 2012; Sandars et al., 2015). Clark (1983) professed teaching methods, and content delivery, determine educational achievement not the medium or technology used. If faculty change teaching methods or content to fit new delivery formats, new teaching methods or content are more likely to have an effect on achievement than the changing of delivery media. Studies have compared face-to-face learning to distance-learning formats in attempts to demonstrate efficacy of distance-learning formats (Bertsch et al., 2007; Cherry & Blackinton, 2017; Eddow 2017; Fritz et al., 2019). Few studies have compared two distance-learning formats together with a constant cohort of students (Fritz et al., 2019; Young et al., 2010).

There are examples of doctoral level physical therapy education embracing technological methods, including distance learning (Koehler, 2016; Manton, 2016). A majority of physical therapy programs in the United States continue to utilize traditional face-to-face methods for content delivery (Commission on Accreditation in Physical Therapy Education, n.d.). Due to increasing demand for physical therapy programs, limited educational space, and increasing costs of physical therapy education without comparable increases in beginning physical therapist salaries, several programs have moved to distance-learning platforms in attempt to decrease external pressures programs face (Shields & Dudley-Javoroski, 2018). Unfortunately, there is minimal evidence of efficacy, appropriateness, preference, and benefit of program-level distance-learning models in physical therapy education. This study contributes to minimal existing evidence of distance-learning formats in physical therapy education through investigation of the perceived impact of changing between two separate distance-education formats experienced by a single cohort of doctor of physical therapy students and their faculty.

Methodology Summary

As detailed in chapter three, an exploratory qualitative case study design was chosen for this investigation of perceived impacts students and faculty experienced in switching distance-learning formats in physical therapy professional education at Idaho State University. In the spring of 2020, the COVID-19 pandemic created havoc on many institutions of higher education (Gagnon et al., 2020; Lederman, 2020). Governmental and institutional administrative directives, to "stay at home," in hopes of decreasing the possibility of spread of the virus, caused shifts in education formats and classrooms (Idaho Official Government Website, n.d.; Idaho State University Coronavirus, n.d.).

Prior to "stay at home" orders, the physical therapy program at Idaho State University utilized a synchronous videoconferencing distance-education model between two distance-separated campuses. Students and faculty were based at each location and content was delivered synchronously at each location via videoconferencing. This model allowed both didactic and practical content to be delivered synchronously and successively. After "stay at home" orders were enacted, students were unable to come to campus. Didactic content was continued via online teaching methods; however, practical hands-on content was delayed until students were able to again meet in person. The Idaho State University physical therapy program switched from a synchronous videoconferencing program format to a hybrid program format. Hands-on practical content, no longer tied to didactic content, was delayed and covered in lab-intensive sessions at a later date when COVID-19 restrictions allowed. This investigation sought to answer the following research questions related to events outlined above:

Q1. What are student perspectives of the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Q2. What are faculty perspectives on the impact of switching from synchronous videoconferencing to an online hybrid-learning format in a doctor of physical therapy program?

Qualitative methods were utilized for this investigation of student and faculty perspectives of changing distance-learning formats during a professional physical therapy education program. These qualitative methods included an agreement survey administered to students, and student and faculty interviews. This investigation covered a semester and a half period of time. The transition, from a synchronous videoconferencing program model to a hybrid program model after "stay at home" orders were introduced, marked the beginning of this investigation. It concluded after delivery of all didactic content of the summer semester was completed, followed by practical hands-on intensive laboratory sessions. All students were invited to complete an agreement survey discussing impacts of changing formats (see Appendix A). Thirty-eight out of forty-six students (nineteen students at each campus location) completed the survey for a response rate of 82.6%. Twelve students (two female and four male students from each campus, which is reflective of the female to male student ratio in the cohort) participated in student interviews. Five faculty members who taught courses during the time of the investigation were interviewed. Semi-standardized interview questions were utilized (see Appendix B).

Summary of Results

Changing distance-learning formats from synchronous videoconferencing to a hybrid format, in response to the COVID-19 pandemic, had a number of impacts on physical therapy students and faculty at Idaho State University. Changing formats allowed students to continue progressing in their physical therapy education despite societal uncertainty resulting from the pandemic. Professional education programs strive to build student competency. The Idaho State University Doctor of Physical Therapy program states the following as its mission, to "Prepare entry-level physical therapists who optimize human movement and function by providing educational opportunities in practice, service, and research" (Idaho State University Physical Therapy, n.d.). Program faculty continued to provide educational opportunities after the format change; thus fulfilling the program's mission. Students and faculty both perceived changing distance-learning formats would not have a negative impact on the students' ability to complete their entry-level education nor have negative impact on their future careers as physical therapists. Achievement of educational and career goals were primary positive impacts discovered in this investigation. Other important educational and pedagogical aspects also emerged.

Negative Impacts

Even as students and faculty did not perceive an overall detriment to career potential and overall education achievement, several aspects of their educational experience were perceived as being negatively affected. Survey responses reflected a perception that educational quality and achievement both suffered after the change. However, interviewees detailed that didactic content was not impacted negatively, and some felt didactic content delivery was better after changing formats. Students overwhelmingly perceived negative impact on the quality of instruction and decreased achievement in hands-on skill development. This decreased skill development was a

result of delayed, rushed, and laboratory intensive instruction of hands-on skills after "stay at home" orders lapsed and students were allowed to meet on campus. Faculty expressed similar concerns regarding student hands-on skill proficiency decreases after changing formats, but did not feel the quality of their teaching had decreased. Hands-on skills are imperative skills in physical therapy. Students and faculty felt decreased proficiency of these skills, during students' first year of physical therapy education, would be overcome with future education and full-time clinical education experiences. It is often during these full-time experiences that hands-on skills are honed and solidified with much repetition and practice.

Another prominent negatively perceived impact was experienced due to decreased interaction between classmates, and between students and faculty. Nearly all surveyed and interviewed students related missing interaction with classmates and many interviewees voiced experiencing difficulties due to decreased interaction. Some students reported loneliness and burnout from working at home alone. One student, who thrived on classmate interaction, suffered an initial-onset panic attack after moving to online at-home learning. In addition, faculty expressed feelings of longing for increased in-person interaction with students beyond their virtual classroom sessions. Even though technology allowed for virtual interaction and students did not feel faculty were less accessible, most students did not engage in informal or formal virtual interaction with classmates and faculty.

Stress negatively affected a number of students. As student interaction and connection to their cohort decreased, motivation to continue working on material at home, and alone, waned. Students felt greater onus for their own learning as increased flexibility of education and personal distractions abounded after changing education formats. Several students had to manage home and/or parental responsibilities while trying to study, which added additional stress. Even

as many students felt increased stress, some students reported no impact on stress from changing formats. For other students, time and effort saved by not having to travel to campus relieved a measure of their stress. It is not possible to attribute all impacts of stress, experienced during this investigation, to changing distance-learning formats of physical therapy education. A worldwide pandemic, which was not well understood, dominated headlines. In addition, information and mitigation strategies were changing rapidly as more was learned about the virus (Gagnon et al., 2020). Personal and societal reactions and some fear of the COVID-19 pandemic likely added further stress for students and faculty.

