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A Study Of Elementary Student Course Completion And Achievement In Virtual And Traditional Format Courses Within The Volusia County School District

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A STUDY OF ELEMENTARY STUDENT COURSE COMPLETION
AND ACHIEVEMENT IN VIRTUAL AND TRADITIONAL FORMAT COURSES
WITHIN THE VOLUSIA COUNTY SCHOOL DISTRICT

by

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ABSTRACT

The focus of this research study was to determine how elementary students enrolled in virtual education classes performed on state assessments and final report card grades in Reading and Mathematics as compared with students enrolled in traditional classes, and to examine whether there was a difference in the successful course completion rates between the two groups. Five research questions guided this study concerning the relationship of successful course completion, final grades, and FCAT 2.0 achievement level scores and the variables of virtual and traditional education in the School District of Volusia County. This study is significant, as the movement of virtual learning is driven by economic factors and learning outcomes need to be considered in making instructional delivery decisions.

Chi-square analysis suggested no statistical significant difference existed in either Reading or Mathematics successful course completion of students in virtual and traditional settings. Chi-square analyses and a one-sample t-test suggested there was no statistical significant difference in performance of virtual and traditional students on FCAT 2.0 Reading and Mathematics achievement levels. Although the Chi-square analyses showed no statistical significance in performance of virtual and traditional students on final report card grades in Reading and Mathematics, the one-sample t-tests suggested there was a statistically significant difference. When interpreting these results, caution should be taken as the virtual student population was extremely disproportionate to the traditional student population. Implications for practice and recommendations for future study are suggested in this study.

To my husband John, the answer to my prayers. . . forever and always.

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I also want to thank my children, Joy and Jordan. In my effort to instill a love of learning and the value of an education, they have been more than understanding and patient when I could not always be there for them. I love you both.

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THE PROBLEM AND ITS CLARIFYING COMPONENTS

Introduction

Virtual education for K-12 school students has grown exponentially since

emerging in 1994. Both virtual courses and virtual schools are expanding within school

districts and states (Glass & Welner, 2011). Additionally, the number of charter schools

has exploded since the onset of charter schools as an alternative to traditional public

schools (U.S. Department of Education, 2011). Combining both concepts, there is a

continual increase in the number of proposals of virtual charter schools (Cavanaugh,

Barbour, & Clark, 2009).

The state of Florida enacted a mandate requiring any student who enters Grade 9

beginning with the 2011-2012 academic year to complete at least one online class toward

the high school graduation requirement (F.S.§1003.428). Cyber, virtual, distance, and

online education are interchangeable terms, but all of them denote taking a class taught

outside the traditional setting by a classroom teacher. Each of the interchangeable words

refers to the completion of a course either partially or completely on a computer.

Although colleges have offered virtual classes since the 1970s, high schools in the United

States did not offer online classes until the early 1990s (Barbour & Reeves, 2009). For

middle and elementary schools, offering virtual courses has been a 21st century initiative.

Historically, the majority of virtual education research studies have been focused

on student characteristics related to success in online learning. Research conducted

during the 1990s compared virtual and traditional education, focusing on student success

(Cavanaugh et al., 2009). In these studies, specific characteristics associated with successful college students enrolled in online classes were reviewed. Ronsisvalle and Watkins (2005) recognized that educational leaders were just beginning to obtain data on reasons for secondary students' success in online learning, and Rice (2006) noted that the effectiveness of virtual education success appeared to be related to student characteristics and student performance. According to Rice, there was a lack of quality studies regarding K-12 online education, leaving the question as to how these characteristics transfer to success for K-12 school students unanswered. Roblyer, Davis, Mill, Marshall, and Pape (2008) and Cavanaugh et al. (2009) have also stressed the need to identify specific characteristics that K-12 students should possess in order to be successful online.

When making decisions regarding expansion of virtual courses and schools, characteristics of students and their performance in virtual courses must be considered. If all students are required to complete at least one virtual course, schools must provide support for students who may not possess these characteristics. Furthermore, there should be remediation for those students lacking these characteristics.

