# Traditional Versus Virtual: A Comparison of Student Outcomes In A Secondary Health and Physical Education Course

A Dissertation

Presented to

The Faculty of the University of Lynchburg

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education (Ed.D.)

by

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March 2020

Lynchburg, VA

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Keywords: Traditional Instruction, Virtual/Online Instruction, Personalized Learning, Student Achievement, Health and Physical Education

University of Lynchburg
Lynchburg, Virginia

Dissertation Title: Traditional Versus Virtual: A Comparison of Student Outcomes In A Secondary Health and Physical Education Course

**APPROVAL OF THE DISSERTATION**

This dissertation, Traditional Versus Virtual: A Comparison of Student Outcomes In A Secondary Health and Physical Education Course, has been approved by the Ed.D. Faculty of the University of Lynchburg in partial fulfillment of the requirements for the Ed.D. degree.

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## ACKNOWLEDGEMENTS

Many people contributed to the completion of my journey. First, I would like to thank my advisor Dr. Roger Jones. Your support and guidance have been invaluable. Second, I would like to thank the members of my committee, Dr. Bobbi Johnson and Dr. Steve Smith. Your suggestions and contributions to my dissertation have been extraordinary and I appreciate your guidance and support. I would also like to take this opportunity to express my thanks and admiration for Dr. John Walker who has been a mentor to me, starting as my cooperating teacher in 1983 and finally as one of my professors in this doctoral cohort. And finally, thanks to the members of Cohort 4, all of whom I have fond memories of and appreciation for all their encouragement.

A special thanks goes to Mr. Scott Graham and Ms. Hollie Jennings for taking me on as their partners in class projects more times than I deserved. Specifically, to Ms. Jennings, your attention to detail and pure determination kept me focused, on task, and helped me reach the goals that were set before me; thank you.

## ABSTRACT

This dissertation examined traditional versus virtual instruction in a secondary school with 1,086 participants. The study focused on a comparison of student outcomes when the instructional implementation differed between traditional face-to-face instruction and the use of technology-based virtual/online instruction. This case study centered around a 10th-grade health and physical education course at a high school in the Commonwealth of Virginia. A quantitative research methodology was used in conducting this study. The quantitative approach allowed the researcher to seek facts so that differences among the two types of instructional delivery models were related to and had an impact on student achievement.

The research study had one central goal; to investigate the possible relationship between two instructional delivery models and student achievement. Within this context, the overarching question for this study is, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"* The findings showed a statistical significance that the instructional delivery model and achievement were related. The participants who had better outcomes were those students who were enrolled in the traditional face-to-face instructional delivery model course rather than the virtual/online course. The theoretical framework for this study, Social Constructivism created by Vygotsky in 1978 supports the findings that the traditional face-to-face instructional delivery model supports student social interactions, which is a factor in student achievement.

## DEDICATION

This dissertation is dedicated to my mom, Nancy Norman, and my lovely bride, Dr. Dana Norman.

Thanks, Mom, for being a good listener and for putting up with my complaining about classes and papers … and also for reading my entire dissertation in less than two hours and adding comments and suggestions.

Dana, I was a seasoned and content health and physical education instructor when I was reacquainted with you. When we were married, I had no idea how driven and persistent you were, but now I have a clear understanding that you are always seeing my potential and how I can continue to grow as an educator and impact students in a positive way. During our years together you have encouraged me to become a highly qualified teacher, to apply and receive National Board Certification, to earn an administrative degree, then actually applying for a principal job and getting it, and finally now, earning a Doctorate of Education.

As you know, this entire process was a battle for me, but you never gave up on me and with your love and encouragement, here we are. So, this dedication goes to you: my encourager, my best friend, my greatest advocate, the best stepmom and my biggest fan, I love you with my whole heart and life.

# TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# CHAPTER 1: INTRODUCTION

## Introduction

*Control leads to compliance; autonomy leads to engagement. – Daniel Pink (2009)*

Engaging students in their learning has been a concern for educators since the time of Greek philosopher Socrates when he developed the instructional methodology of the "*seminar*." Today educators are struggling with critical issues that involve academic achievement, diverse student populations, and economic hardships, all of which affect funding and have links to the instructional methodologies used in schools. The improvement of student achievement is a challenge not only for teachers and administrators, but for the local school board as well. The funding needed to move schools into the 21st century goes far beyond the need for capital improvement or teacher pay, but encompasses the specific issue of moving from a traditional school environment to that of the next generation with technology at the center of instruction.

As technology infiltrates every aspect of our daily lives, how it is used throughout the educational system becomes increasingly important. Technology allows educators and students to stay current and connected. It acts as a motivator for some students and provides customized learning environments for others, each playing a part in the improvement of student performance. The use of technology in support of student engagement enhances instructional practices and becomes an integral part of improving student achievement.

## Statement of the Problem

According to reports from the National Center for Education Statistics, funding for federal mandates of testing often overlap in the area of funding for technology in schools. Technology in education has matured from just network systems and devices bought with special funds, such as grants, to becoming an integral part of the school board budget (NCES, 2019). However, in today's sluggish economy most school districts are facing budget shortfalls. The

lack of funds or even reallocation of funds could put a damper on any technology initiative, including virtual or personalized learning.

In accepting the budget constraints and the school board's purpose, which is to educate all school age children in their community, how does this new focus on personalized learning support student achievement? Understanding the influence technology may have on student achievement is important. Various researchers provided vital data confirming that virtual/online learning can support student engagement (Brown, 2003; Crosby, 2018; Cruzan, 2010; Gemin, Pape, Vashaw, & Watson, 2015; Natale, 2011; Reed, 2012). Continued discussions among educators insist that student engagement is connected to student achievement (Elmore, 2015; Kulik, 1994; Schacter, 1999; Wenglinsky, 1998). This study will provide additional research that could be valuable to educational leaders when determining whether or not to support the use of technology in all classrooms such as health/physical education.

In today's climate of educational accountability, student achievement is an obvious variable for researchers to use when studying the possible influence instructional delivery models have on student outcomes. Research that validates a relationship between the instructional methodologies of virtual/personalized learning and student achievement is important. A study from the National Association for Sport and Physical Education (2007) concluded after reviewing empirical literature that even though there were no significant differences in learning between face-to-face learning with virtual/online approaches, no empirical studies existed specific to physical education comparing face-to-face instruction with virtual/online instruction. Based on this lack of evidence, researchers now have an opportunity to move forward and delve deeper into the field of study and determine how much of an influence a virtual/online course has on student achievement, not just in a core content area, but in a traditional course such as

physical education. Based on the premise from earlier research (Bar, 1968; Bloom et al., 1956) that student learning and the instructional methodology used for learning are related, additional research of student academic achievement within a virtual/online personalized physical education course will help fill the current gap in research. The purpose of this study is to add to the field of study by investigating the possible relationship between the instructional delivery model of a traditional face-to-face physical education course and the use of a technology-based virtual instructional model and its influence on student achievement in physical education.

**Research Questions**

The purpose of this research is to investigate the possible relationship between the instructional delivery model and student achievement. Within this context, the overarching question for this study is, "Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?" Student achievement data for this study is designated as the state Physical Fitness Assessment, the 20-meter Progressive Aerobic Cardiovascular Endurance Run (PACER). The research question is supported by two sub-questions that will guide the study.

a. What difference, if any, is there in student achievement between the two groups as measured by the state Physical Fitness Assessment?
b. What difference, if any, is there between the two groups among student demographics to include: gender and socioeconomic status (free/reduced lunch versus non-free/reduced lunch status), as measured by student achievement on the state Physical Fitness Assessment?

**Significance of the Study**

The empirical research associated with virtual/online learning and blended learning in public education is limited. Even with current studies completed by Brown (2003), Cruzan (2010), Williams (2013), and Crosby (2018) the focus has not been narrowed to show the possible influence of technology-based instruction on student achievement in a health and physical education course. The focus of a blended approach to a traditional course such as physical education and its relationship to student achievement has been unexplored.

The practical application of research linking student achievement to the concept of traditional instruction versus technology-based virtual instruction in a health and physical education course will serve as a stepping stone for others in the field when analyzing the impact of instructional delivery models in order to advance student achievement. The goal for any additional research is to identify variables associated with the instructional delivery system as they relate to student achievement. This focus will provide data for school leaders in the areas of curriculum and instructional strategies and whether they impact student achievement. The research will also have potential implications for budget funding formulas due to the increase in the cost of technology to support the learning environment. The goal of this study is to provide additional research that will help determine if the virtual/personalized learning structure influences student achievement.

**Assumptions**

Throughout the course of this research several assumptions are made by the researcher. An assumption will be made that the data provided by the cooperating school system are accurate. Another assumption made is that the curriculum for health and physical education traditional and virtual courses used within the study covered all of the assessed Virginia

Standards of Learning (Virginia General Assembly, 2012). The final assumption is that the composition of the student body of the school will not measurably change over the course of the study.

**Limitations of the Study**

The limitations of the study are basic within the confines of a case study. A significant limitation is that the case study is not easily generalizable to any current or future technology study that is not similar to the identified school and its conditions. It is specific to the idea that a virtual health/physical education course is equal to that of a traditional face-to-face instructional methodology for a health/physical education course. A second limitation for this research is that the study will not be assessing the same group of students over the time of the research. The student population for each assessment year will not be reviewed as a cohort. Only students who were identified as 10th-grade students who took the Physical Fitness Assessment for the specified years will be reviewed. The third limitation for the study is that no alternative assessment offered by the school, division, or state will be utilized. Only data provided by the identified school as its Physical Fitness Assessment will be utilized. The fourth limitation is that because only 10th-grade students' mean scores will be analyzed, the mention of these findings as the norm for all physical fitness assessments from students taking a virtual/online personalized course within the Commonwealth of Virginia should be taken into consideration and with due caution. The fifth limitation is that since data will not be collected from any other school other than the identified school, the results of this study may only be directly applied to that specified school within the Commonwealth of Virginia and is considered limited in its generalizability to other schools in the Commonwealth of Virginia.

Another limitation is there are different teachers with different personalities. These different teachers and their relationships with students may influence student outcomes. The final limitation is noted as the lack of control over the selected teaching staff for each course section in the study. Earlier studies addressed teacher quality but did not address teacher attendance, professionalism, or the influence of teachers to compensate for what they consider to be poor technology. This study will follow earlier studies and only address the student achievement aspect since there is no feasible way to quantify the feelings of each teacher regarding the use of technology in the school. This researcher affirms that it is impossible to identify all the variables which could influence student achievement and is only providing a description of the data collected from this one rural school in the Commonwealth of Virginia during the school years of 2015-2019.

**Delimitations of the Study**

The first delimitation for this study is that since data were not collected for any school other than a rural county school, the results of this study may only be applied to a specific school division. The school selected is limited to one and is within the Commonwealth of Virginia. The second delimitation is that the only grade level selected for this study will be the 10th grade.

**Definitions of Terms**

The following definitions are provided to describe virtual/online teaching and learning used in this study.

*Distance Education:* The primary variable is the separation of teacher and learner in space and/or time (Sherry, 1996).

*Standards of Learning Assessment (SOL):* A Virginia assessment that measures how well students have learned the required coursework taught in the Virginia public school system (Virginia Department of Education, 2018).

*Student Achievement:* For the purpose of this study, student achievement is restricted to mean the successful mastery of an individual student on the Physical Fitness Assessment of the Virginia Standards of Learning in health/physical education at the 10th-grade level.

*Online Learning:* Students utilize the computer and/or a web-based service to learn and show mastery of the content.

*Physical Education (PE):* Physical education is education of and through human movement where many educational objectives are achieved by means of large muscle activities through sport, games, gymnastics, dance, and exercise (Barrow, 1983).

*Virtual Education:* Refers to teaching and learning in an environment where the teacher and student are separated by time and/or space. The content of the course is provided to the student via the Internet.

**Organization of the Study**

The structure of this research is framed in five chapters. Chapter 1 includes an introduction, a statement of the problem, research questions, the significance of the study, assumptions, limitations and delimitations, as well as the definition of terms and the study's organization. Chapter 2 includes a review of the literature related to traditional versus virtual/online learning and student achievement. Chapter 3 contains a description of the research methodology, the population, data needed, data collection, and the method used for data analysis. Chapter 4 describes the data and the findings of the study and provides an in-depth analysis of the data related to the research questions. Chapter 5 contains the summary of findings, discussion, conclusion, and

recommendations for further study.

**Summary**

This study, focusing on the relationship between a traditional face-to-face health/physical education course compared to a virtual/personalized health/physical education course builds on the premise of the differences among the two groups and student achievement. In the educational environment of the 21st century research that validates a relationship between the instructional methodologies of virtual/personalized learning and student achievement is important. It is the goal of this study to add to the research in order for educators to determine if the virtual/personalized learning structure is a predominant factor in student achievement.