Positive Impacts

Despite negative impacts of decreased hand-on skill development, decreased classmate and faculty interaction, and increases of stress, a number of positive impacts emerged after switching distance education formats. To reiterate, the most important positive aspect was that students were able to continue progressing on schedule because of changing formats. Students and faculty felt there would be no negative effect on students' future careers. Some students felt instead of negatively affecting their future careers, the experience would prove a benefit in their practice due to extensive virtual-learning experiences. Many healthcare professions, including physical therapy, were forced to utilize telemedicine in examinations and treatments during the COVID-19 pandemic to decrease chance of viral spread. Students felt that familiarity with and having learned and practiced skills over Zoom® would directly translate to abilities in practicing therapy via telemedicine technologies.

Although interaction between students and between students and faculty, at individual campuses, was decreased and perceived as a negative, interaction across distance-separated campuses increased after changing distance-learning formats. A majority of interviewed students

reported this increased interaction, with opposite campus students and faculty, as the most influential positive impact of changing formats. Barriers and perceptions of competition between campuses were lessened, and students reported more understanding and connection after interacting more with students and faculty across campuses. Cross-campus groups for discussion and assignments were formed, which had not been regular practice previously in the synchronous videoconferencing model. Many students reported desires to continue cross-campus activities regardless of distance-learning model used in the future. In addition, faculty felt opposite-campus students reached out more frequently, in the hybrid format, than they had in the synchronous videoconferencing format. Faculty learned names of opposite-site students more efficiently when seeing names on Zoom® screens. Improvement in cross-campus interaction created more unity of the full cohort of students, instead of simply being a cohort located in two sites.

For faculty, changing formats was positive due to increased preparation, in exploring new ideas and methods, and in increasing quality of instruction. Faculty felt a greater urgency and impetus to prepare more thoroughly for content delivery in the new format. This provided increased attention to detail and renewed focus on content delivery. As faculty worked to prepare and present content, they found that previously utilized methods were not always most effective in the new format. Faculty found through reflection, discovery, and preparation more effective methods in teaching. As technology inconsistencies and variabilities provided intermittent distractions, faculty also had to prepare for unforeseen difficulties. Students appreciated and were complimentary of faculty efforts in delivering content and felt content, in many cases, was delivered more succinctly.

Technology

Most students reported minimal or no difficulties with technology. Occasional lack of bandwidth issues occurred as students and other members of their households initially all transitioned to home networks. Students reported having necessary equipment and internet capabilities when matriculating into the physical therapy program and did not report needing to purchase or obtain additional equipment with changing education formats. A few students opted to visit campus locations for better study focus and more reliable internet. Having to rely on home networks and equipment, some students felt their technological literacy was lacking, but students did not feel their decreased literacy negatively affected their learning experience.

Summary

Overall, changing distance-learning formats had a number of perceived positive and negative impacts. The primary positive impact was that students were able to continue their physical therapy education. Perceived decreased proficiency of imperative hands-on skills was the most significant negative effect from switching formats. However, students and faculty did not believe these decreases in hands-on ability and proficiency would negatively affect students' overall education and career potential. Students and faculty found they missed familiar interactions previously experienced with on-campus classroom sessions. Learning amidst increased distraction was difficult for some students. Positive impacts from changing distance-learning formats included increased camaraderie and cohesiveness between opposite-campus students and between opposite-site faculty and students. In addition, faculty increased their preparation for teaching which in turn improved the quality of their teaching. Faculty were able to consider newer methods beyond how they had always taught, and felt these positive benefits would help them teach better in the future. When considering both synchronous

videoconferencing and hybrid learning formats, students and faculty discovered positive aspects of both formats. Neither format emerged as a preferable or better format for distance-learning education for all students and faculty. In order to improve student learning and experience in physical therapy education, student and faculty perceptions of switching between formats may prove valuable for educators utilizing these formats.

Discussion

As innovation in education continues to evolve, as technology continues to advance, searching for effective and efficient methods of teaching will be a constant pursuit. Internet technology and distance-learning capabilities have provided many innovations in education (Amirault, 2012). Unfortunately, innovations are often adopted more from their allure rather than from evidence of their efficacy (Colbert & Chokshi, 2014). This investigation provides evidence of the efficacy of utilizing a hybrid form of education in a doctor of physical therapy program facing challenging circumstances created by a worldwide pandemic. Faculty at Idaho State University were successful in progressing students' education without perceived negative effects on students' overall learning or career potential.

This investigation demonstrated perceived impact felt by physical therapy students and faculty at Idaho State University who experienced a change in distance learning formats due to the COVID-19 pandemic. Switching from an in-person synchronous videoconferencing format across two distance-separated campuses, to a learn at home, and then come to campus for practical applications at a later date, hybrid program model, had several consequences. Learning and competence of practical hands-on skills, student interaction, and course preparation were impacted most with personal stress identified as being heightened with the change. Yet, students and faculty perceived that changing distance-education formats in response to the COVID-19

pandemic would not hinder students' ability to learn or hinder students' career potential as physical therapists.

Hands-on Skills

Even though overall learning and career potential were not felt as being hindered, immediate learning was impacted. Didactic learning was not perceived to be hindered or negatively affected, however hands-on practical components suffered. Students found that delaying hands-on content affected curricular connection to didactic content, which caused decreased understanding of rationale for hands-on examination and treatment. They also desired more time to practice and internalize hands-on content that was not possible due to "stay at home" directives designed to decrease possible spread of the COVID-19 virus. Students worried that their hands-on skills would be lacking when going on early full-time clinical affiliations.

Unlike didactic content, the format for practical hands-on skill instruction was not significantly changed. Students were taught practical hands-on skills in-person via a synchronous videoconferencing format, as they would have prior to changing didactic formats. However, timing of this content delivery was changed. Changing the sequencing of content caused delayed hands-on content instruction that was not directly supported by or tied to didactic content. The volume of content covered in each practical session also changed. Prior to COVID-19 caused program shifts, hands-on skill instruction occurred throughout a semester. In the hybrid format, the full semester's hands-on skills were covered in intensive weeklong sessions at the end of the summer term without the advantage of time to practice and recall skills over time. Students felt the quality of their education suffered because of decreased time to develop hands-on skill proficiency that is imperative in physical therapy examination and treatments.

Even though physical therapy students perceived decreased hands-on skill development after changing distance-learning formats, Lazinski (2017) found students achieved satisfactory psychomotor skill development, after delaying hands-on content, in a hybrid-model physical therapy program at Nova Southeastern University. Consistent with Lazinski, even as their psychomotor skills development had been delayed, Idaho State University students perceived they would eventually develop proficiency with hands-on skills further as their education progressed. They felt that current decreases in hands-on skill proficiency would not hinder their potentials of becoming successful physical therapists. One reason for this seemingly contradictory perspective may be the timing of changing formats. The change occurred during the first year of the physical therapy curriculum prior to full-time clinical experiences. There would likely be time to practice and develop these skills, prior to professional practice, in the curriculum and through upcoming full-time clinical experiences required to graduate.