<u>Statement of the Problem</u>

Due to the increase in virtual education classes across the nation, many organizations including charter schools have petitioned school districts and states to implement virtual charter schools. Although virtual education and charter schools have been on the rise, research has been limited concerning K-12 student success in virtual education courses to support these options as positive educational alternatives for all

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students (Cavanaugh et al., 2009; Glass, 2010; Huett, Moller, Foshay, & Coleman, 2008; Rice, 2006; Ronsisvalle & Watkins, 2005).

In an age of educational accountability, the question arises as to whether students enrolled in virtual education classes are held to the same standard as those in traditional brick and mortar public schools. Much of the prior research has compared the completion rates of online and traditional classes. However, "successful completion" has not been operationally defined. Online students have been encouraged to drop courses in the first few weeks if they display signs of failure to maintain the pace, and there has been no data maintained on these students. The variations in student retention data affect completion rate data for virtual courses (Hawkins & Barbour, 2010). Unless completion is defined in the same manner for both cases, a comparison cannot be made (Hawkins & Barbour, 2010).

Purpose of the Study

The purpose of this study was to determine how elementary students enrolled in virtual education classes perform on state assessments and final report card grades in Reading and Mathematics as compared with students enrolled in traditional classes and to examine whether there was a difference in the successful course completion rates between the two groups.

<u>Significance of the Study</u>

The results of this study provided additional information in determining the growth of virtual courses and virtual schools for elementary age students. An examination of the attributes of successful virtual learning provided the background knowledge for leaders to make informed decisions. Dillon and Tucker (2011) observed that "Until policymakers, educators, and advocates pay as much attention to quality as they do to expansion, virtual education will not be ready for a lead role in education reform" (p. 51). The results of this study may be used to assist the Volusia County School District in arriving at future decisions regarding how best to provide virtual instruction and support for elementary students.

<u>Definition of Terms</u>

Numerous terms associated with virtual education are used interchangeably. The following definitions are offered to provide clarity for terminology used in this study.

<u>Brick and mortar school</u>. A brick and mortar school is a traditional school or school building as contrasted with a virtual school (International Association for K-12 Online Learning, 2011).

<u>Distance Learning</u>. Distance learning is a "general term for any type of educational activity in which the participants are at a distance from each other—in other words, are separated in space. They may or may not be separated in time (asynchronous vs. synchronous)" (International Association for K-12 Online Learning, 2011, p. 3). This term is used interchangeably with online or virtual learning.

Florida Comprehensive Assessment Test (FCAT) 2.0. The Florida

Comprehensive Assessment Test 2.0 (FCAT 2.0) is a statewide criterion-referenced

assessment which measures benchmarks in reading, mathematics, science, and writing to

assess student understanding of the Next Generation Sunshine State Standards (Florida

Department of Education, 2011).

Online learning. Online learning refers to "education in which instruction and

content are delivered primarily over the Internet. The term does not include printed-

based correspondence education, broadcast television or radio, videocassettes, and stand-

alone educational software programs that do not have a significant Internet-based

instructional component" (International Association for K-12 Online Learning, 2011, p.

5).

Online learning. This term is used interchangeably with distance and virtual

learning.

Student characteristics. Student characteristics are items associated with success

in virtual learning. The greatest predictor of success in online learning is the

characteristic of past academic performance (Roblyer et al., 2008).

Successful course completion. For the purpose of this study, students who receive

a final course grade of C or better are said to have successfully completed the course.

Traditional education course. A traditional education course is one that is

accessed in a public K-12 school supported with funds from the local and state

government. A teacher delivers the course content in person and gives assignments in the

classroom. The class size adheres to the state guideline. Students complete coursework both in class and at home and deliver the work in person.

Virtual education course. A virtual course is accessed through the Internet using a computer. A remote instructor provides content both through assignments and regular feedback. Course content is delivered solely online. Assignments are completed and submitted online. There is no face-to-face time with the teacher.