# CHAPTER 2: REVIEW OF RELEVANT LITERATURE

## Introduction

Today, educators are struggling with critical issues that involve academic achievement, diverse student populations, and economic hardships, all of which affect funding and have links to the instructional delivery system offered to America's school age children. In 2011, then U.S. Secretary of Education Arne Duncan announced that the economic hardship faced by the nation had become the "new normal" for not only the business sector but for the local school. Due to the financial burdens placed on localities, schools would continue to have to do more with less (Horn & Staker, 2011). As more and more schools struggled with loss of funding, educators throughout the PK-12 public systems began taking advantage of new approaches to learning that were outside the traditional school environment. Instructional delivery models such as distance learning, blended environments, flipped classrooms, and what has come to be known as the model for today's innovative classroom personalized learning, all materialized in the classrooms across America. The U.S. Department of Education considers a working definition of personalized learning as instruction where the pace of learning and the approach for instructional delivery is optimized to meet the needs of the learner (United States Department of Education, 2017).

This form of instructional delivery, viewed by some as a breakthrough innovative model in teaching, has actually been around for more than 90 years; and like most concepts in education, personalized learning continues to adapt, change, and reinvent itself based on the needs of society (Bray & McClaskey, 2015). In the early 1920s, Helen Parkhurst first ventured into personalized learning when she tried to create a student curriculum and program for a child she considered gifted (Parkhurst, Bassett, Eades, & Rennie, 1924). That single effort to craft an individualized plan for one student has grown into today's personalized learning movement.

According to the designer of the phrase *personalized learning*, Victor Hoz (1972) envisioned personalization as meeting students' needs as they develop cognitively, socially, and emotionally in their learning. A teacher's knowledge of what students can do and needs to do in order to facilitate their choices in learning is the basis for personalized education (Kennedy, Freidhoff, & DeBruler, 2015). Fast-forward 47 years and the United States National Education Technology Plan of 2017 defined personalized learning as:

> Learning objectives, instructional approaches, and instructional content (and its sequencing) may all vary based on learner needs. In addition, learning activities are meaningful and relevant to learners, driven by their interests, and often self-initiated. (U.S. Department of Education, 2017, p. 13)

In the era of accountability, when research-based practices are emphasized in all aspects of education, there is limited empirical research regarding the effectiveness and relationship between personalized learning and student outcomes. The current trend in education is focused on personalization and the learners' responsibility for their own understanding of content. Schools are assembling technology for blended learning, 1:1 (one-to-one) initiatives, BYOD (Bring Your Own Device) pilots, flipped classrooms, and virtual/online learning labs. This technology-focused trend comes with a large price tag; therefore, a better understanding of an effective personalized learning environment is essential (Bonk, 2010; Tucker, 2007).

The review of literature begins with a brief history of relevant milestones and trends in education followed by a description of different learning theories, as well as the theoretical framework that ground this study. Next the chapter will focus on a review of different aspects that are featured within learning environments of health and physical education and the benefits seen by students when the use of technology becomes an integral part of instruction. Finally, the

chapter concludes with a summary of the research and a discussion of necessary additions to the existing research.

## Milestones and Trends in Education

Throughout history, teaching and learning have been an integral part of society. As early as 403 BCE when the Greek philosopher Socrates piloted the first Socratic Seminar, learning has centered on building the minds of the young to be critical thinkers. More specifically in the U.S., education has revolved around the ideas of equity, advancement, and establishing relationships with the community (Peterson, 2010). The idea of student-centered learning that is the focus of personalized learning was established in the original Socratic Seminar. Throughout the years of education, student-centered learning moved from the forefront and into the background. The lecture became the format for learning. Professors, teachers, instructors gave their interpretation of information to students, and students were expected to learn. Equity, advancement, and relationships were not even considered as an important aspect for students to need in order to be the critical thinkers of the day. Moving away from lecture back to the framework of the seminar turns instruction towards the personalized learning strategy that research is beginning to target.

**Public education in America.** Massachusetts became the first state to establish a public school in 1820, and by 1852 the final state to join was Mississippi. At that time Congress only stated that cities and towns were to offer public education; there was no requirement as to who attended. Equity became an issue when the Supreme Court upheld the lower courts in their decision that the actions of Homer Plessy, an African American who refused to sit in a train car designated for blacks, was constitutional. The U.S. Supreme Court determined that racial segregation, under the separate but equal doctrine, was Constitutional, and *Plessy v. Ferguson* became a landmark case in 1896.

As the industrial revolution energized the nation at the turn of the 20th century, the need for skilled workers became a national concern; thus, public education began to focus on vocational training. Funded by the federal government as early as 1917, vocational education was viewed as a viable learning program for older students. It was not until the following year (1918) that every state required a child, age six to 14, to complete elementary school. As a standard for public education moved across the nation, equity for various groups of students gradually became the focus in public schools (Cohen, 1976).

First came the challenge of desegregation in public education, and in 1954 the United States Supreme Court ruled in favor of desegregation in the landmark case, *Brown v. Board of Education of Topeka* (Alexander & Alexander, 2012), which declared "separate but equal" education to be unconstitutional making racial segregation in public schools unlawful.

In 1975, Congress tackled the problem of discrimination based on disabilities when it passed Public Law 94-142 (Alexander & Alexander, 2012) known as the Education for All Handicapped Children Act, and later reauthorized as to what we now know as the Individuals with Disabilities Education Act (IDEA). The act requires a free and appropriate public education for all students. More than 40 years past the original 1975 law, in their 2016 unanimous decision of *Endrew F. v. Douglas County School District*, the United States Supreme Court determined a child's Individual Education Plan (IEP) must be substantially different from year-to-year in order to show that the educational program is "appropriately ambitious" and that "every child should have the chance to meet challenging objectives" (*Endrew F. v. Douglas County School District*, Roberts Opinion, 2017). These milestone events in education are the ebb and flow between the traditional role of education in society and the new voice for educational reform based on a call for equity of opportunity for all students (Alexander & Alexander, 2012).

In 1983 the report, *A Nation at Risk*, commissioned by President Ronald Reagan, and written by the Commission on Excellence in Education, came to the forefront of the educational arena. The first report of its kind on the state of education in America, it provided a shocking look into the public education system. According to the report, school age children were being taught by subpar teachers creating an illiterate society. Teacher pay, educational training, and low standards were named as the culprit of a distressing educational system. The bleak and very candid outlook on student achievement within the public school system pushed out an agenda that had educators looking for instructional practices that touted rigor, relevance, and relationships (National Commission on Excellence in Education, 1983).

**Governmental oversight: accountability from goals 2000, NCLB, ESSA.** Even though education is a state right guaranteed by the 10th Amendment to the U.S. Constitution, the U.S. Department of Education has a long history of implementing accountability measures for states dating back to the 1960s when governmental oversight grew out of what politicians say was a necessity to ensure the quality of education received by all American children as balanced. In today's society public schools are frantically trying to keep their heads above water with the wave of federal and state mandates driven by standards and high-stakes testing. In 1989, President George H. W. Bush introduced the Goals 2000 initiative that President Bill Clinton signed into law five years later. Goals 2000 set the foundation for a system of school-to-work. Goals 2000 integrated technology in the schools for the sole purpose of preparing students to enter the workforce knowing how to use computers and software programs that were operated in most industries (Paris, 1994). It was in 2002 when President George W. Bush reauthorized funding legislation of the Elementary and Secondary Education Act, which he called the No Child Left Behind Act (NCLB), and signed HR1 into law to seal the deal for a change in

education (Klein, 2015). Under NCLB, technology in schools entered into a new dynamic of being used to deliver instruction, as well as determine the level of mastery accomplished by the student. Technology in education was now tied to both teaching and testing.

It was not until the Obama Administration that funding was officially tied to personalized/virtual learning instruction. On December 10, 2015, President Barack Obama reauthorized NCLB signing into law the Every Student Succeeds Act (ESSA) (Sanchez & Turner, 2017). The updated law authorized $1.6 billion annually to support transformational learning programs such as personalized and blended learning (Alliance for Excellent Education, 2015). Jacobs (2016) pointed out that with the restructuring of education law, state-led innovation could move from the outskirts of the education system into the center of every classroom.

**Milestones in Physical Education**

As technology in education continued to change, so did the basic structures of one of the most traditional curriculums, health and physical education. Even though the foundations of physical fitness and well-being were crafted from every culture and ethnicity, it was Benjamin Franklin who made it a cornerstone in America's educational system. In 1749, he made physical education and sports competition a part of the curriculum for his first educational venture, the Academy and College of Philadelphia (U.S. Commissioner of Education, 1902). Though most of those in higher education, like Benjamin Franklin, offered physical education as a course, it was not until 1866 when the state of California became the first to have a mandate for physical activity for all students in its public schools (Siedentop, 1991).

**First phase: A balance of mind, body and soul.** In its first foray into public education, physical fitness was geared more to the benefits of activities associated with a healthy body,

mind, and soul. In his presentation to the State Teachers Association at the 1917 St. Louis Convention for Teachers, Kindervater (1926), who at that time was the Supervisor of Physical Education in Missouri, expanded on the idea that a mentally healthy body is an active body. His support of a physical education program for kids of all ages was ahead of its time. Gymnastics was the curriculum of the day, and Kindervater promoted a balanced program that established the old form of gymnastics combined with forms of meditation (religion), and breathing exercises that was thought to soothe the soul (Kindervater, 1926). This balanced program only lasted a few short years until play became the next big movement in the field.

**Second phase: Sport, play, and games were accepted.** In the early 1900's until the time leading up to the Great Depression, sports and the training for games were a focus for those coming into the field of education. Physical education classes up to this point were mainly taught by women who promoted gymnastics. The shift for young men to become teachers and leaders in education provided a push for the sports, play, and games curriculum (Siedentop, 1991). While the tenets of athletics remain a part of the current curriculum structure, a major shift began making its way into the course of physical education. A focus on social and emotional supports ran concurrent with the American people and their reaction to the 1929 stock market crash.

**Third phase: An inclusion of social and emotional indicators.** The inclusion of social and emotional elements into the physical education courses throughout America's schools was based on a growth in the field of medicine. An understanding that social interaction and behavior were connected was a by-product of one of the worst times in American history. People who had wealth, security, and status in society were now dealing with significant losses – not just financial loss due to the stock market crash but status in their social circles. How they were adapting depended on how they were able to cope. The pendulum was swinging back to the

basics of a balanced curriculum that included physical education, which focused on the mind and the body (Rice, Hutchinson, & Lee, 1969).

As education advanced into the 20th century, so did physical education. Courses focused on physical fitness stood the test of time and became a fixture in every public school across America (Edwards, 2015). President Dwight D. Eisenhower wanted to ensure children were prepared for all aspects of life and in 1956 created the President's Council on Youth Fitness. The group created a new fitness regimen that would be adopted by educators and pushed into school gymnasiums. Later, in 1966, President Lyndon B. Johnson took it one step further and created the Presidential Physical Fitness Challenge. Even though the challenge has been retired from practice since 2013, it was the first of its kind for physical education (Edwards, 2015). It provided an avenue that allowed teachers of fitness to deliver instruction in a way that as students mastered the skill they could be assessed. The Presidential Physical Fitness Challenge would be a road map for assessment practices that are being used today, such as the Progressive Aerobic Cardiovascular Endurance Run (PACER), a multi-stage, 20-meter aerobic capacity run that becomes more difficult the longer the student is engaged in the test.

Throughout the course of education physical fitness has grown from a time where it was only thought of as a way to compete in sports to what we see now as an integral part of education. In all 50 states, school age children engage in physical activity each day as a part of their required curriculum. How the curriculum is being implemented is changing in order to connect the standard content to the way today's students learn – with technology (Rickabaugh, 2016).

## Milestones in Distance Education

Distance education was not always intertwined with technology. Just like the meager beginnings of compulsory education in the United States, the act of obtaining a formal education outside of the brick and mortar classroom was fraught with obstacles. Whether it was by mail, radio, video, satellite, or internet, distance education has stood the test of time and continued to be a relevant and viable alternative to face-to-face instruction.

**The correspondence course.** The concept of taking a course from afar all started with a small advertisement from Caleb Phillips in a 1728 edition of *The Boston Gazette*. In his ad, Phillips offered to teach anyone in the country shorthand, via a system of exchanging letters through the United States Postal Service. It took over 100 years for the exchange system to make its way into formal education and in 1873 The Society to Encourage Studies at Home was established as the first correspondence school in the United States (Miller, 2014). As the desire for education and equality continued to grow, so did the correspondence course movement. In 1892, the University of Chicago took notice of this new trend and became the first established institution of higher learning to offer correspondence courses. It was not until the turn of the 19th century that a primary school in Baltimore, Maryland offered the first instruction for younger students who did not have access to a K-12 school (Miller, 2014).

**The influence of new technology.** The movement of the correspondence course changed with the age of technology. In 1922 Pennsylvania State College offered the first correspondence course via the transmission of course content over the radio. It was followed by the offering of courses by way of television in 1953 by the University of Houston. It was not until 1968 when the University of Nebraska-Lincoln offered the first independent study high school and anyone could obtain an accredited high school diploma via distance education (Miller, 2014). This

breakthrough era for distance education was capped off with the first virtual college that had no brick and mortar campus in 1976. The Coastline Community College offered all courses through a variety of telecommunications systems: radio, video, or satellite (Miller, 2014).