Decreased hands-on skill development was overwhelmingly the most impactful result of changing distance-learning formats. It is likely that most students value these skills due to psychomotor ability requirements in physical therapy practice. Didactic information and content has been shown in literature to be effectively and efficiently learned in multiple formats, however psychomotor skill development requires hands-on practice that can be difficult to obtain in other learning formats. Physical therapy programs must provide educational opportunities for developing hands-on skill proficiency. Timing of instructing these skills is also important as demonstrated in this investigation. Students need to be able to combine didactic content with practical hands-on content to build meaning and purpose of their hands-on treatments. They also need time for practice and recall of hands-on skills.

Physical therapy programs utilizing hybrid models prior to the outbreak of the COVID-19 pandemic, brought students to campus several times during a semester. This practice allowed for more frequent hands-on skill instruction and practice than was possible at Idaho State University during this investigation. However, even with more frequent sessions, delaying hands-on content may create disconnect from the didactic content. As this investigation demonstrated, students felt their experience and education were most affected by perceptions of decreased hands-on skill proficiency with low content connection and time for proficiency. Administrators and educators utilizing hybrid delivery models must provide connection to didactic content and enough time for students to feel proficient in hands-on skills. Doing so will likely increase student satisfaction and perceptions of positive educational experiences. Students will be and feel more prepared for full-time clinical affiliations where they can solidify and hone hands-on abilities.

Studying the first-year cohort was important due to variability of student experiences on future full-time clinical experiences. It would be difficult to compare like experiences and education after students attend full-time clinical experiences as student perspectives may be influenced by lessons learned from clinical instructors at external clinical affiliation sites. It is often on the full-time clinical experiences where students solidify clinical skills and learning. To meet accreditation standards for physical therapy education (Commission on Accreditation in Physical Therapy Education, n.d.), Idaho State University's physical therapy program requires students to participate in four, eight-week full-time clinical experiences. These experiences provide much time for students to practice skills and build proficiency. This extensive upcoming training may support students' perspectives that their future abilities and careers would not be negatively affected, and they would be able to gain lacking practice and proficiency of practical hands-on skills. Faculty felt students had achieved foundations of didactic knowledge and

practical hands-on skills that could be built upon. The program director professed this achievement when he stated, "I trust that we have provided them with the basic knowledge, skills, and abilities that are needed to go out and practice." He felt the program had been successful and students had built resiliency that will carry them in their education and careers.

Meridian Survey Differences

A surprising finding from surveying students in this investigation was that Meridian-based students perceived greater negative impacts then their Pocatello counterparts. The number of survey participants was equal in both locations and demographics were reflective of the gender breakdown in each location. Recognizing there is a possibility of coincidence with student responses, a few possible explanations for discrepancies in perception are presented. Local characteristics of each campus location may influence student perceptions. The Meridian campus is located in the Boise metropolitan area while Pocatello is in a more rural area of the state. Students may face greater distraction from higher-paced communities in the larger metropolitan area, which could affect more aspects of their lives. Based in the metropolitan area, the Meridian campus is a satellite commuter campus without full local availability of all university amenities. Differences in commute and service availability may influence students' perceptions of their experiences.

Students may have perceived a measure of inequality between campuses prior to changing formats and this may have carried over to survey responses. Divanoglou et al. (2018) reported students, studying physical therapy in a synchronous videoconferencing format, had strong relationships with their same-site campus personnel, but lacked positive relationships with opposite site students and lacked connection with faculty at a distance. Students felt competition and inequality between campuses due to perceived differences of location and faculty. Even

though content is shared between campuses synchronously, during the spring semester, most of the course content originated from the Pocatello campus. As students in Pocatello may have built better relationships, due to proximity with primary instructors, Meridian students may have felt greater impact and inequality due to decreased ability to build positive relationships.

A final possible explanation for the change in perceptions could be from the outbreak of COVID-19 in Idaho. The first confirmed case of the virus in Idaho was in the Boise area and spread occurred quickly throughout the metropolitan area. In contrast, it was several weeks before a positive case was reported near Pocatello and spread was much slower in the more rural community. External events, with virus concerns compounded by a higher metropolitan area, may have influenced student perception more negatively in Meridian.

Interaction

Achievement and future career potential may not have been perceived as being negatively affected by changing distance-learning formats, but students struggled with decreased interaction and camaraderie. Students had been accustomed to being in class with classmates and instructors located at their same campuses. With government and institutional administration mandated "stay at home" orders, these previously experienced interactions were disrupted. Interaction benefits of easy study group formation and conduction, bouncing of ideas between students and faculty, asking informal questions, and receiving classmate reminders and motivations to complete assignments were lost. Due to distancing requirements, students were not able to get together in class, or at home, so many felt alone in learning. Technology provided opportunities of communication to continue interactions at a distance, but students felt technology was not effective and preferred in-person interaction.

Even as interaction with same education site students and faculty decreased, a surprising effect from students and faculty working from home, was an ability to better interact with students and faculty from the opposite site campuses. While accreditation dictates equivalency between campuses in experiences, equipment, and learning abilities in synchronous videoconferencing, inherent or perceived inequalities exist between campuses. These differences may be experienced due to location or accessibility of campus resources. Similar to findings of Divanoglou et al. (2018), decreased feelings of closeness or relationship with distant-site faculty and students was experienced. One faculty member located in Meridian reported:

> I don't really know their names in Pocatello. So, I feel like I develop a close connection with the students that are with me, and the ones in Pocatello are swept along for the ride…I feel like despite the instructors' best efforts, the remote site is always going to be a little disadvantaged.

Faculty members were able to learn names of distance-site students from Zoom® screens and got to know them better in the online format.

Prior to changing distance-learning formats, group projects were assigned based on campus location. After changing to the hybrid format, intermixing students, from each campus location in working groups, allowed students to get to know each other better with more cross-campus interaction as they completed assignments. In addition, because of increased interaction between campuses, students felt they learned more about their counterparts at the opposite site and previous feelings of competition decreased. A student observed benefits of cross-campus groupings and interaction in the hybrid model:

> I think it has helped kind of remove barriers between the Meridian and Pocatello campuses. Because you could feel a wall there during the synchronous learning. Now that

we have been on Zoom®, whenever we've had breakout sessions, they've been made up

of Meridian and Pocatello students and that's just kind of gotten rid of those barriers, and

I feel we are more unified as a class of 2022 cohort.

A desire to continue cross-campus interaction and activities was expressed by many students at each location. Young et al. (2010) found similar student desires when investigating physical therapy students participating in an international distance-learning experience. Students, in their study, desired to have more time to interact with the distance-site students located at different campuses, and countries.

Interaction is a very important aspect of education for students and faculty as seen in this investigation. Students and faculty both missed and longed for interaction curbed by moving to the hybrid model of instruction. Interaction in distance education is a challenge. In synchronous videoconferencing formats, interaction with students and faculty at distant campuses is limited. In hybrid models, typical interaction is limited to virtual activities or intensive laboratory sessions. In-person interaction has been a benefit of traditional classroom education. With increased usage of distance technology, educators need to develop methods that will foster interaction between students and between faculty and students. Many students in this investigation were initially motivated to continue learning after changing formats. However, this motivation waned after working alone for a time. Students also felt the weight of personal accountability for their learning. They reported missing study groups and helpful reminders from classmates that had occurred with more frequency before the change.