Virtual school. A virtual school is a state approved and/or regionally accredited school that offers credit courses through distance learning methods that include Internet-based delivery (International Association for K-12 Online Learning, 2011). This term includes schools offering credit for courses in kindergarten through grade eight.

Theoretical Framework

Piaget's Theory of Cognitive Development is the theoretical framework that was used to support this study. Piaget separated individuals into four intellectual developmental learning stages from birth to adulthood. The first stage, sensorimotor, encompasses children from birth until two years of age. During this period, children are developing language, acquiring object permanence, and attaining the beginning of mathematical structure, linking numbers to objects (Ojose, 2008; Piaget & Cook, 1952; Wadsworth & Wadsworth, 1984; Wavering, 2011). The second stage, preoperational, is composed of children from 2 to7 years old. This period is characterized by an increase in language abilities including symbolic thought, and limited logic (Ojose, 2008; Piaget & Cook, 1952; Wadsworth & Wadsworth, 1984). Piaget's third stage of cognitive

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development includes children from 7-11 or 12 years of age. This stage is referred to as concrete operational. Children develop language and basic skills at a rapid rate during this period. Knowledge is acquired using senses, and the logical operations of seriation and classification are developed during this stage (Ojose, 2008; Piaget & Cook, 1952; Wadsworth & Wadsworth, 1984). Piaget's final stage, formal operational, includes children from 11 or 12 years of age to adulthood. This last stage is characterized by abstract thought processes, analysis of information, ability to make inferences, deduct, and the application of knowledge (Ojose, 2008; Piaget & Cook, 1952; Wadsworth & Wadsworth, 1984; Wavering, 2011).

Piaget's theory examines how children develop thought processes over time. As children mature with proper nurturing and stimulation, individual intelligence builds on earlier concepts mastered and expands the higher-order thought processes (Owens & Valesky, 2007). The concrete operational stage covers the majority of students enrolled in Grades 3, 4, and 5. Students are able to see and think concretely but have a difficult time thinking in abstract terms and understanding abstract concepts. Children are just beginning to think logically. Manipulatives and hands-on activities assist in cementing mathematical concepts (Ojose, 2008; Wadsworth & Wadsworth, 1984).

When examining the effectiveness of various instructional programs, both virtual and traditional, the cognitive stage of the child must be considered. In this study, the researcher sought to examine whether virtual instruction of students would meet the developmental stage of the children necessary for positive academic outcomes. This

information will assist in making future decisions regarding virtual instruction of elementary school age children.

Research Questions

Five research questions and hypotheses were formulated for this study. These questions, which were used to guide the research, follow:

1. What difference, if any, is there in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher?

   H_{01} No significant difference exists in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher.

2. What difference, if any, is there in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings?

   H_{02} No significant difference exists in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings.

3. What difference, if any, is there in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings?

   H_{03} No significant difference exists in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings.

4. What difference, if any, is there in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings?

   H_{04} No significant difference exists in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings

5. What difference, if any, is there in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings?

   H_{05} No significant difference exists in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings.

Limitations

This study had the following limitations:

1. There are additional student characteristics, along with past academic performance to which success in online learning can be attributed. These include: self-regulation, self-motivation, locus of control, and self-efficacy (Roblyer, et. al., 2008; Ronsisvalle & Watkins, 2005). The exclusion of these characteristics in this study may limit the results.

2. The accuracy of and access to the Volusia County School District student record database may limit the results.

3. The number of students enrolled in Volusia Virtual School may limit the results.

<u>Delimitations</u>

This study had the following delimitations:

1. This study was delimited to the 54 elementary schools in the School District of

    Volusia County and the Volusia Virtual School.

2. School data were delimited to that obtained for the 2011-2012 school year for the

    54 elementary schools in the School District of Volusia County and the Volusia

    Virtual School.

3.   The students who withdrew during the trial period were not included in the

    sample. The trial periods of each virtual school vary. This information may

    affect the successful course completion data.

4. The sample of students will be Volusia County School District students and may

    not be generalizable to other districts and states.