**The arrival of the internet and personalization.** As technology advanced, so did the era of distance education. Internet technology came into existence in the early 1960s and was used mainly by the U.S. Department of Defense (UNPAN, 2009). It was not until the beginning of the 1980s when the educational institutions providing distance education began to utilize the Internet. Courses were static in content and provided little variation. However, with the backing of President Bill Clinton and his educational platform of "The Little Red Schoolhouse," access to the Internet was guaranteed for all educational facilities. This wide-spread Internet access revolutionized how stakeholders of education viewed both teaching and learning (Williams, 2013).

A rapid growth in distance learning opportunities was seen during the 1990s, and educational institutions were not the only ones to take advantage of this growth. Independent companies began creating e-learning systems to allow an interactive and instant platform for personalized learning. In 1997, Blackboard Inc.© was founded and a new course management and delivery platform opened the floodgates for any educational institution to utilize distance education as an instructional delivery model. Learning management systems that soon followed were Moodle© on August 20, 2002; Canvas©, created in 2008 but did not launch the classroom component until 2011; and Google©, opened the doorway for all educators to use the Google Classroom© system for free on May 6, 2014 (Miller, 2014). Thirty-five states have their own public virtual school, offering any resident the opportunity for personalized instruction through a

virtual platform. All total there are 34 states that provide students access to a full-time virtual school and 21 states with a blended virtual school opportunity (Molnar et al., 2017).

## Defining Personalized Learning

Although personalized learning has been around longer than many educators realize, the goal has been the same. James Rickabaugh (2016), author of *Tapping the Power of Personalized Learning* stated it very simply: it is "the repositioning of the student within the learning and teaching process" (p. 5). The traditional learning environments of brick and mortar schools continue to struggle with the overarching elements of personalized learning: pace, place, choice, and voice (Horn & Staker, 2012; NACOL, 2009). As education speed races into the arena of personalized learning, administrators, teachers, parents, and students begin the journey of implementation.

***Operational description.*** Not every educator will have the same understanding of what personalized learning is. Some may move to the extreme of only a virtual learning environment; while others may lean in the direction of utilizing exemplars for problem-based learning activities without the use of technology. Educators over the last decade have come to understand that personalized learning combines the best of all learning resources to formulate options for each student. Researchers Basham, Hall, Carter, and Stahl (2016) identified an operational definition for personalized learning stating that learners may engage with web-based curriculum, activities within the school building that are self-directed, and in-person direct instruction by a classroom teacher, whether it is in real-time personal interactions or via technology.

## Learning Theories

Teaching and learning are traditionally grounded in the concept of the teacher releasing information to the learner by introducing a fact or skill. Then the learner is provided the

opportunity to apply that fact or skill in order to show the teacher they have acquired knowledge. This type of teacher-centered instruction has been the foundation of the American public education system since its inception and a core component in physical education classes since 1966. Along the way, different theoretical frameworks have been established to confirm that true learning only occurs when a personal attachment is made between the learner, the instructor, and the content (DiMartino & Wolk, 2010).

In the early 20th century, Russian psychologist Lev Vygotsky introduced the theory of social constructivism. The theory gained world-wide recognition after his death (June 11, 1934) when excerpts of his work were translated into English in 1962. This provided a roadmap in understanding pedagogy that relates to personalized instruction. Vygotsky's (1978) framework was used to examine literature related to the different types of instructional delivery associated with mental abilities and which modes of instruction garner the greatest academic success or mastery of a concept with the individual learner. Vygotsky (1978) realized that a key component to student progress was making instruction personal to learners and attaining their individual Zone of Proximal Development (ZPD). According to Vygotsky (1978) the ZPD is the range of a learner's ability to master a concept with adult guidance and without, either collaborating with a peer or self-taught. Vygotsky's original theory was useful in the development of two theories developed in the mid-1900s that became essential to the elements of personalized learning: Maslow's Hierarchy of Needs and Bloom's Taxonomy.

**Maslow's hierarchy of needs.** In order to make learning personal, the question – what motivates a person to do anything, especially learn? – must be answered. Maslow's (1943) motivational needs theory, called hierarchy of needs, was the basis for linking what an individual may want, within the social realm (community) to their actual needs. The foundational question

was, is there a basic need to know and understand in order to exist in the world or a desire to achieve one's full potential and not only learn, but create? The basic question is further extended by delving deeper into the concept of needs and wants in order to determine if it is the *want for learning* that *moved the person's need to a want*, further asking, did socialization play a central role in that process? (McLeod, 2016).

Maslow (1943) established the framework that one must satisfy the basic needs in order to move from level one of physiological needs to level five, self-actualization. The levels of hierarchy (from low to high needs) are physiological, safety, love/belonging, esteem, and self-actualization. Maslow (1943) believed satisfying basic needs held true within social constructivism, meaning one must move through the levels of human development in learning, but can only extend from one level to the next if the need has been met through a social situation (interaction with others). Understanding that the basic needs must be met first, educational psychologist Benjamin Bloom overlapped both social and intellectual aspects to develop his Taxonomy.

**Bloom's taxonomy.** Bloom's Taxonomy was presented as a theoretical framework of learning in 1956. The goal was to examine levels of thinking in education from the lowest aspect of rote learning to the highest level of learning such as analyzing or evaluating. Three domains of learning were identified in order to determine if learning was being achieved: Cognitive (Knowledge), Psychomotor (Skills), and Affective (Attitude), known to educators as KSA. The focus of the three domains centered on the learner and the learning process. After students were provided an opportunity to learn under this theory, they should have obtained a new skill, a new piece of knowledge, and a new attitude (Bloom et al., 1956).

Despite the perception that most educational theories are vastly different, the overarching idea among Vygotsky (1978), Maslow (1943) and Bloom et al. (1956) is that all are connected in their focus on targeted learning. Whether it is the interaction with people that leads to the development of learning (Vygotsky, 1978) or the necessity of teachers in determining how students are learning in order to re-direct their instruction (Bloom et al., 1956), the theory remains focused on learning.

**Personalized learning theories.**

***Vygotsky's (1978) constructivism theory.*** In determining the elements of a theoretical framework for personalized learning, one must focus on the core elements of Vygotsky's theory where he pressed forward in proving that social interactions among students enhances learning when the learner has a social connection and sees the need. This was in contrast to the famous 1936 Theory of Cognitive Development of Jean Piaget that surmised children are born with a mental structure that is basic and all learning is formed on that initial genetic structure (McLeod, 2018). As Vygotsky's social constructivism theory expanded, so did the pedagogy of personalized learning. The move toward an instructional delivery model that was student centered rather than teacher centered set the stage for education in the digital age (Bray & McClaskey, 2015).

***Siemens' (2005) connectivism theory.*** The most utilized theoretical framework for today's digital learners is the theory of connectivism. It is a framework for understanding learning utilizing technology. First introduced in 2005, Professor George Siemens' theory connected the importance of student-led learning to students' interaction with technology. He recognized that the digital age had brought a new avenue of learning into the classroom, creating a new path for individualization.

As personalized learning moved to the forefront of education; the theory of connectivism established itself as a part of the underpinning of learning. Connectivism represents itself as a process of linking information sources while nurturing connections in order to have up-to-date knowledge for making decisions (Siemens, 2005). It has become the essence of personalized and virtual learning models.

**Learning Systems Identified with Personalized/Virtual Learning**

Instructional delivery models that currently align with a personalized/virtual learning environment are rapidly growing. Many are too new to have been grounded in research, but several have stood the test of time and researchers are concentrating on those that are producing significant gains in student performance (Basham et al., 2016): blended learning and flipped classroom learning.

**Blended learning.** Using technology to improve the learning environment is not new. In 1958, a teacher named B. F. Skinner used what he called "teaching machines" to allow his students to work independently on concepts in which they were interested in learning more about. This was only one way that teachers began utilizing technology as a way to help engage and motivate students to critically think and problem solve (Basham et al., 2016).

The concept of blended learning is similar to Skinner's use of his teaching machine, but on a more structured scale. In the traditional classroom, the teacher and student are face-to-face for all learning situations including delivery of material and assessed performance of that material. A working definition of blended learning from researchers is a more formal program where students learn, in part, with face-to-face direct instruction and through virtual/online learning. Learners have some control over the time, their curriculum path, the pace of their learning, and the place (Basham et al., 2016; Horn & Staker, 2012; Rickabaugh, 2016; Singh,

2003), meaning that the difference in the traditional classroom to the blended learning environment may be drastic based on the teacher and students' confidence level with technology. Using the virtual/online tool to communicate, collaborate, and create allows for students to gain ownership of not only the place in which they learn, but the pace and amount of time it takes for them to learn. This leads to the understanding that educators have to determine if their version of blended learning will take the step towards personalization.

In a blended learning classroom, even though it is a mixed delivery of instruction, the teacher has the option to deliver the content within a synchronous structure or asynchronous structure. The synchronous approach is that everything happens at the same time. Teachers provide the information whether it is via face-to-face or virtual/online and each student has the same amount of time to master that information. Asynchronous structure differs by allowing the same information to be delivered differently by time. Allowing for time differences in delivery and reply creates a level of personalization that is specific to the blended learning environment (Christensen, Horn, & Johnson, 2008).

Research has shown that the potential of the blended learning classroom on student preparedness for college or career is revolutionary (Horn & Staker, 2012). In 2011 Innosight Institute, a leading proponent of education reform conducted one of the first meta-analyses and surveyed more than 200,000 stakeholders in order to glean information on the effectiveness of blended learning. Surveys and interviews were conducted with operators of blended learning programs, as well as school administrators, teachers, parents, and students. It showed the impact that blended learning has already made on the educational system in America. Courses of hard-to-fill teaching positions in small, rural, and even urban districts are now being offered to students due to the accessibility of virtual/online instruction (Horn & Staker, 2012). This

research is supported by those in education whose priority focuses on the quality of education, as well as those in the government sector whose priority remained the bottom line. Horn and Staker (2012) pointed out that most educational reforms slant to one side, but with teachers as the creators of this reform and the fact that local governments understand the advantages in terms of cost, both groups have come out strong in support of a blended learning environment.

However, blended learning comes in many forms that can be expensive and time-consuming and often try to take the place of the classroom teacher. Whether a school uses one approach, such as a split class that offers students face-to-face time with their instructor in a setting where they rotate through centers offering computers as one of the options, or another, such as a virtual science lab that is blended using technology to gather and record evidence for the experiment, technology to support the blended environment is essential. Furthermore, technology costs money. Again, the fundamental concern for local governments who are struggling to keep schools afloat is whether or not a blended learning delivery model can save the locality money so they can continue to offer quality education at a lower cost to its citizens (Horn & Staker, 2012; Singh, 2003).

**Flipped classroom learning.** A second, and far more structured, personalized learning system is that of the flipped classroom learning environment. In 2007, Bergman and Sams, two chemistry teachers from Woodland Park High School in Colorado, began recording their classroom lectures for students who were absent. They have come to be known as the inspiration behind the K-12 flipped classroom movement. The notion of streaming video lectures to students who were not face-to-face with their instructor had been around in the college arena for some time, but it was Bergman and Sams who capitalized on this new instructional delivery system and reinvented the purpose of time with the classroom teacher (Noonoo, 2012).

Bishop and Verleger (2013) define a flipped classroom as one that utilizes an asynchronous video lecture system where students can view lectures outside of the classroom and practice problems within a group-based system or one-on-one with the teacher in the classroom. This structured system of instructional delivery and follow-up guidance and support is foundational to the personalized learning pedagogy. Bray and McClaskey (2015) expanded on this by noting that the support mechanism already built into the flipped classroom learning environment is crucial to its success. Class content is permanently archived for students to review or remediate based on their understanding of the material, allowing for more interaction between students and teachers. If students miss a class, do not come prepared for class, or do not have access to technology outside of school, the content is provided to them so they can participate in the class discussion and activities.

As a byproduct of this delivery model, when the teacher forces the direct instruction to take place outside the normal classroom environment, it encourages communication and collaboration. This turns the responsibility of learning over to students, which in turns actively involves them in the process of learning (Bray & McClaskey, 2015).

**Virtual/online learning.** This new form of distance learning is a catalyst for shifting the way educators teach and students learn. Virtual/online learning moves away from lecturing students and makes the instructional methodology more collaborative between teacher and student in creating a new learning environment. Whether it is synchronous, where students have a set time to log into the course and interact directly with their teacher, or asynchronous, allowing students to determine when they participate in the course through virtual/online forums, message boards, or emails, it is all considered a virtual/online learning opportunity.