The initial synchronous videoconferencing format utilized at Idaho State University did not provide for effective student interaction between campus locations. Figurative barriers existed between campuses beyond the actual distance barrier of campus separation. These

barriers decreased when students participated together in online lessons and in cross-campus assignment groups. Students overwhelmingly enjoyed and desired to continue these cross-campus experiences. This investigation demonstrated fostering cross-campus interaction between distance-separated locations is possible, beneficial, and desired to increase positive educational environments and cohesiveness of cohorts. Educators should consider methods to foster increased interaction and unity between campuses in synchronous videoconferencing programs.

Increasing opportunities for interaction for students in online and hybrid programs is important for educators. As demonstrated by student responses, students at home dealt with more distraction, had decreased motivation, and felt more alone in their learning. Providing opportunities and activities encouraging interaction may help with student performance and retention. Faculty at South College report placing importance on interaction through a number of activities in their hybrid program model:

> We also assign students to groups with a faculty coach (an advisor). These groups, which often develop into formal study groups, contribute to the feeling of togetherness and create a support network.

> Our faculty are skilled in forming a community in a virtual classroom by developing interactive class sessions with small group discussions in virtual breakout rooms and spirited debates over course content and patient case scenarios. These activities provide a platform for students to engage with each other and often result in an outpouring of encouragement, support, and praise among classmates.

> Formation of community is strengthened during the on-campus lab immersions, even when social distancing is enforced. When students are assigned to different lab rooms, they can share live streaming video to participate in friendly challenges,

energizing activities, and simple words of encouragement. During these lab activities,

students still work together in the evenings throughout a one- to two-week lab

experience, often forming virtual meetings as a means to work together. (American

Physical Therapy Association, 2020, "Be Creative with Technology" section)

For programs moving to hybrid-type formats, similar methods of encouraging interaction should

be employed. In addition, synchronous videoconferencing programs should not limit interaction

opportunities to students based in one location. Technology allows for utilization of activities

and procedures to increase interaction between campuses, which builds a better community of

learners to enhance educational environment and experience (Garrison et al. 1999).

Faculty Preparation

A surprising positive result of changing distance-learning formats emerged as physical

therapy faculty had to evaluate their courses in different ways than they had previously. The

announcement for "stay at home" orders came a week before spring break. Faculty had a two-

week window to change distance-education formats. Initially, some planned same, or very

similar, methods to ones they were using prior to switching formats. Unfortunately, even as

formats, initially and after changing, both utilized distance technologies, reliance on previously

used methods proved ineffective as the department chair stated, "Synchronous delivery over DL

and synchronous delivery over Zoom® ended up not being equivalent at all…I started to

implement more truly online strategies of breakout rooms and leading questions and preemptive

activities."

Due to a significant and forced change in delivery format, faculty had to analyze and

reflect on their courses. As faculty worked to adjust courses, more focus was placed on content

and delivery methods. Faculty found other, more effective ways to instruct. There was increased

precision, as instructors could not rely as much on classroom cues or classroom charisma. Increased preparation and precision, after changing formats, enhanced faculty perceptions of the quality of their courses. Faculty perceived the quality of their instruction increased as they found better and, in some cases, more effective methods to teach. Faculty should use periodic reflection to improve their teaching and to avoid possible teaching stagnation.

Changing Formats

Overall, students and faculty perceived negative impacts of changing distance-learning formats as decreased hands-on skill proficiency, decreased closeness with classmates, and stress. Positive perspective impacts were experienced in continued progression of student learning, no adverse effect to future physical therapy career potential, better cohesion and interaction between campuses, learning of new methods for presenting material, and increased preparation for delivering content. While these impacts were experienced at the physical therapy program at Idaho State University after switching distance-learning formats, it is important to recognize that perceived impacts were likely influenced by events external to students' educational experiences. It was beyond the scope of this investigation to study effects the worldwide pandemic had on the cohort being studied, but these events assuredly influenced student and faculty perspectives. Students and faculty likely were concerned for personal and family safety, for health, and for an ability to continue their education. As there were many unknowns and changing messages regarding COVID-19 during the study (Gagnon et al. 2020), student and faculty stress levels were likely heightened by circumstances and methods to mitigate viral spread. One of those mitigating methods was to modify the learning environment and format. Even though this investigation focused on a single mitigating change, it is likely other influences may have affected student and faculty perception.

Impact experienced from a forced expedited switch in distance-education delivery formats was likely greater than if the program had made a planned and methodical change in formats. One student recognized initial discomfort with switching formats, even though recognizing that the change was necessary in order to continue program progression. She reported if the program had been designed as a hybrid-type program initially, it would have been more organized from the start. In addition, she likely would not have chosen to attend a hybrid only program due to conflicts with her learning style. In this investigation, it is important to consider impacts of unexpected change. With more time and a comprehensive change plan, impact felt by students and faculty may have been different. In adopting a new model of distance education in response to difficult circumstances, program faculty demonstrated that even in the absence of extensive preparation a lesser researched format in physical therapy education could be employed effectively, and without perceived degradation of learning (other than perceived hands-on learning difficulties).

Considering all external pressures and unknowns, it is encouraging a majority of students did not feel their learning, and their future careers, would be negatively affected after changing the vehicles carrying their content by changing distance-learning formats. These perceptions support, but do not prove as there were those who perceived negative impact, Clark's assertions that the medium by which educational content is carried does not create learning. In his words:

> The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes change in our nutrition. Basically, the choice of vehicle might influence the cost or extent of distributing instruction, but only the content of the vehicle can influence achievement. (Clark, 1983, p. 445)

Students and faculty, at Idaho State University's physical therapy program, both perceived and experienced student achievement in didactic instruction and learning, even after changing distance-education formats. Changing "vehicles" of delivery was not perceived as creating negative results.

It is not surprising students and faculty did not perceive negative effects on didactic learning achievement. Research demonstrates there is little difference in achievement levels for those educated in different distance-learning formats. Hortos et al. (2013) found examination scores for osteopathic medicine students were consistent between three locations (two with synchronous videoconferencing and the third via face-to-face instruction). While Fritz et al. (2019) observed similar results between a recorded video group, a face-to-face group, and a synchronous videoconferencing group of medical students. In physical therapy education, Jones et al. (2010), comparing achievements of students on both sides of the Pacific Ocean, discovered equal educational achievement in post-test measures between groups of physical therapy students learning via face-to-face instruction, web-based modules, and a group with combined methods. Previous investigations have highlighted that when technology does not function as expected, student perceptions are lower (Alnabelsie et al. 2015; Kunin et al. 2013). Student perceptions may have been more positive as technological problems were intermittent and few in this investigation.