<u>Overview of Methodology</u>

Research Design

The research design for this study was quantitative. Florida Comprehensive

Assessment Test 2.0 2012 data were collected for students in Grades 3-5 in the School

District of Volusia County and the Volusia Virtual School. Final report card Reading and

Mathematics grades for 2011 and 2012 were also collected for these same students. A

quantitative methodology was selected as the research design for this study because the

researcher sought to determine the relationship between two variables, final report card grades and FCAT 2.0 scores, and to investigate course completion.

Selection of Participants

The target population for this study included two groups of students. Participants were students in Grades 3, 4, and 5 in the 54 elementary schools of Volusia County School District for the 2011-2012 academic year and students in Grades 3, 4, and 5 who were enrolled in the Volusia Virtual School for the same time period.

Population

The population for this study was all 2011-2012 Volusia County students in Grades 3, 4, and 5 who received final report card grades for 2011 and 2012 and took the FCAT 2.0 in 2012. All students in Grades 3, 4, and 5 enrolled in the 2011-2012 Volusia Virtual School who received final report card grades for 2011 and 2012 and took the FCAT 2.0 in 2012 were included in the study.

Data Collection

The researcher presented this research proposal to the Educational Leadership faculty at the University of Central Florida and the Superintendent of the Volusia County School District. The researcher then submitted the proposal to the University of Central Florida Institutional Review Board and received approval to conduct the research (Appendix A). A request for approval was submitted to the Office of Program

Accountability of Volusia County Schools to access student data and was subsequently

approved (Appendix B).

Dependent and Independent Variables

The dependent variables for Research Question 1 of this were 2011 final report

card grades and 2012 successful course completion. The dependent variables for

Research Questions 2-5 of the study were 2012 final report card grades and 2012 FCAT

2.0 levels. The independent variables for all five questions of this study included virtual

education and traditional education.

Data Analysis

Due to the large disparity in sample sizes between the virtual students and

traditional students, one-way Chi-square analyses were run instead of the *t*-tests that had

been originally planned. To run the Chi-square tests, the frequencies for each of the

variables in question for the traditional student group were recorded and used as expected

counts. The Chi-square test was then run for only the virtual students using the

aforementioned expected counts. This methodology was applied to all five of the

research questions. All tests were conducted at the $\alpha = .05$ level of significance. The

comparisons were re-run using *t*-tests. Because of the large disparity in the two groups,

the traditional group was considered the population for the one-sample *t*-tests. This

approach was taken for the Reading and Mathematics course grades, as well as FCAT 2.0

Achievement Scores.

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Organization of the Study

This report of research is organized in five chapters. Chapter 1 has provided an introduction to the study and included the background of the study, statement of the problem, purpose of the study, significance of the study, definition of terms, the research questions and the theoretical framework. An overview of the methodology was included and addressed the research design, selection of participants, data collection and analysis. Chapter 2 provides a review of the literature related to the research topic. Chapter 3 describes the methodology used to conduct the study and details the procedures used in determining participants, instrumentation, and data collection and analysis procedures. Chapter 4 presents the results of the study. Chapter 5 includes a summary of the study, discussion of the findings, implications for practice, and recommendations for further research.

CHAPTER 2
REVIEW OF LITERATURE

Introduction

Since its inception, virtual education has exploded. Although colleges offered

online classes beginning in the mid-1980s, virtual education was limited in the K-12

setting prior to the introduction of the World Wide Web in 1991. Virtual education for

students in Grades K-12 began in 1994. Since that time, course offerings and online

learning models have expanded each year (Watson, Murin, Vashaw, Gemin, & Rapp,

2012). As K-12 online learning has evolved, researchers have continued to examine its

impact on public education.

Although the number of district and charter K-12 virtual schools has increased

each year, there has been limited research concerning the successful academic

performance of students (Glass, 2010; Rice, 2006; Ronsisvalle & Watkins, 2005). The

purpose of this study was to extend the research into this area and to determine how

elementary students enrolled in virtual education classes perform on state assessments

and final report card grades in Reading and Mathematics as compared with students

enrolled in traditional classes and to examine any differences in successful course

completion rates of the two groups.