Virtual/online course programs that are now the backbone of distance education through technology have been established for well over 30 years. In *Promising Practices in Online Learning,* the North American Council for Online Learning (NACOL, 2009) reported that more than half of the public school districts in the United States offered virtual/online courses and services. In the 2018 *Trends in Online Education Report*, programs of higher education continue to target working professionals, and career-motivated individuals. Both diverse groups of students are focused on one thing, learning that fits into their current lifestyle (NACOL, 2009).

**The Growth of Virtual Learning in Traditional Courses**

As distance education morphs into a new era of instructional delivery, traditional courses find themselves caught in the crossfire. The increase in virtual/online courses for students of all ages is a growing industry. According to the *Grade Increase Report* (2018) released by the Babson Survey Research Group, more than 6.3 million people over the age of 18 were enrolled in a virtual/online course. Students who were both in undergraduate and graduate level courses took at least one virtual/online course during the first semester of the 2016 school year. That is a 5.6% increase from 2015, a significant one in just a year's time. However, the greatest increase occurred in the K-12 area of education (Seaman, Allen, & Seaman, 2018).

The non-profit organization The Virtual High School (VHS) began in 1996 in order to provide virtual/online courses to any student in the United States. Individual schools or districts can pay to become a member of VHS, allowing their secondary students to participate in gaining a credit in a virtual/online course (VHS, 2018). With the oldest and largest state-run virtual secondary school in the nation, Florida leads the way in the public school virtual/online industry. The Florida Virtual School (FVS) began in 1996, growing from only a handful of teachers and 70 students to a virtual school with over 200,000 students enrolled in 2016. Other states such as

Minnesota, Michigan, Kansas, and Virginia all have growing state-run virtual schools. The Minnesota Virtual Academy (MVA) now supports all Minnesota high school students by allowing them access to courses that may not be available in many of the small school districts across the state. The MVA serves over 1,500 students each year in obtaining Dual Enrollment and Advanced Placement credits (Beem, 2010; Friedman, 2018).

Both Michigan and Virginia are heading in the same direction as they now require all high school students to take at least one virtual/online course in order to graduate. But it is Texas that has led the way in offering more than core academics. The Texas Virtual School (TVS), like Florida's FVS, provides every high school student and educator the opportunity to enroll in courses for areas such as art, music, health, career, technology, and yes, even physical education (Gonzalez, 2012; TVS, 2018). These are courses that are foundational to the public school system, but due to their "hands-on" and "active" participation have not been considered as accessible courses virtual/online.

The ability to transform learning from the traditional "sit-and-get," brick-and-mortar classroom to a virtual system that personalizes instruction is becoming a cornerstone of the educational system. It is essential that the next step be taken to determine the benefits for students of whether or not the virtual leap into courses such as physical education which require a hands-on/active participation.

**Physical Education: Traditional Versus Virtual**

The U.S. Department of Education (2018) has defined high-quality physical education programs as requiring action in four areas: health-based curriculum, quality instruction, student assessment, and policies that promote fitness for life. The Center for Disease Control and Prevention (CDC, 2018) determined that a quality physical education program was part of the

solution to the obesity crisis in America. With the popularity of virtual/online education and many states moving towards a requirement for all students to experience a virtual/online course, it is only natural that physical education, a bedrock in a school's curriculum, moves to a virtual/online format. But does that support the continued push for students of all ages to be engaged in physical activities during the school day?

Virtual/online physical education courses offer a distinctive challenge that the traditional course does not: determining how to embed the most identifiable quality of the course, movement, to a digital environment. Goad and Jones (2017) conducted research that focused on the training provided to physical education teachers and how they transformed their instructional practice to the virtual/online course. The research noted that the delivery of the physical portion of the virtual/online course continued to be a challenge in the aspect of limited student participation, with less than 30% of their participants meeting the required 225 minutes of weekly physical education (Goad & Jones, 2017).

In 2007, the National Association for Sport and Physical Education (NASPE) released a position paper providing initial guidelines for virtual/online physical education. The statement acknowledged that even though many educators had embraced virtual/online coursework, an equal number of physical education teachers are unconvinced that such approaches for core content areas such as reading, math, science, or history would work for the content area of physical education. The study concluded after reviewing empirical literature that even though there were no significant differences in learning between face-to-face learning with virtual/online approaches, no empirical studies existed specific to physical education comparing face-to-face instruction with virtual/online instruction (NASPE, 2007). Since then, researchers Trout and Christie (2007), as well as Mosier (2012), have conducted studies specific to the use of

virtual/online instruction in the physical education course. Trout and Christie (2007) provided insight on how interactive video games were now being utilized in physical education virtual/online courses, and Mosier (2012) led a call to action when he explained that using a virtual physical education for some students may meet their learning style and allow them to excel in a virtual/online environment when they would not have done so in a face-to-face environment.

**Curriculum standards.** One of the beneficial aspects of the virtual/online physical education movement is that the virtual/online course has the potential to promote the national content standards in physical education. According to NASPE (2007), five standards frame the virtual/online curriculum and were pulled from the original President's Council on Youth Fitness: Development of Motor Skills, Understanding Movement Concepts, Physical Activity Participation, Physical Fitness, and Social Behavior. Within the virtual/online curriculum, each standard is aligned to meet the requirements of a digital learner.

Students participating in a virtual/online course will view a video clip to understand standard one and the technique used to master the skill. They will participate in a virtual field trip to a sports complex to learn the movement and its impact on an athlete in order to master standard two. For standard three the students will wear a heart monitor to track their participation in physical activity while in standard four they will develop a fitness plan as one of their written assignments. Achieving the final standard five, students will participate in game-like simulations to demonstrate conflict resolution, cooperation, and leadership. The standards did not change, only the instructional delivery model (Mohnsen, 2012).

## Current State of Virtual Health & Physical Education

Due to the growing number of students involved in virtual/online courses, in 2009 the U.S. Department of Education conducted a meta-analysis of 51 virtual/online learning studies related to all disciplines. Out of the 51 studies, only two investigated virtual/online physical education at the secondary level. The two studies, Karp and Woods (2003) and Kane (2004), provided the basis for how educators are adapting virtual learning to become a more personalized learning environment, especially if the learning is taking place virtual/online. The studies identified that there is little accountability between teacher and student and that the current focus of most courses is on fitness and did not address a comprehensive physical education curriculum (Mohnsen, 2012).

**Potential challenges.** As the world of technology continues to advance, the potential challenges of a virtual/online physical education course consistently diminish. One of the challenges that continues to surface for the physical education teacher of a virtual/online course is that of assessment. The National Physical Content Standard One requires the teacher to observe the student performing motor skills and to actively participate in a certain number of minutes each week of physical movement. The recommendations from research conducted by Mohnsen (2012) recognize that students who are technologically savvy can upload video, pictures, and data to their course in order to show that they have participated and met the requirements.

In a study conducted by Ransdell, Rice, Snelson, and Decola (2008), the researchers identified ten concerns about a virtual/online Health Related Fitness (HRF) course: (1) lack of integrity found in the academics related to physical fitness; (2) low learner motivation; (3) high level of non-participation by students; (4) non-qualified teachers responsible for the

virtual/online content; (5) the computer-based program rewards sedentary behavior; (6) lack of interaction with peers and teachers; (7) failure to meet state and national physical education standards; (8) lack of {immediate} feedback from the teacher while learning a skill; (9) uncertainty from those teachers certified/qualified to teach the virtual/online course; and (10) inability to determine instructor's success in students understanding the content. The group provided suggestions within their research to assist with several of the major concerns identified, but none that would effectively support a different approach to the new stream of virtual/online health related fitness course.

**Benefits.** Aside from the obvious instructional benefits that are targeted in the research regarding the use of virtual/online personalized learning environments such as student engagement and increased academic performance, the unintended benefits are now being seen throughout the educational arena. Benefits noted in having personalized learning include: collaboration between educators and government, as well as the collaboration among educators, a shared commitment to success for its citizens, both young and old, and the engagement of family and community (Rickabaugh, 2016).

Each one of these aspects has the essence of building relationships even though the avenue to engage is an online/virtual component. A personalized learning environment harnesses a system that provides additional opportunities for all stakeholders to become engaged in learning. Both families and communities can play a more active role. Parents and students can see how their education relates to the real world, and community members are allowed insight into what the future holds for their localities. Businessmen can help in determining the needs and share that with educators to help produce students ready to enter the workforce or college and local governments as the funding body can see first-hand these results (Rickabaugh, 2016).

## Conclusion

By comparison to other educational reform initiatives, virtual/online personalized learning is in its infancy. While that may be the case, the system of creating a structure where students have ownership of their learning, whether by place, pace, voice, or choice, should not be lost by its simplicity. The components of virtual/online personalized learning have come full circle from Socrates in 403 BCE to Parkhurst in the 1920s, Vygotsky in 1978, Siemens in 2005, and Bergman and Sams in 2007; each of these teachers of learners knew that student engagement, motivation, and the ability to critically think were essential.

As history has shown in America, equity and accountability have been in the forefront of education. Personalized learning, whether it is virtual/online or face-to-face, ensures that students are provided an education that is targeted to meet their individual needs, while still keeping them accountable for their learning (Basham et al., 2016). As three of the mainstream delivery systems for personalization continue to grow, blended learning, flipped classrooms, and virtual/online learning environments, all support an effort to make education equitable for all. Equity for each student is a prominent fixture within personalized learning, and due to the enormous amount of governmental oversight, accountability is required.

Based on the limited amount of research regarding virtual/online personalized learning in regards to real-time data and instant feedback systems, educators should continue to research, probe, and analyze different learning structures in order to ensure that they have adopted and implemented the best system for their specific school, classroom, and student.

# CHAPTER 3: METHODOLOGY

## Introduction

The proposed study was a quantitative study designed to conduct a comparison of virtual/online instruction versus traditional classroom instruction for a 10th-grade health and physical education course. Chapter 3 outlines the research design and methods that were used in the study. The purpose statement, theoretical framework, and research questions were presented as a foundation for the study. The chapter also includes information regarding the population sample used for the research, collection of data which consists of what was needed, how it was collected, and the determination of how the data was to be analyzed. The chapter concludes with a summary of the steps used for the quantitative case study.

The purpose of this study was to look at the possible influence a virtual/online personalized health and physical education course had on student achievement as measured by student performance on the state Physical Fitness Assessment at the 10th-grade level. As stated in Chapter 1, the overarching question for this study was, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"*

A quantitative research methodology was used in conducting this study. The quantitative approach allowed the researcher to seek facts and causes of human behavior so that differences among the variables can be identified (Roberts, 2010). In quantitative studies, as in this one, the data that was collected were numerical and descriptive. The decision for a quantitative method allowed for the use of standardized measures and a larger population size. The study made no attempt to account for or show cause for the change in instructional delivery models, only in gathering data. The Virginia Department of Education had established 10th grade standards of

learning for health and physical education courses. This study investigated health and physical education courses, both virtual/online and face-to-face, that aligned to Virginia's SOLs. The overarching goal of this study was to describe the event of an instructional delivery model for a health and physical education course and the data connected to student achievement with or without the use of technology.

**Theoretical Framework**

The theoretical model that was used in this study was first established in 1934 by Vygotsky and after his death was developed into the Theory of Social Constructivism of 1978. The Constructivism Theory favors the instructional delivery model of inquiry-based learning and creates a classroom environment where social interactions help build knowledge through experiences and questioning of ideas (Deulen, 2013).

In this study, the Constructivism framework was used so the role of the learner, any outside social forces, combined with previous understanding of content, created new learning within a zone that was essential for attaining knowledge. This aligned with Vygotsky's original definition of the Zone of Proximal Development (ZPD) that is the centerpiece of the Constructivism Theory. ZPD is defined as, "the distance between the (child's) actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 131).

The Theory of Constructivism Model shown in Figure 3.1 represents how a student progresses through three stages in order for learning to occur: (1) the learner cannot do, (2) the learner can do with guidance, which is the ZPD and learning occurs, and (3) where the learner

can do and mastery is achieved. With this constructivism teaching methodology, students construct knowledge through social interactions and guided inquiry from their instructor.

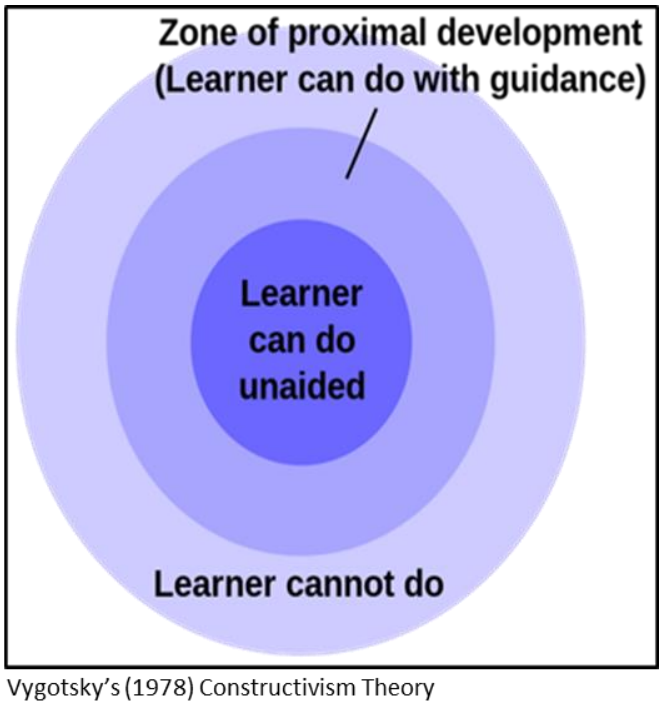


*Figure 3.1.* The theory of constructivism.