In an attempt to emphasize program-level hybrid education in physical therapy education, Gagnon et al. (2020) published a report describing experiences from Baylor University's program-level hybrid program. The authors acknowledged that many physical therapy programs had to move to online methods during the COVID-19 pandemic. However, they were careful not to call these programs, that changed formats, "hybrid" programs. In the authors' view, true
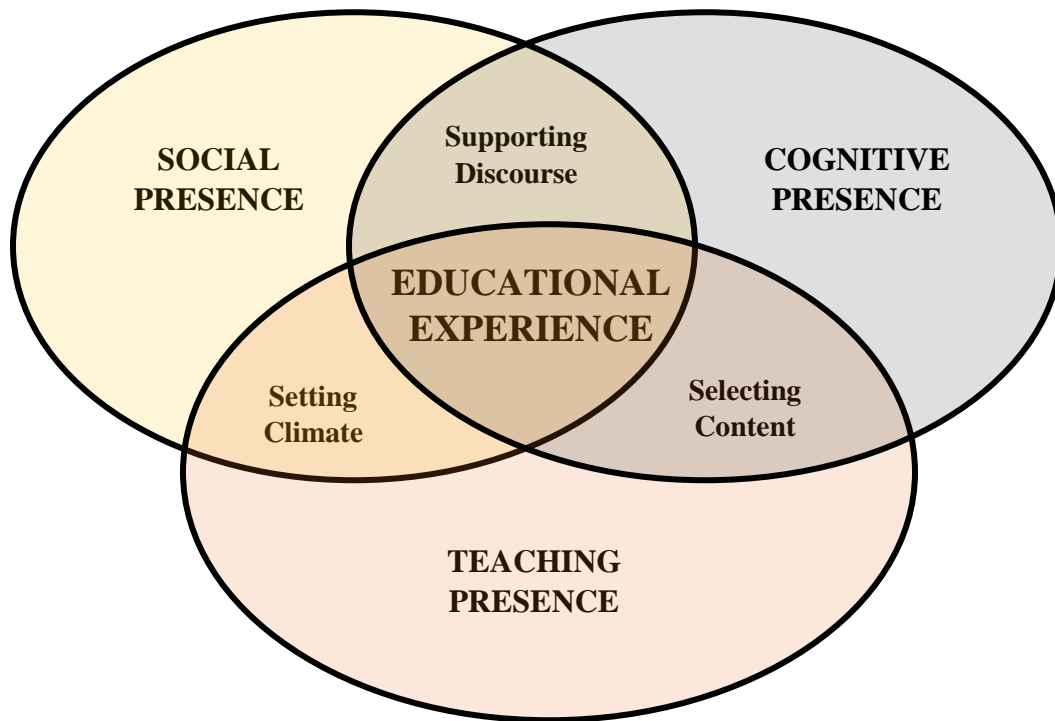
hybrid models take time and planning to develop. Most physical therapy programs, due to COVID-19 measures, moved from face-to-face methods to online, or hybrid-type delivery. Idaho State University's program moved from synchronous videoconferencing to a hybrid-type delivery. Although likely not considered a fully hybrid delivery format due to rapid expedited format change by Gagnon et al. (2020), many hybrid-format aspects were utilized at Idaho State University.

Community of Inquiry

Gagnon et al. (2020) iterated that building a community of learners in online and hybrid formats is difficult, but crucial. Citing work by Garrison et al. (1999), the authors discussed interaction between the cognitive presence, social presence, and teaching presence of learning in a community of inquiry. Intersection of these three presences, in a program, enhances learning environments and experience (see Figure 17). Each of these presences were impacted when Idaho State University's physical therapy program switched distance-learning formats, and these presences emerged in the perspectives of students and faculty. Students reported experienced difficulties adjusting to the new format. Some reported this difficulty was due to stress, others due to motivation, and yet others professed not being able to learn as well online. When viewed solely from a cognitive presence, learning was daunting to many of the students. Difficulty in connecting in-person hands-on content with, via-distance, didactic content demonstrated poor initial cognitive presence after changing formats.

Figure 17

Community of Inquiry Theoretical Framework

SOCIAL PRESENCE

Supporting Discourse

COGNITIVE PRESENCE

EDUCATIONAL EXPERIENCE

Setting Climate

Selecting Content

TEACHING PRESENCE

Elements of an Educational Experience

Note. Adapted from "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education" by D. R. Garrison, T. Anderson, and W. Archer, 1999, *The Internet and Higher Education*, *2*(2-3), p. 88. Copyright 2000 Elsevier Science Inc.

Physical therapy program students and faculty at Idaho State University identified impacts to social and teaching presences after changing formats to the hybrid format. Gagnon et al. (2020) explained, "Interactions between students may happen more naturally in face-to-face classrooms, where students are located geographically in the same community" (p. 1271). These interactions were more frequent and stronger with same-site campus students and faculty in the synchronous videoconferencing format. Experience of losing these interactions was cited by a

majority of students, surveyed and interviewed, as a negative impact of changing formats. In addition, faculty felt less connection with students. However, an increase of social and teaching presences occurred between students and faculty at opposite-site campuses through synchronous lectures, breakout rooms, and cross-campus group assignments.

As faculty learned to utilize technology more effectively and students became more accustomed to the new format, teaching, social, and cognitive presences began to intersect. This created a workable learning environment, which likely became a basis for student and faculty perspectives relating to feelings of little to no impact of changing distance-education formats on student achievement, learning, and future career potential. Student and faculty perspectives of decreased proficiency of hands-on skills likely were more negative because of limited time and experience in conducting in-person intensive hands-on labs and practical activities via technology. Many of these skills, regardless of content delivery format, are solidified during accreditation-required 30-weeks of full-time clinical experiences (CAPTE, n.d.). It is during these full-time clinical experiences that students work in professional clinics treating patients under the tutelage of clinical instructors. The perceived future benefit of these clinical experiences in solidifying skills with intertwining of social, teaching, and cognitive presences, could further explain why students reflected no likely impact to future careers in physical therapy after changing formats.

Even though, in this case study, faculty and students at Idaho State University perceived minor to no impact on learning and future career potential for first-year physical therapy students, actual impact is unknown and will not likely be realized until graduation or during post-graduation employment. The program director referred to these unknowns when he stated:

I would say that I do have concerns about how well prepared these students will be. Would I want them treating my mom or mother-in-law? That being said, I trust that we have provided them with the basic knowledge, skills, and abilities that are needed to go out and practice. Now, will they be behind some of their peers who traditionally graduate? Possible. I wonder that. But as we get further into this my sense of confidence goes up both in their ability and our ability to teach this way and to get them exactly what they need. We had to put off a lot of lab content. So that is where my biggest concern is, in their hands-on skills, but now that we're fitting that lab content in, and finding a way to do it, with appropriate physical distancing, mask wearing, and contact tracing, I think "yeah, they got this."

Physical therapy program faculty will be able to determine actual impact, in the future, after students complete their physical therapy education, complete all full-time clinical education experiences, and take the National Physical Therapy Examination (Federation of State Boards of Physical Therapy, n.d.) in preparation for licensure. Results of the board examination can be compared to previous years to gauge true impact on physical therapy educational achievement. In addition, learning from employers through surveys, which are sent yearly to new employers of program graduates, will also give insight to actual impacts from changing distance-learning formats and disruptions caused by the COVID-19 pandemic.