This review of literature has been organized to present an overview of the history

of education in the United States leading up to virtual education, a discussion of various

student experiences with online learning, and an examination and comparison of course

completion of students in virtual and traditional school settings. Prior research conducted

to measure student achievement and attempts to determine whether virtual or traditional settings affect the academic performance of students in the K-12 setting are also reviewed.

<div align="center">History of Education in the United States</div>

<div align="center">*The Early Period*</div>

The history of American public education is rooted in the founding of the country. The religious turmoil in Europe led to the colonization of America (Marlow-Ferguson, 2002). According to Cubberley (1919), the "first schools in America were clearly the fruits of the Protestant Revolt in Europe" (p. 45). The settlers of the United States came to America for religious freedom and included a number of religious sects. The Puritans colonized Massachusetts in 1620, and towns were established with a "Meeting House" in the center. This building served two purposes for both civil and religious life.

The primary purpose of education was religious and moral instruction (Mathison & Ross, 2008). Puritans believed that all children should learn to read so they would be able to read the Bible and prepare for salvation (Cubberley, 1919; Gulliford, 1996; Marlow-Ferguson, 2002; McCulloch & Crook, 2008). All instruction was distinctly religious and intended to sustain the Puritan beliefs (Marlow-Ferguson, 2002). The job of instruction fell upon parents or private academies. Children were taught at home so they could read and participate in church services. At times, the master of apprentices provided instruction (Cubberley, 1919). As Marlow-Ferguson (2002) noted, "The Bible

was believed to be the direct word of God" and, therefore, was used for instruction (p. 1,492).

As early as 1642, the government took an active role in public education. The colony of Massachusetts created the Massachusetts Law of 1642 which was the first law regarding education. This decree resolved that all children needed to be taught to read and work, in order that the colony would continue to prosper as the children aged (Cubberley, 1919; Mathison & Ross, 2008). The government wanted children to be able to read so they could understand religion and the laws of the colony. Though the law left the primary role of educating children to the home, the role of enforcement was assigned to the town leaders (Cubberley, 1919). If the town officials did not ensure literacy among the town's children, the town leaders would be fined and punished (Mathison & Ross, 2008). Following the legislation, Massachusetts proceeded to open one school in every town (Marlow-Ferguson, 2002).

In 1647, the colony of Massachusetts created a two-part decree that further influenced education. The first section of the law dictated that any town with a population of 50 or more was required to appoint a paid teacher to educate children in reading and writing (Cubberley, 1919; Marlow-Ferguson, 2002). The second part stated that larger towns with more than 100 households were required to provide a Latin grammar school in order to prepare boys for Harvard College. Harvard, established in 1636, prepared young men for the ministry (Cubberley, 1919; McCulloch & Crook, 2008). If town officials failed to fulfill this law, the town was required to pay a penalty. This was the first time that the government played an active role in establishing and

maintaining schools, and enforcing a monetary penalty if the town was negligent (Cubberley, 1919).

Establishing secondary schools was an attempt to insure literacy and religious indoctrination of the townspeople (Marlow-Ferguson, 2002). "Only New York City had Latin schools comparable to those in Massachusetts" (Marlow-Ferguson, 2002, p. 1492). The colony of Connecticut also began to form Latin schools (Marlow-Ferguson, 2002). Gulliford (1996) reported that the Law of 1647 established petty schools, which were the predecessors of grammar schools. Marlow-Ferguson (2002) noted that "Although the Virginia colony founded William and Mary College in 1693, it and other Southern colonies did not operate anywhere near as many free grammar or public school as did Massachusetts and Connecticut" (p. 1493).

The primary purpose of the school building was to provide shelter for the children while the instructor taught them to read and write (Altenbaugh, 1999). This was the foundation of the one-room schoolhouse. Additionally, the townspeople gathered at the schoolhouse for meetings, celebrations, elections, and fundraisers (Gulliford, 1996). Settlers placed a high value on education and believed that only homes and houses of worship were of greater importance than schools (Marlow-Ferguson, 2002). Gulliford (1996) noted that as the number of students grew, "Two one-room buildings could be joined together to form a larger school" (p. 36). Throughout the south, wealthy plantation owners hired tutors to instruct their children to read, write, and perform simple arithmetic. Later, colonies passed laws which required the masters of apprentices to ensure their education (Marlow-Ferguson, 2002; Mathison & Ross, 2008).