The proposed study concentrated on the portion of the Constructivism Model that focused on the relationship between instructional delivery with guidance and student achievement that is unaided. This theoretical framework allowed the researcher to determine if face-to-face instruction or virtual/online instruction would or would not influence student achievement.

**Population**

The population for this study were students in the 10th grade at a rural Virginia high school that met the criteria of taking a health and physical education course. The population was divided into two categories: (1) students who had taken a health and physical education course aligned to the Virginia SOLs in a virtual/online personalized learning setting during the school

years of 2015 to 2019; and (2) students who had taken the health and physical education course aligned to the Virginia SOLs in a traditional face-to-face setting during the school years of 2015 to 2019.

Only those within the population who had a state Physical Fitness Assessment score reported by the school to the Virginia Department of Education were selected for this study. The report provided a detailed description of the scope of the physical fitness assessment, and from this information, a list of all students who participated in the physical fitness assessments for the years of 2015-2016, 2016-2017, 2017-2018, and 2018-2019 were compiled.

The 10th-grade level was selected because the school division identified as providing a virtual/online personalized learning health and physical education course for 10th graders, had done so for multiple consecutive years. This allowed the researcher to show multiple years of data in an effort to determine trends that may or may not support the use of a virtual/online instructional delivery model which supported student achievement.

The final component of the population consideration was the demographic variables used to determine if the composition of the student body in the high school remained the same over the period of time for the study. The variables that may have an influence on student achievement that were reviewed were gender and socioeconomic status. For the purpose of this study, only the 10th grade state Physical Fitness Assessment data from the participating school was included.

**Data Needed**

The importance of comparing similar data across the time span of the virtual/online health and physical education course was essential for this study. Selecting the school years 2015 to 2019 allowed for both the school selected and the state Physical Fitness Assessment to be

consistent within the years of the study. If additional years prior to 2015 or after 2019 were utilized, the data would encompass years that did not offer both traditional and virtual/online courses. Uniformity within the data would have failed to exist.

Demographic data needed for this study was as follows: percentage of male and female students and the percentage of students identified as low socioeconomic status (free/reduced lunch). The following criteria/definitions were used in selecting these demographic data:

(1) The percentage of students by gender within the total student population were identified as the combined sum of male and female students for the years of 2015-2019.

(2) The low socioeconomic status was determined by the percentage of students from the total student population who received free and reduced meals, students who received Temporary Assistance for Needy Families (TANF), or those students who received Medicaid for the years of 2015-2019.

(3) The study utilized the means of the student scores on the state PACER Physical Fitness Assessment to measure student achievement.

**Data Collection**

All data was collected from the local division data files for assessment information provided to the Virginia Department of Education (VDOE) annually and by using the VDOE website, www.doe.virginia.gov. Two forms of data were collected: (1) demographic data consisting of gender and socioeconomic student status; and (2) students' scores on the state PACER Physical Fitness Assessment for the years 2015-2019.

The researcher retrieved data identifying the number of students who participated in the virtual/online health and physical education course during the years of 2015-2019. The

researcher then retrieved data identifying the number of student participants who were assigned to the traditional face-to-face health and physical education course during those same years of 2015-2019. Students who had completed all parts of the state required PACER Physical Fitness Assessment and whose data were recorded to the Virginia Department of Education were selected for the study.

The data, which was provided to the VDOE by each division, detailed the scope of the physical requirements/test given to each student participant. Once all student participant information was collected for the years 2015-2019, reports were reviewed and a final list of students was divided into the two participation groups – those who participated in the virtual/online course and those who participated in the traditional face-to-face course. All demographic variables were assembled by utilizing two reports housed on the VDOE website under the Assessment and Achievement Data link: (1) Fall Membership Report, which is a representation of the number of K-12 students enrolled on the first school day in October each year; and (2) Report Card (for the participating school), which provided information about student achievement, accountability ratings, attendance, program completion, school safety, teacher quality, and other topics.

The final data collected was the state required PACER Physical Fitness Assessment scores for each student participant in both the virtual/online course and the traditional face-to-face course. To collect this information, the researcher sent a formal written request to the superintendent of schools and the principal of the participating school requesting the release of said data (Appendix A and Appendix B). Approval was issued on September 13, 2019, and September 10, 2019, respectively (Appendix C and Appendix D).

This study used existing data (PACER Physical Fitness Assessment) that were collected by the school division between 2015 and 2019. The data were retrieved from the Student Information Manager Wel-Net database and downloaded over a secured network. These data were transferred into an Excel spreadsheet which allowed the data to be transferred into the IBM SPSS Statistics version 26 software program for analysis. All student identifiers were redacted and each student was assigned a number to keep his or her test scores confidential.

A request to conduct the study was submitted to the University of Lynchburg's Institutional Review Board (IRB) using the Existing Data Research Protocol. The Office of the IRB notified the researcher on October 2, 2019, that the study was approved (Appendix E).

**Data Analysis**

In order to determine if the different instructional delivery models of virtual/online instruction and traditional face-to-face instruction had any influence on student achievement on the state PACER Physical Fitness Assessment at the 10th-grade level, an analysis of the data during the 2015-2019 school years was completed. All data was gathered, and the researcher entered the data into a 2010 Microsoft Excel© document, transferred the data into the software program, Statistical Package for Social Sciences (SPSS) and ran three specific analyses: a descriptive statistic, a Chi-square, and a *t*-Test. See Table 3.1 for a detailed summary of the three statistical analyses that were completed.

Table 3.1

*Summary of Data Analysis Test and Comparisons*

| Test Completed | Comparisons | Dates Used | Grade & Content |
|---|---|---|---|
| Descriptive Statistics | Variables between demographics of school years.<br>a. Student gender<br>b. Socioeconomics: free/reduced lunch status<br>c. Student achievement: PACER ~ met/not met benchmark | School year 2015 through 2019 | Grade 10 Virginia Physical Fitness Assessment |
| Chi-Square | Determine if there is a statistical significance.<br>a. Difference of instructional delivery model on student achievement. | School year 2015 through 2019 | Grade 10 Virginia Physical Fitness Assessment |
| *t*-Test | Difference in means for statistical significance<br>a. Combined years for males mean score comparing virtual vs traditional.<br>b. Combined years for females mean score comparing virtual vs traditional. | School year 2015 through 2019 | Grade 10 Virginia Physical Fitness Assessment |

With the demographic characteristics assembled individually and collectively, a summary of descriptive statistics was completed in order to compare and determine if there was a significant difference between the demographics of the school during the years of 2015-2019. The second analysis was a Chi-square test to determine if there was any statistical significance

between the virtual/online instructional delivery model to the face-to-face instructional delivery model among student achievement. A Chi-square showed whether or not the instructional delivery model and the rate of expected success (pass or fail) of 10th-grade students on the state PACER Physical Fitness test were related to the actual achievement (pass or fail).

The final test was an analysis using the *t*-test on the mean scores for the specific PACER portion of the fitness test for each student. This *t*-test was run twice identifying males in the first run and females in the second run since the benchmark score for passing was different for each gender. The outcome of the *t*-test was used to determine if there were any statistically significant differences in the two types of instructional delivery models: virtual/online learning model to the traditional face-to-face instructional delivery model on student achievement.

These three statistical analyses, using the SPSS software in order to reject the null hypothesis established in the original research question: that no statistical difference would be identified regarding the relationship between student achievements based on the different instructional delivery models of virtual/online personalized learning and traditional face-to-face learning. An alpha level of 0.05 was used for all statistical tests, and the effect size was calculated by using *r*. If alpha is less than 0.05, then it was considered a statistically significant difference among the different instructional models for student achievement success; if alpha is greater than 0.05, then it was not considered statistically significant.

**Summary**

The intent of this chapter was to describe the methodology that was used in this study. The chapter described in detail the purpose of the study, the theoretical framework that was used, the selection of the population, and how the school and student participants were vetted in order to determine if they met the identified criteria. The chapter also listed the data needed based on

the specifications from noted gaps in the review of literature. The data collection and methods that were used in analyzing the data collected were followed in order to maintain the guidelines within research for conducting a rigorous study.

# CHAPTER 4: PRESENTATION OF FINDINGS

## Introduction

The purpose of this study was to examine the effectiveness of two instructional delivery models between a virtual/online personalized health and physical education course and the traditional face-to-face model when measuring student achievement on the Virginia Physical Fitness Assessment at the 10th-grade level. As stated in Chapter 1, the overarching question for this study is, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"*

The compilation of data from 1,086 students at a rural Virginia high school that meet the criteria of taking a health and physical education course was utilized for this study. The population was divided into two categories: (1) students who took a health and physical education course aligned to the Virginia SOLs in a virtual/online personalized learning setting during the school years of 2015 to 2019, and (2) students who took the health and physical education course aligned to the Virginia SOLs in a traditional face-to-face setting during the school years of 2015 to 2019.

Findings from this study add to the research of the possible influences a virtual/online personalized learning setting may or may not have on student achievement. The collection of data, examination, and analysis of student performance in the areas of health and physical education, specific to the student's success on the Progressive Aerobic Cardiovascular Endurance Run (PACER) Physical Fitness Test was completed. The findings from this study may serve as one data point for school divisions in the Commonwealth of Virginia when the school division is contemplating whether or not to offer a 10th-grade health and physical education course to be taken in a virtual/online setting.

**Procedures**

IRB Approval (Appendix E) was given on October 2, 2019, which allowed the researcher to begin making initial contact to staff members at the rural school division's central office and downloading public demographic data from the Virginia Department of Education (VDOE) website. On August 26, 2019, the researcher submitted letters to the superintendent of schools and the high school principal requesting to have access and use data for the period of 2015 to 2019 Virginia Physical Fitness Assessment Scores for all 10th-grade students by cohort years. Letters of approval were issued to the researcher on September 10th and 13th of 2019 (Appendix D and Appendix C) from the school and division level personnel. Submission for IRB approval was submitted by the principal investigator on staff at University of Lynchburg via google docs© on September 26, 2019, with approval being granted by the University of Lynchburg Internal Review Board on October 2, 2019 (Appendix E).

Data were received by a downloaded electronic Excel© spreadsheet from the division's Health and Physical Education Lead with permission from the Supervisor of Assessment and Planning on January 26, 2020. Of the 1,248 students in the 10th grade during the years of 2015 to 2019, a total of 1,086 scores was identified for the study as meeting the criteria. Student scores totaling 162 were not complete and were removed from the study. These data had missing scores due to movement in or out of the school during the four-year cohort span of time or an incomplete pre- or post-assessment. On February 9, 2020, the research had a redacted spreadsheet of data with all incomplete files removed and all cohort years of 2015-2016, 2016-2017, 2017-2018, and 2018-2019 into one file to be uploaded into SPSS in order to perform a descriptive test, a Chi-square, and a *t*-Test with outputs for analysis. The three tests chosen were to aide in the determination of whether or not there was a difference in the instructional delivery

model between virtual/online and traditional face-to-face instruction that would influence student achievement for 10th graders on the state PACER Physical Fitness Assessment. By February 29, 2020, all statistical tests had been run in SPSS and the researcher began the analysis process.

**Demographic Characteristics by Cohort**

Demographic data were comprised of the (1) gender of students within each cohort year, (2) socioeconomic status of students on free/reduced lunch, and (3) student achievement as meeting the standard on the PACER for each cohort year. Demographic data is statistical data that calculates numerically the characteristics of the sample population of the study. In this research study the demographic data collected were out of the total number of students who met the criteria of the study, how many were male, how many were female, how many were identified as low socioeconomic status, and how many met the post-PACER standard. The main reason for selecting the three specific characteristics was to determine whether or not the demographics for each cohort of students in the school stayed similar across all four years of the study. In running a descriptive analysis, the three variables–gender, socioeconomic status, and student achievement–were analyzed to determine if the school had a similar composition from the initial year of implementation of a virtual/online personalized learning health and physical education course to the most recent year of implementation. The school division provided 10th-grade students the opportunity to enroll in either the traditional face-to-face health and physical education course or the virtual/online course. Any student who selected the virtual/online course was charged a fee of $400 if it was a new course and $250 if the course was being taken for credit recovery. This was compiled for data analysis in order to determine if a student's socioeconomic status impacted the demographic makeup of each cohort. The descriptive data

showed all four cohorts with similar percentage of students identified as low socioeconomic status which allowed for continuity of the data across years.