Recommendations for Educators

Physical therapy educators employing distance-learning methods may gain insight from the results of this investigation. In this case study, students and faculty did not perceive a decrease in quality or learning achievement other than for practical hands-on skills. This is consistent with Clark's (1983) assertions that technology medium used does not change

educational achievement. However, physical therapy educators must account for many educational aspects in order to provide successful educational experiences for physical therapy students and faculty, especially when considering different formats.

The strongest message of impact from Idaho State University physical therapy students was the lack of hands-on skill development. Hands-on skills are widely utilized in all settings of physical therapy and crucial for students to learn during their entry-level education. After switching formats to the hybrid method, which resulted in delaying hands-on content until this content could be present while abiding by COVID-19 precautions, students and faculty, felt these skills were not well connected to didactic content. Students desired more hands-on content and faculty wondered how well the students had grasped these imperative skills. The forced hybrid format, due to COVID-19 restrictions, did not allow for regular hands-on skill instruction that other hybrid programs plan more frequently during didactic instruction (Baylor University n.d.; University of Southern California, n.d.). This case study demonstrates the importance of tying didactic content together with more frequent practical hands-on skill instruction and practice. Educators in all formats of physical therapy education should evaluate hands-on skill instruction to ensure it occurs with sufficient volume of instruction, connection to didactic content, and time for knowledge and practice for integration.

The importance of between student, and faculty to student, interaction was another major element educators can learn from this case study investigation. Students longed for interaction that was decreased after "stay at home" orders prevented in-person classroom sessions. Previously experienced camaraderie with fellow students and faculty was missed and many students felt more alone. Some students at Idaho State University thrived being alone, but the majority of students wanted more interaction. Programs utilizing distance-learning methods must

be mindful that many students need interaction, and should develop methods of fostering student interaction when developing curriculum and lesson plans. It will be beneficial for educators to focus on building relationships along with building knowledge.

Specific to programs utilizing synchronous videoconferencing, intercampus interaction and groupings are possible and important. Students and faculty, in this case study, reported having better relationships with students located at opposite campus locations in the hybrid model than they did in the synchronous videoconferencing model. Opposite-site students and faculty were more accessible through Zoom® than over fixed distance-learning systems. One important lesson learned was that students did not need to be bounded by location, and students located on opposite campuses could be paired or grouped effectively. Educators at institutions utilizing synchronous videoconferencing between distance-separated campuses should consider, if they do not already, grouping students from their different locations. The students and faculty in this case study found this to be very positive and built understanding and camaraderie with opposite-site students. Divanoglou et al. (2018) discovered that physical therapy students, at their distant-site campus in a synchronous videoconferencing format in Australia, felt poor coordination with instructors and a sense of inequality from host-site students in content delivery. Students at both campuses reported feeling a sense of competition with the opposite campus. During hybrid format learning at Idaho State University, students who were paired or interacted more with students at opposite campuses, grew closer through group work and interaction between campuses increased. One student reported:

I think with the Meridian and Pocatello campuses, the switch was better for intercampus mingling, if that makes sense. I feel we were much more unified with the Meridian

campus than we were before. That is something that is a good bonus of everything that

has happened.

In order to decrease possible feelings of inequality and competition, physical therapy programs should consider pairing, or grouping, students from opposite campuses together for educational activities and assignments.

Regardless of delivery format, important lessons were learned by faculty in this case study. First, faculty realized they needed to spend more time in preparation for teaching in the new format. Second, faculty learned new ways of instruction and tools to use in instruction. Prior to the change in distance-learning delivery formats, some faculty members utilized consistent and repeated methods. After changing formats, it was realized that previous methods could not be fully relied upon. Increased preparation, and learning previously unused methods, allowed faculty to improve the quality of their teaching and instruction. It is recommended that educators consider investigating their teaching methods and allow for innovation, which may take increased preparation. Educators should seek evidence for newer methods so they do not fall into the trap of technological advances without concomitant evidence of effectiveness (Colbert & Chokshi, 2014; Sandars et al., 2015). Instructors should work to add to the evidence through investigation if only sparse evidence exists (Amirault, 2012; Sandars et al., 2015).

There was not sufficient time to form a comprehensive plan to transition to pure hybrid-program delivery. Taking parts of synchronous videoconferencing philosophies and using them in hybrid formats was successful during the pandemic. However, for physical therapy programs considering hybrid program formats, pedagogy should be studied, planning should be thorough, and transition should not be rushed. Gagnon et al. (2020) proclaimed that although many

programs shifted learning during the pandemic, formats were not truly hybrid learning, as initial design was not for hybrid methods:

> In the wake of COVID-19, physical therapy educators were abruptly required to suspend onsite learning and provide virtual instruction. It is important to note that—although these efforts have been innovative, thoughtful, and may prove to be successful—this shift of learning designed for face-to-face delivery to virtual delivery may be best described as remote instruction. This should not be confused with online or blended/hybrid learning, as these terms should be reserved for describing teaching and learning designed to be delivered—in whole or part—online. (P. 1273)

The authors admit that hybrid doctor or physical therapy education is misunderstood and there are many outcomes that still need to be assessed. Programs considering hybrid models should be careful in their planning, preparation, and intentional in their assessment of student outcomes, program outcomes, faculty and administrative workload, and student educational and professional career satisfaction (Gagnon et al., 2020).

Suggestions for Additional Research

Further research studying impacts of switching delivery formats would give additional insight into different forms of educational delivery. As mentioned previously, this case study investigated student and faculty perspectives of impacts of switching distance-learning formats. Student and faculty did not feel changing formats would affect students' overall learning or future career potentials. Future research should measure impacts of changing educational formats on National Physical Therapy Examination (Federation of State Boards of Physical Therapy, n.d.) performance of these students compared to other cohorts. This would answer questions of the actual impact of switching distance-learning formats. A second investigation could compare

results of programs switching from face-to-face learning to online/hybrid formats to those who went from one form of distance education to hybrid-like formats.

One difficulty with all investigations of change, using a single cohort, is that students have an initial format in which they are accustomed. Change from one format may often be met with dissatisfaction for many reasons. Occasionally research subjects may prefer a newer model as was the case in this case study with four students reporting preference for the hybrid model of education. As this case study investigated impacts of switching from synchronous videoconferencing to a hybrid model of delivery, further investigations could study the opposite change (hybrid to synchronous videoconferencing). This would likely be difficult as most hybrid programs do not require students to reside in an area local to campus, but maybe an opportunity would arise. At Idaho State University, the cohort following the one studied, began the physical therapy program utilizing more hybrid methods, due to the COVID-19 virus, and will move to more of a synchronous videoconferencing model after concerns of viral spread decrease.

Another possible related research investigation could evaluate the impact of switching back to the first format. Students in the current investigation have had content presented at their homes with delayed hands-on practical content for the same duration in which they were instructed initially via synchronous videoconferencing. "How will the students respond to going back to the initial format and what will be the impact?" would be a possible follow on research topic.

Another topic and theme derived from this case study that would be valuable research would study cross-campus interaction in synchronous videoconferencing delivery. Students felt better connection with their opposite site classmates when partnered and grouped together in the hybrid format. It would be interesting to learn perspectives of fairness or competition between

campuses with and without cross-campus groupings. In addition, it would be valuable to learn if educational achievement was consistent if students had same-campus versus cross-campus groupings. Another possible area of investigation for synchronous videoconferencing programs would be to study student perceptions between campus sites located in urban versus rural locations.