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Often children were schooled in homes. The dame school was one type of informal home school. Unmarried or widowed women would take neighbor children into their homes. For a few pennies a week, women conducted their household chores while they taught the alphabet and encouraged children to read and write using the Bible as their guide (Cubberley, 1919; Gulliford, 1996). Introduced in America in 1655, the hornbook consisted of a sheet of paper with letters, numbers, and the Lord's Prayer printed on it. This single page was attached to a wooden paddle (Altenbaugh, 1999). Along with the Bible, these were the only instructional materials used in dame schools. In addition, girls learned household skills, and boys learned to help around the farm (Gulliford, 1996). Dame schools became a prerequisite for admission to the town grammar school. (Cubberley, 1919).

With the formation of public schools, came the necessity of instructional materials. Other than the Bible, books were limited to whatever the ministers or wealthy citizens donated. The first schoolbook, *New England Primer,* was printed in 1690 and replaced the hornbook as a beginning reader (Altenbaugh, 1999; Cubberley, 1919; Marlow-Ferguson, 2002). Primers such as this placed emphasis on the alphabet, numbers, and spelling although the contents were religious in nature (Altenbaugh, 1999; Collins & O'Brien, 2003; Cubberley, 1919; Mathison & Ross, 2008). According to Mathison and Ross, this primer became the primary source of instruction, selling approximately three million copies between 1690 and 1850. Nearly every home had a copy (Cubberley, 1919). Marlow-Ferguson (2002) explained that students went on to learn scripture verses from the Bible. The *New England Primer*, the Bible, and an

occasional almanac comprised the entire book collection of most colonial homes (Altenbaugh, 1999).

Following the Revolution, education shifted from a religious purpose to a democratic societal purpose (McCulloch & Crook, 2008). The establishment of public schools came as early as 1785 when the Northwest Ordinance of that year required that one lot of each township be set aside for the maintenance of public schools. Many towns formed simple schools that provided the basic educational training of reading and writing (Mathison & Ross, 2008). McCulloch and Crook (2008) noted, "The New England colonial experience became the dominant model for the establishment of public education across the United States" (p. 858).

Instruction in reading using spelling books began in the 1730s (Altenbaugh, 1999). Dilworth's 1740 English publication, *A New Guide to the English Tongue*, was used for instruction in the New England and middle colonies, and Dyche's *Guide to the English Tongue* was used in the southern colonies (Altenbaugh, 1999; Cubberley, 1919). It contained words for spelling instruction and a number of fables. The cost of importing the books limited their use, and access was problematic (Marlow-Ferguson, 2002). During the Revolutionary War, the British destroyed many printing presses because the crown was concerned the printed materials might be traitorous (Marlow-Ferguson, 2002). Altenbaugh reported there was a demand for American works following the war. In 1783, Webster authored and published the first American textbook, *Spelling Book*, which became the primary text for reading instruction (Altenbaugh, 1999; Cubberley, 1919). According to Cubberley, writing materials were expensive. The cost of paper, pencil,

and steel pens prohibited their use. Slates were not used until about 1820, and often figures were traced in the sand (Cubberley, 1919).

Between 1785 and 1836, two school readers were used for reading instruction. Webster's *Grammatical Institute Part III* was introduced in 1785 but was supplanted by Murray's *English Reader* in 1799 (Altenbaugh, 1999). In 1826, Worcester began writing texts that were geared more to children, and McGuffey introduced his *Eclectic* series in 1836, changing the term "reader" to a volume in a series of texts for reading instruction (Altenbaugh, 1999). Several authors introduced reading series which continued until the early 1900s. In the early 20th century, reading texts began to contain nursery rhymes, folk tales, and myths in an effort to foster an appreciation of literature (Altenbaugh, 1999).