Descriptive statistics were run for the three different demographics identified for each cohort year of 2015-2016, 2016-2017, 2017-2018, and 2018-2019 of traditional and virtual, and all years 2015 through 2019 combined. Table 4.1 Demographic Characteristics All Combined Years 2015-2019 (*N*=1086) displays the descriptive analysis of all years combined (2015-2019).

Table 4.1

*Demographic Characteristics All Combined Years 2015-2019 (N = 1086)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 585 | 53.9 | 53.9 | 53.9 |
| | Female | 501 | 46.1 | 46.1 | 100.0 |
| | Total | 1,086 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 140 | 12.9 | 12.9 | 12.9 |
| | No | 946 | 87.1 | 87.1 | 100.0 |
| | Total | 1,086 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 613 | 56.4 | 56.4 | 56.4 |
| | No | 473 | 43.6 | 43.6 | 100.0 |
| | Total | 1,086 | 100.0 | 100.0 | |

The theory that the demographics of each school would have minimal change throughout all years of the four cohort of students from 2015 through 2019 was hypothesized that if there

were no statistically significant changes in the demographic variables, then the student body of the school would consist of a similar composition for each year of the study. Table 4.1 shows that among all cohort years there were a total of 585 male students and 501 female students totaling 1,086 students who took a pre- and post-PACER Physical Fitness Assessment. Of those 1,086 participants, 140 were identified as low socioeconomic status receiving either free or reduced meals for breakfast and lunch. This made up 12.9% of the students who participated in the study while 946 had no identified status. The final demographic showed that out of the 1,086 student participants, a total of 613 met the Post-PACER Standard while 473 did not.

**Cohort one.** The school that is the focus of this began assessing 10th-grade students on the PACER Physical Fitness Test as a portion of the course curriculum. Both traditional and virtual/online students participated in the assessment. Students in Cohort One entered the 10th grade in the fall of 2015. Of these 243 students, 131 were male and 112 were female. Only 29 were identified as low socioeconomic status receiving either free or reduced meals for breakfast and lunch. This made up 16.4% of the students who participated in the study while 214 had no identified status. The final demographic showed that out of the 243 student participants for Cohort One a total of 202 met the Post-PACER Standard while 41 did not.

When broken down by those who took the course utilizing the opportunity for different instructional delivery models, the traditional face-to-face student participants totaled 213. This group was made up of 120 males, 93 females, 28 identified as low socioeconomic status, while 185 were not identified and 179 met the Post-PACER Standard while 34 did not. Those who took the virtual/online health and physical education course totaled 30 students: 11 male, 19 females, one identified as low socioeconomic status, 29 not identified, 23 met the Post-PACER Standard while seven students did not. These demographic data are included in Table 4.2

Demographic Characteristics of Cohort One: Traditional 2015-2016 and Table 4.3 Demographic Characteristics of Cohort One: Virtual 2015-2016.

Table 4.2

*Demographic Characteristics of Cohort One: Traditional 2015-2016 (N = 213)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 120 | 56.3 | 56.3 | 56.3 |
| | Female | 93 | 43.7 | 43.7 | 100.0 |
| | Total | 213 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 28 | 13.1 | 13.1 | 13.1 |
| | No | 185 | 86.9 | 86.9 | 100.0 |
| | Total | 213 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 179 | 84.0 | 84.0 | 84.0 |
| | No | 34 | 16.0 | 16.0 | 100.0 |
| | Total | 213 | 100.0 | 100.0 | |

Table 4.3

*Demographic Characteristics of Cohort One: Virtual 2015-2016 (N = 30)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 11 | 36.7 | 36.7 | 36.7 |
| | Female | 19 | 63.3 | 63.3 | 100.0 |
| | Total | 30 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 1 | 3.3 | 3.3 | 3.3 |
| | No | 29 | 96.7 | 96.7 | 100.0 |
| | Total | 30 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 23 | 76.7 | 76.7 | 76.7 |
| | No | 7 | 23.3 | 23.3 | 100.0 |
| | Total | 30 | 100.0 | 100.0 | |

**Cohort two.** Students in Cohort Two participated in both traditional and virtual/online health and physical education courses and entered the 10th grade in the fall of 2016. Of these 279 students, 134 were male and 145 were female. Only 32 were identified as low socioeconomic status receiving either free or reduced meals for breakfast and lunch. This made up 17.2% of the students who participated in the study while 247 had no identified status. The final demographic showed that out of the 279 student participants for Cohort Two, a total of 213 met the Post-PACER Standard while 66 did not.

When broken down by those who took the course in the traditional face-to-face instructional delivery model, student participants totaled 231. This group was made up of 115

males, 116 females, 30 identified as low socioeconomic status, while 201 were not identified and 190 met the Post-PACER Standard while 41 did not. Those who took the virtual/online health and physical education course totaled 48 students: 19 males, 29 females, two identified as low socioeconomic status, 46 not identified, 23 met the Post-PACER Standard while 25 students did not. These demographic data are included in Table 4.4 Demographic Characteristics of Cohort Two: Traditional 2016-2017 and Table 4.5 Demographic Characteristics of Cohort Two: Virtual 2016-2017.

Table 4.4

*Demographic Characteristics of Cohort Two: Traditional 2016-2017 (N = 231)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 115 | 49.8 | 49.8 | 49.8 |
| | Female | 116 | 50.2 | 50.2 | 100.0 |
| | Total | 231 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 30 | 13.0 | 13.0 | 13.0 |
| | No | 201 | 87.0 | 87.0 | 100.0 |
| | Total | 231 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 190 | 82.3 | 82.3 | 82.3 |
| | No | 41 | 17.7 | 17.7 | 100.0 |
| | Total | 231 | 100.0 | 100.0 | |

Table 4.5

*Demographic Characteristics of Cohort Two: Virtual 2016-2017 (N = 48)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 19 | 39.6 | 39.6 | 39.6 |
| | Female | 29 | 60.4 | 60.4 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 2 | 4.2 | 4.2 | 4.2 |
| | No | 46 | 95.8 | 95.8 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 23 | 47.9 | 47.9 | 47.9 |
| | No | 25 | 52.1 | 52.1 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

**Cohort three.** Students in Cohort Three participated in both traditional and virtual/online health and physical education courses and entered the 10th grade in the fall of 2017. Of these 242 students, 136 were male and 106 were female. Only 30 were identified as low socioeconomic status receiving either free or reduced meals for breakfast and lunch. This made up 24.9% of the students who participated in the study while 212 had no identified status. The final demographic showed that out of the 242 student participants for Cohort Three, a total of 98 met the Post-PACER Standard while 144 did not.

When broken down by those that took the course in the traditional face-to-face instructional delivery model, student participants totaled 194. This group was made up of 113 males, 81 females, 24 identified as low socioeconomic status; 170 were not identified and 79 met the Post-PACER Standard while 115 did not. Those that took the virtual/online health and physical education course totaled 48 students: 23 males, 25 females, six identified as low socioeconomic status, 42 not identified, 19 met the Post-PACER Standard while 29 students did not. These demographic data are included in Table 4.6 Demographic Characteristics of Cohort Three: Traditional 2017-2018 and Table 4.7 Demographic Characteristics of Cohort Three: Virtual 2017-2018.

Table 4.6

*Demographic Characteristics of Cohort Three: Traditional 2017-2018 (N = 194)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 113 | 58.2 | 58.2 | 58.2 |
| | Female | 81 | 41.8 | 41.8 | 100.0 |
| | Total | 194 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 24 | 12.4 | 12.4 | 12.4 |
| | No | 170 | 87.6 | 87.6 | 100.0 |
| | Total | 194 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 79 | 40.7 | 40.7 | 40.7 |
| | No | 115 | 59.3 | 59.3 | 100.0 |
| | Total | 194 | 100.0 | 100.0 | |

Table 4.7

*Demographic Characteristics of Cohort Three: Virtual 2017-2018 (N = 48)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 23 | 47.9 | 47.9 | 47.9 |
| | Female | 25 | 52.1 | 52.1 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 6 | 12.5 | 12.5 | 12.5 |
| | No | 42 | 87.5 | 87.5 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 19 | 39.6 | 39.6 | 39.6 |
| | No | 29 | 60.4 | 60.4 | 100.0 |
| | Total | 48 | 100.0 | 100.0 | |

**Cohort four.** As 10th-grade students for Cohort Four entered school in the fall of 2018 they also had the option of enrolling in either the traditional or the virtual health and physical education course. Of these 322 students, 184 were male and 138 were female. Only 49 were identified as low socioeconomic status receiving either free or reduced meals for breakfast and lunch. This made up 24.4% of the students who participated in the study while 273 had no identified status. The final demographic showed that out of the 322 student participants for Cohort Four, a total of 100 met the Post-PACER Standard while 222 did not.

When broken down by those that took the course utilizing the opportunity for different instructional delivery models, the traditional face-to-face student participants totaled 243. This group was made up of 140 males, 103 females, 44 identified as low socioeconomic status, while 199 were not identified, and 75 met the Post-PACER Standard, while 168 did not. Those that took the virtual/online health and physical education course totaled 79 students: 44 males, 35 females, five identified as low socioeconomic status, 74 not identified, 25 met the Post-PACER Standard while 54 students did not. These demographic data are included in Table 4.8 Demographic Characteristics of Cohort Four: Traditional 2018-2019 and Table 4.9 Demographic Characteristics of Cohort Four: Virtual 2018-2019.

Table 4.8

*Demographic Characteristics of Cohort Four: Traditional 2018-2019 (N = 243)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 140 | 57.6 | 57.6 | 57.6 |
| | Female | 103 | 42.4 | 42.4 | 100.0 |
| | Total | 243 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 44 | 18.1 | 18.1 | 18.1 |
| | No | 199 | 81.9 | 81.9 | 100.0 |
| | Total | 243 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 75 | 30.9 | 30.9 | 30.9 |
| | No | 168 | 69.1 | 69.1 | 100.0 |
| | Total | 243 | 100.0 | 100.0 | |

Table 4.9

*Demographic Characteristics of Cohort Four: Virtual 2018-2019 (N = 79)*

Student Gender

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 44 | 55.7 | 55.7 | 55.7 |
| | Female | 35 | 44.3 | 44.3 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

SES Status

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 5 | 6.3 | 6.3 | 6.3 |
| | No | 74 | 93.7 | 93.7 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

Pacer Post Standard Met

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 25 | 31.6 | 31.6 | 31.6 |
| | No | 54 | 68.4 | 68.4 | 100.0 |
| | Total | 79 | 100.0 | 100.0 | |

**Measurements of Teaching Modality: Chi-Square**

A non-parametric test, distribution free statistics, was chosen as the second statistical test based on two points: (1) because there was no clear numerical interpretation with the pass/fail data collected, and (2) a non-parametric test would allow the researcher to observe distribution of frequencies on what is expected to occur against what did occur; i.e., was student achievement proven to show a significant difference based on the type of teaching modality a student experienced, virtual or traditional.

Two types of Chi-square analysis are available, one known as a "goodness-of-fit" test, which would provide the researcher the opportunity to easily compute what is expected by chance. The other type, a Chi-square Test of Independence, also known as the test for association, would provide the researcher a way to examine nominal data to see whether student achievement is related to the type of instructional delivery they received. The rationale for either type of Chi-square test is that for any one set of occurrences, such as a student (data point) passing the state PACER Physical Fitness Assessment in a 10th-grade traditional face-to-face class, the outcome or predictions can be computed based on the chance of other students (data points) with similar characteristics having the same outcome.

To verify the expected outcomes, a Chi-square Test of Independence was completed to compare what was observed with what was expected. The goal was to determine any statistical differences between the two modalities of instructional delivery as compared and expected by chance. The test showed that there was a statistical significance between the two instructional delivery models of virtual/online and traditional face-to-face. The statistical formula for the results: ($x^2$ (1, $N$ = 1086) = 16.17, $p$ < .001) and the test outcomes are shown in Table 4.10 indicating the exact level of asymptotic significance is .001 confirming the results are significant at the .05 level. In other words, student performance and the method by which they are taught health and physical education in the 10th grade are not independent of one another and are related.

Table 4.10

*Chi-square PACER Post-Standard Met: Virtual-Traditional 2015-2019 (N = 1086)*

Case Processing Summary

| | Cases | | | | | |
|---|---|---|---|---|---|---|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Pacer Post-Standard Met * Virtual or Traditional | 1,086 | 100.0% | 0 | 0.0% | 1,086 | 100.0% |

Pacer Post-Standard Met * Virtual or Traditional Cross-tabulation

| | | | Virtual or Traditional | | Total |
|---|---|---|---|---|---|
| | | | Virtual | Traditional | |
| Pacer Post-Standard Met | Yes | Count | 90.0 | 523.0 | 613.0 |
| | | Expected Count | 115.7 | 497.3 | 613.0 |
| | No | Count | 115.0 | 358.0 | 473.0 |
| | | Expected Count | 89.3 | 383.7 | 473.0 |
| Total | | Count | 205.0 | 881.0 | 1,086.0 |
| | | Expected Count | 205.0 | 881.0 | 1,086.0 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 16.172[a] | 1 | .000 | | |
| Continuity Correction[b] | 15.549 | 1 | .000 | | |
| Likelihood Ratio | 16.044 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 16.157 | 1 | .000 | | |
| N of Valid Cases | 1,086.000 | | | | |

[a]0 cells (0.0%) have expected count less than 5. The minimum expected count is 89.29.