Conclusion

In spring of 2020, an outbreak of a worldwide pandemic emerged, which changed methods of educational content delivery for institutions of higher education. Following directives from disease experts and governing bodies of these institutions, in-person courses were ceased to decrease possible spread of the COVID-19 virus. Most education programs switched from traditional face-to-face delivery to delivery via distance measures. The Doctor of Physical Therapy program at Idaho State University switched from one form of distance delivery, synchronous videoconferencing, to another, hybrid, format of distance delivery. This qualitative case study investigated Idaho State University physical therapy faculty and students' perceived impact of switching distance-education formats.

Faculty and students switching distance-education formats felt negative and positive impacts. The predominant negative impacts were experienced in decreased connection to didactic content and comfort with hands-on skills crucial to the physical therapy profession. Interaction between students, and between students and faculty, was also perceived as a negative impact. Some students felt isolated and without connection to classmates. Students and faculty also felt increased stress. Positive impacts included students and faculty interacting with distant-site campus students in the hybrid model more than they had in the synchronous videoconferencing model, which led to better understanding of students at opposite-campus sites,

and less perception of competition between sites. Faculty were forced to place greater preparation, which included better focus on salient material, on their lectures and courses. Both faculty and students found more flexibility in teaching and learning after switching formats.

It will likely be some time before researchers and educators understand the full impact of the COVID-19 pandemic on many aspects of life, including education. Not until the students at Idaho State University's physical therapy program graduate, take the National Physical Therapy Examination, and begin working as full-time clinicians will actual impacts be revealed. However, this case study investigated perceived impact on physical therapy content learning and on future career potential. Even though hands-on practical skills and decreased interactions were seen as negative impacts of changing distance-education formats, faculty and a majority of students felt students would not be hindered in their learning progress or future careers. Some even felt students would be more resilient and more prepared for their careers as physical therapy practice evolves and more fully embraces telehealth practices. These perceptions of equivalence of learning and career potential between distance-education technology formats supports Richard Clark's (1983) theory of instructional design that states, "…media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes change in our nutrition" (p.445). Even as there is limited research on newer technologies utilizing distance learning, good pedagogy and teaching, after switching distance-education formats (because of a world-wide pandemic), was perceived as producing equal learning, overall student achievement, and career potential in the students at Idaho State University's Doctor of Physical Therapy Program.

Although this case study investigation was bounded by the temporary switching of distance-learning formats in response to a specific event, its findings reveal crucial aspects that

will enhance educational experiences for faculty and students, even in times outside of pandemic. As hands-on skills are imperative in physical therapy, and proficiency of these skills was in question by both faculty and students after instruction of these skills was delayed, rushed, and lacked content connection with didactic instruction, educators must provide sufficient time and engagement with hands-on content for student proficiency. This is especially true in hybrid program formats that regularly delay hands-on skills instruction and practice until intensive education sessions. Activities designed to allow students to revisit content with continual practice, even at a distance, would improve retention, proficiency, and confidence with these skills.

All programs should foster interaction between students to build a community of learners, which enhance educational environments and experiences (Garrison et al., 1999). This is especially true in distance-education models where students may be isolated from classmates. Students in this investigation had difficulty staying motivated and overcoming distractions that may have been more easily managed through increased interaction and accountability between classmates. Activities and procedures should be designed to create interaction between students either between campuses or in home education environments. In synchronous videoconferencing models, cross-campus interaction through assignments and activities is necessary to decrease perceptions of competition and inequality between campuses. As students understand and have a more cohesive cross-campus culture, barriers and possible resentments that can harm education will lessen. Faculty will also build better relations with students in distance learning as they work with and reach out to those at a distance.

Faculty felt their teaching effectiveness and quality improved after having to reflect on and adjust previously utilized methods of instruction to better engage students in a new format.

Faculty should regularly evaluate methods and seek feedback from peers to avoid possible teaching stagnation and ensure student engagement. As innovation in teaching and education continues, faculty should investigate new methods, but should embrace those methods with evidence of efficacy instead of simply those currently popular. In addition, programs investigating changing formats of instruction must do so with planning and preparation for long-term success.

In this investigation, change occurred rapidly in response to distancing requirements. Faculty were successful in providing continued progress for their students, however, long-term impacts of the change will be realized in the future through standardized testing required for licensing. Discovering student and faculty impacts from this investigation of an unusual circumstance provides crucial information and evidence to physical therapy educators utilizing distance-education formats, or considering changing to these formats.

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Appendix A

Impact of Switching Distance-Learning Formats Survey

1. To what extent did your **Levels of Stress** change in response to the change from synchronous videoconferencing to the online/hybrid content delivery format?

I was significantly more stressed with the online/hybrid model of learning	I was slightly more stressed with the online/hybrid model of learning	There was no difference in levels of stress between synchronous videoconferencing and online/hybrid models of learning	I was slightly more stressed with the synchronous videoconferencing model of learning	I was significantly more stressed with the synchronous videoconferencing model of learning

2. To what extent was the **Quality of your education impacted** by the change from synchronous videoconferencing to the online/hybrid content delivery format?

Major adverse effect on educational quality	Minimal adverse effect on educational quality	No change in educational quality	Minimal improvement effect on educational quality	Major improvement effect on educational quality

3. To what extent did **External Distractions affect your ability to learn** in the change from switching from synchronous videoconferencing to the online/hybrid content delivery format?

I had significantly more distractions while learning with the online/hybrid model of learning	I had slightly more distractions while learning with the online/hybrid model of learning	There were no differences in distractions between synchronous videoconferencing and online/hybrid models of learning	I had slightly more distractions while learning with the synchronous videoconferencing model of learning	I had significantly more distractions while learning with the synchronous videoconferencing model of learning

4. To what extent was **Convenience of educational content delivery** impacted by the change from synchronous videoconferencing to the online/hybrid delivery format?

Convenience of education was significantly better with online/hybrid content delivery	Convenience of education was slightly better with online/hybrid content delivery	There was no difference in the convenience of education between synchronous videoconferencing and online/hybrid models of learning	Convenience of education was slightly better with synchronous videoconferencing	Convenience of education was significantly better with synchronous videoconferencing

5. To what extent was your **Ability to Learn** impacted by the change from synchronous video conferencing to the online hybrid/content delivery format?

It was significantly easier to learn in the online/hybrid learning format	It was slightly easier to learn in the online/hybrid learning format	There was no difference in the ability to learn between synchronous videoconferencing and online/hybrid learning formats	It was slightly easier to learn in the synchronous learning format	It was significantly easier to learn in the synchronous learning format

6. To what extent were **Life Challenges** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

I had significantly more difficulty managing life challenges while learning with the online/hybrid model	I had slightly more difficulty managing life challenges while learning with the online/hybrid model	Life challenges did not effect my learning differently between synchronous videoconferencing and online/hybrid learning formats	I had slightly more difficulty managing life challenges while learning with the synchronous videoconferencing model	I had significantly more difficulty managing life challenges while learning with the synchronous videoconferencing model

7. To what extent was your **Educational Achievement** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

My educational achievement was significantly better with the online/hybrid model of learning	My educational achievement was slightly better with the online/hybrid model of learning	My personal ability in educational achievement was not effected by changing delivery from synchronous videoconferencing to the online/hybrid model of learning	My educational achievement was slightly better with the synchronous videoconferencing model	My educational achievement was significantly better with the synchronous videoconferencing model

8. To what extent did your **Technical Literacy affect your ability to learn with** changing from synchronous video conferencing to the online/hybrid content delivery format?