According to Altenbaugh (1999), buildings designed for the sole purpose of education were not constructed until the early 19th century. They were designed "to support the mission and methods of formal education" (Altenbaugh, 1999, p.327). In 1837, Horace Mann was appointed to oversee the schools in Massachusetts (McCulloch & Crook, 2008). Mann used his position to promote the benefits of public-run schools (Marlow-Ferguson, 2002). During this same period, Henry Barnard petitioned Connecticut to establish a state school board and fought for better textbooks once the board was created (Marlow-Ferguson, 2002). One of the first schoolhouses that had many separate classrooms opened in 1837, "segregating pupils according to their age and level of achievement" (Altenbaugh, 1999, p. 328).

According to Marlow-Ferguson (2002), as the population of America grew, one-room schoolhouses began to close, and larger schools were constructed to hold students in Grades 1-8. Following World War I, automobiles became affordable while education budgets diminished. Another reason for the movement to close one-room schoolhouses and merge elementary schools was the viable option of transportation. By the start of the 21st century, nearly all one-room schoolhouses were gone (Marlow-Ferguson, 2002).

The Emergence of Non-traditional Education

Toward the end of the 19th century, alternative forms of traditional education, including distance education, were introduced (Howard, Boettecher, Justice, Schenk, Rogers, & Berg, 2005). The first form of distance education was correspondence instruction. Correspondence courses were offered to solve the problems of "geographical separation from sources of higher education, demands of work and military service, lack of access for women, minorities, and the handicapped, religious convictions, and limitations of the curriculum" (Howard et al., 2005, p. 1006).

According to Howard et al. (2005), "Anna Eliot Ticknor, the daughter of a Harvard professor, founded the first correspondence instruction program in the United States in June 1873 that focused primarily on enrichment courses" (p. 1007). Correspondence courses consisted of texts and assignments. Tests were mailed to the student with no face-to-face contact with the instructor and mailed back to the instructor once completed (Collins & O'Brien, 2003). These enrichment courses were designed for "women who had limited access to higher education" (Howard et al., 2005, p. 1007).

Correspondence courses were also developed for training rather than education (Howard et al., 2005). In 1886, Foster, a publisher, began printing materials for miners on accident prevention (Howard et al., 2005). Five years later, Foster offered miners correspondence courses for a fee, fulfilling a need for additional training.

At the turn of the century, most of the population in America was uneducated (Duncan, 2005; Howard et al., 2005). Mathison and Ross (2008) stated that "When the federal government began to draft men to fight in World War I, it found that 25 percent of them were illiterate" (p. 290). There was a need to educate the military forces and the workforce because of the industrialization of the country. Duncan (2005) noted the armed services began to use correspondence courses for technical education during this time period and tracked the enrollment, training, and performance of thousands of service members who participated in correspondence programs.

In the early years of the 20th century, various states also began testing students. The first version of the Iowa Test of Educational Development began in the 1920s (Lindquist, 1970). It was not given on a statewide basis for another 10 years. During this period, however, the New York Regents produced their own state assessment (New York Department of Education, 2012).

Correspondence programs entered the university setting in 1873 when "Illinois Wesleyan began to offer correspondence courses to supplement traditional classroom courses that could lead to AB or PhD degrees" (Howard et al., 2005, p. 1008). Howard et al. (2005) reported that enrollment in correspondence courses at the university level reached a peak in 1926. Correspondence classes dwindled as radio and educational

television were introduced. Television became an option because students could see the instructor during the presentation, and classes could be taped and delivered by mail to students (Marlow-Ferguson, 2002). During the 1950s through the 1970s, research was conducted regarding the effectiveness of televised classes as compared to traditional classroom instruction. In one study, Saba (2000) indicated there were no statistical differences in effectiveness between the two. As technology advanced in the 20th century, distance education adapted to education (Power & Gould-Morven, 2011).