[b]Computed only for a 2 x 2 table

**Comparison of mean scores: virtual vs traditional instructional delivery model.**

Based on the results of the Chi-square test, it was important for the researcher to extend the analysis and determine the difference in the means for statistical significance in the instructional delivery model between a traditional face-to-face health and physical education course and the virtual/online personalized learning model. The numerical student achievement data was collected on the Post-Standard PACER Physical Fitness Assessment for all four cohort years combined; 2015-2016, 2016-2017, 2017-2018, and 2018-2019. A *t*-Test utilizing SPSS statistics program was completed for the four combined cohorts showing whether there was a statistical difference regarding the pass/fail rate in student achievement between those participants who took the traditional course in comparison to those who were enrolled in the virtual course and passed or failed the PACER Post-Standard Assessment.

Two *t*-Tests were completed in order to distinguish between males and females. The PACER Assessment had different cut scores (pass-rates) for the two different genders. In order to show that the students met the PACER Post-Standard Assessment, the male participants must score a 51 or above in the 20-meter PACER while female participants must score a 32 or above in the 20-meter PACER in order to meet standard. Both traditional and virtual course participant data were treated completely independent due to the various years of enrollment in the 10th-grade health and physical education course. To illustrate the comparison, Tables 4.11 and 4.12 display the PACER Post-Standard results for virtual: timeframe 1, and traditional: timeframe 2.

Table 4.11 specifically compares the traditional course scores to the virtual course scores of the male student participants in the combined Cohorts 1-4 (Years 2015-2016, 2016-2017, 2017-2018, 2018-2019). The total sample size for males combined years was 585: Cohort One (2015-2016) had 11 male participants in the virtual course with 120 in the traditional course;

Cohort Two (2016-2017) had 19 male participants in the virtual course with 115 in the traditional course; Cohort Three (2017-2018) had 23 male participants in the virtual course with 113 in the traditional course; and Cohort Four (2018-2019) had 44 male participants in the virtual course with 140 in the traditional course. The mean score for the Virtual Health and Physical Education Course PACER Post-Standard Assessment was 43.55 with a standard deviation of 18.336 and the mean score for the Traditional Health and Physical Education Course PACER Post-Standard Assessment was 50.99 with a standard deviation of 18.324, showing it to be a significance of *p*.001.

The statistical formula for the results:

Virtual: ($M$ = 43.55, $SD$ = 18.34)

Traditional: ($M$ = 50.99, $SD$ = 18.32)

($t$ (583) = 3.66, $p$.001)

Table 4.11

*t-Test: Male Combined Cohorts Separating Instructional Delivery Model (N = 585) Combined Cohort Data*

Combined Cohort Data

| | Timeframe | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pacer Post | 1-Virtual | 97 | 43.55 | 18.336 | 1.862 |
| | 2-Traditional | 488 | 50.99 | 18.324 | .829 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | *t*-Test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Post | Equal variances assumed | .002 | .966 | 3.66 | 583.0 | .000 | -7.445 | 2.037 | 11.447 | -3.444 |
| | Equal variances not assumed | | | 3.65 | 136.8 | .000 | -7.445 | 2.038 | 11.476 | -3.415 |

Table 4.12 specifically compares the traditional course scores to the virtual course scores of the female student participants in the combined Cohorts 1-4 (Years 2015-2016, 2016-2017, 2017-2018, 2018-2019). The total sample size for females combined years was 501: Cohort One (2015-2016) had 19 female participants in the virtual course with 93 in the traditional course; Cohort Two (2016-2017) had 29 female participants in the virtual course with 116 in the traditional course; Cohort Three (2017-2018) had 25 female participants in the virtual course with 81 in the traditional course; and Cohort Four (2018-2019) had 35 female participants in the virtual course with 103 in the traditional course. The mean score for the Virtual Health and Physical Education Course PACER Post-Standard Assessment was 29.24 with a standard

deviation of 13.288, and the mean score for the Traditional Health and Physical Education Course PACER Post-Standard Assessment was 32.49 with a standard deviation of 11.458, showing it to be a significance of *p*.012.

The statistical formula for the results:

Virtual: (*M* = 29.24, *SD* = 13.29)

Traditional: (*M* = 32.49, *SD* = 11.46)

(*t* (499) = 2.52, *p*.012)

Table 4.12

*t-Test: Female Combined Cohorts Separating Virtual/Traditional (N = 501)*

Combined Cohort Data

| | Timeframe | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pacer Post | 1-Virtual | 108 | 29.24 | 13.288 | 1.279 |
| | 2-Traditional | 393 | 32.49 | 11.458 | .578 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | *t*-Test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Post | Equal variances assumed | 6.510 | .011 | 2.52 | 499.0 | .012 | -3.245 | 1.290 | -5.780 | -.711 |
| | Equal variances not assumed | | | 2.31 | 153.5 | .022 | -3.245 | 1.403 | -6.017 | -.473 |

Based on the results of the two *t*-Tests for both male and female groups within the combined Cohorts 1-4, there was a significant difference in the means of students who took the

10th-grade health and physical education course virtual/online versus traditionally. Looking at the mean scores, students had better outcomes when they were participating in the course that offered the traditional face-to-face instructional delivery model.

**Summary**

Data were collected from the 1,248 students in the 10th grade during the years of 2015 to 2019 at a Virginia rural high school. A total of 1,086 student scores were identified for the study as meeting the criteria for participating in either a virtual/online or a traditional face-to-face 10th-grade health and physical education course and having submitted to the Virginia Department of Education both their Pre- and Post-PACER Physical Fitness Assessments. Student scores totaling 162 were not complete and were removed from the study. These data had missing scores due to movement in or out of the school during the four-year cohort span of time or an incomplete pre- or post-assessment.

The study looked at whether there was a statistical difference regarding the pass/fail rate in student achievement between those participants who took the traditional face-to-face course in comparison to those who were enrolled in the virtual/online course and passed or failed the PACER Post-Standard Physical Fitness Assessment. Throughout this chapter a review of the procedures used in collecting and analyzing data was recorded.

The study utilized student achievement and demographic data from the period of 2015-2016 through 2018-2019 school years. Student demographic data were used to demonstrate that the student population for each Cohort 1-4 stayed similar throughout the time of the study. Student achievement data consisted of mean scores from the state PACER Physical Fitness Assessment as reported to the VDOE. A breakdown of the descriptive statistics completed for two demographic characteristics, the Chi-square, and the *t*-Test was provided in order to explore

the overarching question, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"*

The findings showed that the study rejects the null hypothesis that no statistical difference would be identified regarding the relationship between student achievement based on the different instructional delivery models of virtual/online personalized learning and traditional face-to-face learning.

# CHAPTER 5: SUMMARY OF FINDINGS, CONCLUDING DISCUSSION, AND RECOMMENDATIONS

## Introduction

The purpose of this study was to add to the field of study by investigating the possible relationship between the instructional delivery model of a virtual/online health and physical education course to a traditional face-to-face health and physical education course and its influence on student achievement. Research that validates a relationship between the instructional methodologies of virtual/online personalized learning and student achievement is important. In 2007 the National Association for Sport and Physical Education concluded that even though there were no significant differences in learning between face-to-face instructional model and that of a virtual/online approach, no empirical studies existed specific to physical education. Based on the evidence from earlier research (Bar, 1968; Bloom et al., 1956) that student learning and the instructional methodology used for learning are related, additional research of student academic achievement within a virtual/online personalized health and physical education course was necessary to fill the current gap in research.

This study was organized into five chapters. Chapter 1 communicated the problem and the significance of the study outlining the research question. Chapter 2 connected previous research to the current trends of virtual/online instruction and outlined the theoretical framework for the study detailing literature related to the two types of instructional delivery models (virtual/online and traditional face-to-face model). A description of the methodology utilized in the study was given in Chapter 3, while Chapter 4 detailed the collection of data, examination of the data, and analysis of student achievement on the state PACER (Progressive Aerobic Cardiovascular Endurance Run) Physical Fitness Test. This chapter contains a summary of the findings, concluding discussion, and recommendations for future research. Areas of importance

within this study included the results based on student gender, those identified as low socioeconomic students, and the overall achievement of both subgroups.

**Summary of Findings**

The research study had one central goal; to investigate the possible relationship between two instructional delivery models and student achievement. Within this context, the overarching question for this study is, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"* Student achievement data for this study was designated as the state PACER Physical Fitness Assessment. The research question was supported by two sub-questions that guided the study.

a. What difference, if any, is there in student achievement between the two groups (virtual and traditional) as measured by the state Physical Fitness Assessment?
b. What difference, if any, is there between the two groups among student demographics to include gender and socioeconomic status (free/reduced lunch versus non-free/reduced lunch status), as measured by student achievement (success) on the state Physical Fitness Assessment?

Using the SPSS statistical program, a descriptive, Chi-square, and an independent *t*-Test were run to produce outcomes for the collected data centered on the two sub-questions. The findings of the first sub-question which were generated using a Chi-Square Test of Independence showed that there was a statistical significance between the relationship of the two instructional delivery models of (1) virtual/online and (2) traditional face-to-face and student achievement. The Chi-square indicated the exact level of asymptotic significance as .001 confirming the results are significant at the accepted alpha value of .05 level. Student achievement and the

method by which students are taught health and physical education in the 10th grade are not independent of one another and were shown to be significantly related.

The second research sub-question asked if there were any statistically significant differences between the students of certain demographics within the two instructional delivery groups of virtual/online and traditional face-to-face when measuring their success (student achievement) on the PACER Physical Fitness Assessment. The demographics selected were gender and socioeconomic status. These demographics were selected based on elements within the structure of the school's course implementation guidelines.

Gender became a selected demographic due to the difference in pass rates established by the Virginia Department of Education for male and female students. In order to pass the 20-meter PACER assessment, a male student must receive a score of 51 or above, while a female student must receive a score of 32 or above. This difference in pass rate required two separate *t*-Tests to be run and processed so that the data could be handled completely independent of one another. When these data were analyzed, both male and female *t*-Test outcomes were found to be statistically significant. The *P*-value for this data was *p*0.001 for males and *p*0.012 for females.

The other selected demographic was the identification of participants as low socioeconomic status. This selection was due to the fact that participants throughout all four years of the study could have selected to be enrolled in the virtual/online course as a credit-recovery course, costing the students $250 or as an advancement course, which would cost the student $400. This is different from 10th-grade students who are on a regular course trajectory and not needing to repeat a course or gain time within their schedule for an elective course such as band, art, drama, etc. The descriptive statistics completed with these data showed each of the four cohorts with similar percentage of students identified as low socioeconomic status which

allowed for the sample to remain consistent across the four years of the study. The combined cohorts, nor any individual cohort year, did not have the number of identified low socioeconomic participants over 15% showing that this participant characteristic should not be considered as a factor for student achievement.

One of the most revealing aspects of the study was that it was not necessary to analyze between cohort years. It was not until the *t*-Test analysis was completed that the researcher recognized that even though the groupings were by cohort, they were not inter-related. A 10th-grade student in Cohort One would be an 11th grade student in Cohort Two, a 12th grader in Cohort Three, and aged out for Cohort Four. So, even though cohorts were established by years, it was only for the recognition of 10th-grade students, not, for example, a four-year cohort for graduation as is the norm. It should also be noted that the 10th grade year is the last year where the health and physical education course is required for all students in the state of Virginia, so students in the 11th or 12th grade would not be enrolled in a required health and physical education course.

**Conclusion**

The main research question was, *"Does the difference in the instructional delivery model between traditional face-to-face instruction and the use of technology-based virtual instruction influence student achievement in a 10th-grade health and physical education course?"* There was a statistically significant difference between the relationship of student achievement and the instructional delivery model used. Therefore, the conclusion of this study is that there will be a difference in student scores based on the course instructional model of virtual/online or traditional face-to-face.

An analysis of two sub-questions also found significantly statistical evidence that the mean scores of both male and female participants were related to the type of instructional delivery model of the course they were enrolled in for the 10th-grade health and physical education course. Also noted is the fact that the percentage of student participants identified as low socioeconomic status did not impact the outcome of the study since the total sample population from year to year remained similar in percentage of participants with that identification.

**Discussion**

Based on the results of the three different statistical analyses, there was a significant difference between student achievement of those 10th-grade health and physical education students who took the course either in a virtual/online instructional delivery model or a traditional face-to-face instructional delivery model. The findings showed that the students who had better outcomes were those students who participated in the course that offered the traditional face-to-face instructional delivery model. The theoretical framework for this study, Social Constructivism created by Vygotsky (1978) and introduced to the world of education in 1978 supports the findings that the traditional face-to-face instructional delivery model supports student social interactions, which moves them into their individual Zone of Proximal Development (ZPD).