I have a significant lack of technological literacy and this negatively affected my ability to learn at home	I have a slight lack of technical literacy and this negatively affected my ability to learn at home	I have a significant lack of technological literacy, but this did not have an effect on my ability to learn at home	I have a slight lack of technological literacy, but this did not have an effect on my ability to learn at home	I do not have a lack of technological literacy, and technology did not effect my ability to learn at home

9. To what extent was the **Efficiency of Learning** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

The online/hybrid model was significantly more efficient in content delivery and learning	The online/hybrid model was slightly more efficient in content delivery and learning	There was no difference in content delivery and learning efficiency between the synchronous videoconferencing and online/hybrid learning models	The synchronous videoconferencing model was slightly more efficient in content delivery and learning	The synchronous videoconferencing model was significantly more efficient in content delivery and learning

10. To what extent were your **Finances** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

I was significantly worse financially with the online/hybrid model of learning	I was slightly worse financially with the online/hybrid model of learning	There was no difference in my finances between synchronous videoconferencing and online/hybrid models of learning	I was slightly worse financially with the synchronous videoconferencing model of learning	I was significantly worse financially with the synchronous videoconferencing model of learning

11. To what extent was your **Interaction with Classmates** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

I had significantly more interaction with classmates with the online/hybrid model of learning	I had more slightly more interaction with classmates with the online/hybrid model of learning	There was no difference in my interaction with classmates between the synchronous videoconferencing and online/hybrid learning models	I had slightly more interaction with classmates with the synchronous videoconferencing model of learning	I had significantly more interaction with classmates with the synchronous videoconferencing model of learning

12. To what extent was your **Interaction with the Faculty** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

I had significantly more interaction with the faculty with the online/hybrid model of learning	I had slightly more interaction with the faculty with the online/hybrid model of learning	There was no difference in my interaction with the faculty between the synchronous videoconferencing and online/hybrid learning models	I had slightly more interaction with the faculty with the synchronous videoconferencing model of learning	I had significantly more interaction with the faculty with the synchronous videoconferencing model of learning

13. To what extent was the **Accessibility of the Faculty** impacted by the change from synchronous video conferencing to the online/hybrid content delivery format?

The faculty was significantly more accessible with the online/hybrid model of learning	The faculty was slightly more accessible with the online/hybrid model of learning	There was no difference in the accessibility of the faculty between the synchronous videoconferencing and online/hybrid learning models	The faculty was slightly more accessible with the synchronous videoconferencing model of learning	The faculty was significantly more accessible with the synchronous videoconferencing model of learning

14. To what extent was your **Future Career as a Physical Therapist** impacted by the change from synchronous video conferencing to the online hybrid/content delivery format?

The change from synchronous videoconferencing to the online/hybrid learning model will have a significant negative effect on my future career as a physical therapist	The change from synchronous videoconferencing to the online/hybrid learning model will have a slight negative effect on my future career as a physical therapist	The change from synchronous videoconferencing to the online/hybrid learning model will have no effect on my future career as a physical therapist	The change from synchronous videoconferencing to the online/hybrid learning model will have a slight positive effect on my future career as a physical therapist	The change from synchronous videoconferencing to the online/hybrid learning model will have significant positive effect on my future career as a physical therapist

15. What is your expected **Overall Impact** from the change from synchronous video conferencing to the online/hybrid content delivery format to your physical therapy education?

Changing from synchronous videoconferencing to the online/hybrid model of learning will have a significant negative impact on my physical therapy education	Changing from synchronous videoconferencing to the online/hybrid model of learning will a slight negative impact on my physical therapy education	Changing from synchronous videoconferencing to the online/hybrid model of learning will have no lasting impact on my physical therapy education	Changing from synchronous videoconferencing to the online/hybrid model of learning will have a slight positive impact on my physical therapy education	Changing from synchronous videoconferencing to the online/hybrid model of learning will have a significant positive impact on my physical therapy education

16. Please comment on any other aspects of the change from synchronous videoconferencing to online/hybrid learning and its impact on your learning.

Appendix B

Semi-Standardized Interview Questions

Appendix B1 - Student Interview Questions

Please describe your experience and impression with the switching from synchronous video conferencing to the hybrid model of distance education in the spring and summer semesters of your physical therapy education.

What are positive aspects of the synchronous videoconferencing delivery format?

What are positive aspects of the hybrid delivery format?

What are negative aspects of the synchronous videoconferencing delivery format?

What are negative aspects of the hybrid delivery format?

What problems, if any, did you have with technology (bandwith, wi-fi, equipment) with the switch in distance formats?

How was the quality of the education you received effected by the change in educational formats from synchronous videoconferencing to the hybrid model due to the COVID-19 pandemic?

How was your learning achievement effected by the change in educational formats from synchronous videoconferencing to the hybrid model due to the COVID-19 pandemic?

What effect will the change of content delivery have on you overall physical therapy education?

What effect will the change of content delivery have on your future career as a physical therapist?

Which distance learning format (synchronous video conferencing or hybrid model) do you prefer and why?

(Optional questions)

What effect did stress have on your education after switching from synchronous videoconferencing to the hybrid model of educational delivery due to the COVID-19 virus?

What were the causes of your stress that you felt during this time?

In our pre-survey, 63% of responders reported that the hybrid model was more convenient in delivery of content, how, if it was for you, was the content more convenient in its delivery?

How was your ability to learn effected by the change in content delivery from synchronous videoconferencing to the hybrid model? What specific things effected the ability to learn?

What kind of interactions did you have with your classmates, with instructors? How were these interactions effected by the change in educational delivery?

Appendix B2 - Faculty Interview Questions

Please describe your experience and impression of the program's switch from synchronous video conferencing to the hybrid model of distance education in the spring and summer semesters.

What effect, if any, did the change from synchronous videoconference delivery to a hybrid model of delivery have on your teaching?

What modifications were necessary to make the change?

How was the quality of your instruction changed by the content delivery change?

What are positive aspects you have found with the synchronous videoconferencing delivery format?

What are positive aspects you have found with the hybrid delivery format?

What are negative aspects you have found with the synchronous videoconferencing delivery format?

What are negative aspects you have found with the hybrid delivery format?

What was the overall effect of the switch for you as an instructor?

What did you learn from the experience?

Please describe your experience and impression of the program's switch from synchronous video conferencing to the hybrid model of distance education in the spring and summer semesters.

How do you judge the success of the switch from synchronous videoconferencing to hybrid delivery? What made it successful/unsuccessful?

What do you think the overall effect of the content delivery switch will be on the students' education?

What do you think will be the overall effect of the content delivery switch on the students' future careers as physical therapists?