The goal of the Constructivism framework was to create a classroom environment where social interaction builds knowledge through experience. (Deulen, 2013). The traditional face-to-face instructional delivery model for the health and physical education course received 90 days of social interactions (face-to-face instruction) whereas the virtual/online instructional delivery model for the health and physical education course received only three days of social interactions

(face-to-face instruction). The breakdown of social interaction with the two different types of instructional delivery methods was as follows: (1) traditional instruction in a health and physical education course totals 180 school days with 90 days identified for health instruction and the other 90 days specified for the physical activity portion of the course; and (2) instruction of the same content but utilizing the virtual/online delivery model only has an estimated three face-to-face days of instruction. These are benchmark days allowing for a beginning meeting to introduce the delivery model and to take the Pre-PACER assessment, a day at mid-curriculum as a "check-in" for how students were advancing in the course, and end-of-year to complete a Post-PACER assessment for student achievement in the class. In keeping with Vygotsky's ZPD belief that interaction with people leads to the development of learning, this research provides statistical evidence that students who received more social interactions performed better on the PACER Post-Standard Physical Fitness Assessment.

**Implications for practice.** Given the importance of student interactions with others to improve their learning and performance, educators should devote more time to incorporating opportunities for dialogue and appropriate personal connection within the classroom. This interaction should be peer-to-peer, as well as teacher-to-student. As noted in Chapter 2, teacher-centered instruction has been a core component in physical education classes since 1966. However, many theoretical frameworks, such as Maslow (1943), Bloom (1956), and Vygotsky (1978) have confirmed that true learning only occurs when a personal attachment is made between the learner, the instructor, and the content (DiMartino & Wolk, 2010). It is imperative for educators to build a student-centered classroom where a two-way dialogue can be established so that true, lifelong learning can take place. This move from teacher-centered instruction to student-centered instruction is long overdue for the traditional instructional delivery model, but

now more than ever the virtual/online instructor must grasp the importance that social interactions impact student achievement.

**Recommendations for Further Research**

The following recommendations for further study are proposed:

1. Conduct a study that includes a mixed-methods approach that interviews and surveys teachers, students, parents, and school administrators. This study would use the same criteria for determining a relationship between the instructional delivery models of virtual/online versus traditional; however, the study would be a longitudinal study and could be conducted at elementary, middle, or high school.
2. Conduct a study at the middle school level focused on the same research questions, just for a different age group. This would be considered a replication study to determine if age is a factor in student outcomes.
3. Conduct the research study for a group of students using the mean scores of students over a five-year period. This study would track one cohort of students starting in sixth grade and follow them until they completed their health and physical education course requirements in the 10th grade. This would allow for the researcher to determine if student achievement was impacted while enrolled in the virtual/online course understanding that there would be an increase of experience that a student would have in using the web-based course program.
4. Conduct a study that researches the amount (time) of physical activity each student received in a school year based on which type of instructional delivery model they received (virtual/online or traditional face-to-face).

5. Conduct the same study as this one adding in the descriptive variables of attendance, discipline, and instructional differences from virtual/online instruction to traditional instruction. This study would add to the previous research and allow for a more defined understanding of why a statistical significance was found in the relationship between student achievement and the instructional delivery model.
6. Finally, conduct a full qualitative study interviewing teachers, students, and parents on the different aspects of each type of instructional delivery model, the decision they made to take the course using that instructional delivery model, and their justification for choosing that model. Compare those themes to the overall theme of student achievement being related to the instructional delivery model of a traditional face-to-face course that was found in this research study.

**Reflections**

Conducting this study, *Traditional Versus Virtual: A Comparison of Student Outcomes In A Secondary Health and Physical Education Course,* allowed this researcher to gather evidence about the quality of virtual/online instruction compared to that of the traditional classroom instructional delivery model and how well it is preparing students for life after high school. Overall data supported the fact that the student/teacher relationship is still a vital part of learning. Relationships among teachers and students is an important aspect in creating a school culture that is welcoming, engaging, and centered on supporting all students.

The work of the future is tied to technology. Today, we carry a larger computer capacity in our hands with our cell phones than the computer used in the 1960s to calculate the trajectory of the first rocket into space. So, technology will not slow down, but as educators, we must

support the future while holding onto the tried and true tenets of the past. Be present, build trust, create opportunities to expand their world and be the educator that every child remembers.

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## Appendix A: Request to Superintendent of Schools for Data

Austin Donald Norman, II
P.O. Box 741
Forest, VA 24551

Dr. Douglas Schuch, Superintendent
Bedford County Public Schools
310 South Bridge Street
Bedford, VA 24523

August 26, 2019

Dear Dr. Schuch:

As you know, I am an enrolled in University of Lynchburg's Educational Leadership Studies doctoral program. In March of this year I sat for my dissertation proposal and was awarded acceptance as a doctoral candidate. Recently, I completed all the required coursework and passed my oral comprehensive exam just last week. I plan to submit a request to the University of Lynchburg's Institutional Review Board (IRB) to begin conducting research related to my topic investigating the possible relationship between an instructional delivery model and student achievement in the areas of Health and Physical Education. In order to conduct this study, I need your permission to use existing National Physical Fitness Assessment data for four cohorts of tenth grade students who were enrolled in Jefferson Forest High School during the following years: 2015-2016, 2016-2017, 2017-2018, and 2018-2019.

If I am allowed to use this data, I plan to analyze the data for each cohort by comparing the mean scores from the National Physical Fitness Assessment of the students who received virtual instruction versus those students who received the traditional face-to-face instruction. The purpose of this study is to look at the possible influence an online/virtual personalized health and physical education course has on student achievement. The tenth grade level was selected because the school division has provided an online/virtual personalized learning health and physical education course for tenth graders for several consecutive years. This will allow the research to show multiple years of data in an effort to determine trends that may or may not support the use of an online instructional delivery model that supports student achievement. Safeguards will be taken to keep the data confidential by storing all data on a password protected computer issued to me by BCPS. Students' names will be redacted and not used when findings are reported to my committee. I will, however be willing to provide specific details to you and other members of your academic staff who may share an interest in knowing the identified strengths and limitations of our virtual/online program.

If you approve for me to use the data described above, I would appreciate having a signed letter from you giving me permission to do so. I will be submitting with my IRB application. My goal is to have my application into the University of Lynchburg no later than September 10, 2019. Please let me know if you have any questions or concerns regarding this request. Thank you for your continued support.

Sincerely,

Austin D. Norman II

Austin D. Norman, II (Donnie)
Assistant Principal
Jefferson Forest High School
anorman@bedford.k12.va.us
(434)258-8244

## Appendix B: Request to Principal for Data

Austin Donald Norman, II
P.O. Box 741
Forest, VA 24551

Mr. Brian Wilson, Principal
Jefferson Forest High School
1 Cavalier Circle
Forest, VA 24551

August 26, 2019

Dear Mr. Wilson:

As you know, I am an enrolled in University of Lynchburg's Educational Leadership Studies doctoral program. In March of this year I sat for my dissertation proposal and was awarded acceptance as a doctoral candidate. Recently, I completed all the required coursework and passed my oral comprehensive exam just last week. I plan to submit a request to the University of Lynchburg's Institutional Review Board (IRB) to begin conducting research related to my topic investigating the possible relationship between an instructional delivery model and student achievement in the areas of Health and Physical Education. In order to conduct this study, I need your permission to use existing National Physical Fitness Assessment data for four cohorts of tenth grade students who were enrolled in Jefferson Forest High School during the following years: 2015-2016, 2016-2017, 2017-2018, and 2018-2019.

If I am allowed to use this data, I plan to analyze the data for each cohort by comparing the mean scores from the National Physical Fitness Assessment of the students who received virtual instruction versus those students who received the traditional face-to-face instruction. The purpose of this study is to look at the possible influence an online/virtual personalized health and physical education course has on student achievement. The tenth grade level was selected because the school division has provided an online/virtual personalized learning health and physical education course for tenth graders for several consecutive years. This will allow the research to show multiple years of data in an effort to determine trends that may or may not support the use of an online instructional delivery model that supports student achievement. Safeguards will be taken to keep the data confidential by storing all data on a password protected computer issued to me by BCPS. Students' names will be redacted and not used when findings are reported to my committee. I will, however be willing to provide specific details to you and other members of your academic staff who may share an interest in knowing the identified strengths and limitations of our virtual/online program.

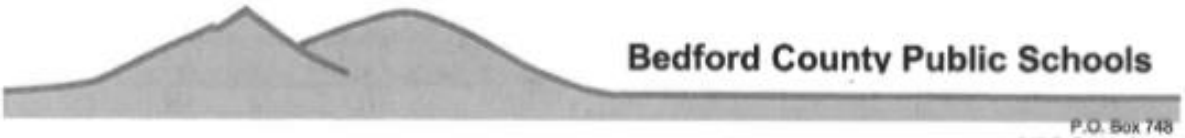
If you approve for me to use the data described above, I would appreciate having a signed letter from you giving me permission to do so. I will be submitting with my IRB application. My goal is to have my application into the University of Lynchburg no later than September 10, 2019. Please let me know if you have any questions or concerns regarding this request. Thank you for your continued support.

Sincerely,

Austin D. Norman II

Austin D. Norman, II (Donnie)
Assistant Principal
Jefferson Forest High School
anorman@bedford.k12.va.us
(434)258-8244

## Appendix C: Approval Letter from School Division




P.O. Box 748
310 S. Bridge Street
Bedford, VA 24523
Ph. 540-586-1045

**September 13, 2019**

Mr. Austin Donald Norman, II

Dear Mr. Norman:

The purpose of this letter is to provide written approval to conduct the research study entitled "Traditional Versus Virtual: A Comparison of Student Outcomes". This approval grants permission to survey Jefferson Forest High School to use existing National Physical Fitness Assessment Data.

Please provide the IRB# to us, once you have it.

Best of luck to you as you begin this research project.

Sincerely,

Mark Blankenship
Supervisor of Assessment and Planning

## Appendix D: Approval Letter from Principal of School

**JEFFERSON FOREST HIGH SCHOOL**
OFFICE OF THE PRINCIPAL
1 Cavalier Circle
Forest, Virginia 24551
School Phone 434-525-2674 School Fax 434-525-0106
https://bedfordjfhs.sharpschool.net/

September 10, 2019

Mr. Austin Donald Norman, II
P.O. Box 741
Forest, VA 24551

Dear Mr. Norman,

I would first like to let you know that I am pleased to assist you as you research the benefits of specific instructional strategies that show student progress in the area of online/virtual learning. Research of this importance is needed in the field of education and I am excited to be a part of the process.

Austin (Donnie) Norman, you have permission to utilize state physical fitness data from Jefferson Forest High School in order to conduct your research as specified in your IRB.

Throughout this process if you need additional information please do not hesitate to contact me.

Sincerely,

Mr. Brian Wilson
Principal
Jefferson Forest High School
brian.wilson@bedford.k12.va.us

## Appendix E: IRB Approval from University of Lynchburg

University of Lynchburg

**University of Lynchburg Institutional Review Board for Human Subjects Research**
***Research Approval Letter***

| | |
|---|---|
| Date: | October 2, 2019 |
| To: | Dr. Roger Jones |
| From: | Institutional Review Board (IRB) |
| IRB Approval No.: | LHS1920030 |
| Project Title: | Traditional Versus Virtual: A Comparison of Student Outcomes in a Secondary Health and Physical Education Course |
| Final Determination: | Approved |
| Approval Date: | October 1, 2019 |

Thank you for your recent submission to the University of Lynchburg Institutional Review Board (IRB) for Human Subjects Research. Your request for review of your research project listed above has been completed. The proposal and related study comply with the standards set by the U.S. Department of Health and Human Services, Code of Federal Regulations, Title 45 CFR Part 46, Protection of Human Subjects, and all applicable federal, state, and institutional policies. If a member of the research team is affiliated with and/or if there is an affiliated research site from which participants are recruited and/or data are gathered, then your study may necessitate review from another entity. It the responsibility of the PI to inquire at other site(s) and with other IRBs regarding reviewability and, if necessary, secure approval from other site(s)/IRB(s) prior to the collection of data.

Please remember that if any modifications are necessary, these changes need to be approved by this Board. The IRB website includes detailed instructions and forms for this process. Investigators must report any adverse events involving subjects to the IRB Director as soon as possible but no later than three working days after the discovery of the occurrence. **Please submit a closure form within 30 days of completion of data collection (when no additional interaction will occur with human subjects).** While the Lynchburg IRB will make an effort to send reminder correspondence regarding completion of a closure form, it is ultimately the responsibility of the PI and research team, not the Lynchburg IRB, to ensure that this deadline is met. Please feel free to contact the Director at irb-hs@lynchburg.edu if you have any questions.

*The University of Lynchburg Institutional Review Board website is located at https://www.lynchburg.edu/academics/institutional-review-board/