Apple Computer introduced the Apple II, one of the first personal computers, in 1977. Using games like "Oregon Trail," computers became popular in public schools, and as they became more affordable, they were purchased for schools. The launch of the World Wide Web in 1991 directly advanced online learning. Once the Internet was available, Web-based courses flourished (Marlow-Ferguson, 2002; Power & Gould-Morven, 2011). The majority of these courses were at the collegiate educational level (Marlow-Ferguson, 2002; Mathison & Ross, 2008; Power & Gould-Morven, 2011).

Prior to 1994, textbooks were the main source for reading instruction. In 1994, President Clinton signed the Improving America's Schools Act which reauthorized the Elementary and Secondary Education Act of 1965 and made provisions for educational technology. Clinton pledged that every public school would have Internet access (Mathison & Ross, 2008), and in the ensuing years, there was a marked increase in Internet use (Marlow-Ferguson, 2002). According to Mathison and Ross, though only 3% of classrooms were connected to the Internet in 1994, 63% were connected in 2008.

Online Learning in the United States and Florida

At the time of this study, there were five states including Florida, which required completion of at least one online course for high school graduation (Watson et al., 2012). Florida has been the forerunner in virtual education opportunities for K-12 students. According to Watson et al., Florida has been the only state to offer both supplemental and full-time online learning as options for all students in Grades K-12. From the 2008-2009 school year to the 2011-2012 year, multi-district full-time online enrollment in Florida increased 796% (Watson et al., 2012). In terms of rankings of student enrollment in state virtual schools, in 2012, Florida was at the top followed by New Hampshire. Course enrollment of 303,329 in Florida's state virtual school was 312% greater than New Hampshire's state virtual school. Additionally, the percentage of course enrollments to state population was 39% in Florida, surpassing New Hampshire's percentage of 24% (Watson et al., 2012).

Online learning in K-12 schools in Florida began as early as 1995. Both Orange and Alachua Counties launched pilot programs for Internet-based high school programs and eventually formed an alliance to for state grant funding (Tucker, 2009). This resulted in the beginning of Florida High School in 1997, which according to Tucker, evolved into Florida Virtual School (FLVS). FLVS was the country's first state-wide Internet-based public high school and has since been recognized as a national model for online learning (Tucker, 2009; Watson et al., 2012). In 1997, the Florida Legislature enacted Florida Statute 1002.20, which provided FLVS as a viable educational option for children, and there were 77 course enrollments in that year (Tucker, 2009). During the 2011-2012

academic year, course enrollments had grown to 303,329 (FLVS, 2012), and parents and students throughout the world were turning to online learning as an alternative to traditional brick and mortar schools (Watson & Ryan, 2006).

In 2008, the Florida Legislature passed a law that expanded the virtual offerings for high school students to include options for students in Grades K-8. Beginning with the 2009-2010 school year, districts had to provide online learning for elementary and middle school students or contract with a provider (Tucker, 2009). FLVS was not ready to begin its own program and instead developed a partnership with Connections Academy to run a K-8 program for them (Tucker, 2009). Due to the fact that FLVS operates as a public school, the school receives funding for the students who attend. The financial hardship caused by the diverted funding caused Florida school district personnel to study virtual education opportunities within their districts (Tucker, 2009). To remedy the loss of funding, eight districts created virtual schools, which operated within their districts and were able to keep the funding in the county school systems (Tucker, 2009). Both FLVS and county-based virtual programs have continued to expand each year (NCES, 2012).

In 2011, further advancement in online learning in Florida was ensured with the passage of a law requiring all high school students to complete at least one online course toward graduation beginning with the 2011-2012 academic year (F.S. §1003.428). As virtual education in the K-12 setting has progressed from a fledging initiative to what has become an integral part of the education of all Florida public high school students, researchers have increasingly begun to examined factors related to student experiences with online learning.

Student Experiences with Virtual Education

Though there exists a plethora of research regarding student performance in higher education online courses, the amount of research for K-12 students enrolled in virtual courses has been limited (Cavanaugh et al., 2009). Sanderson and Greenberger (2010) found that "online learning programs have exploded on the educational scene, growing at a rate of approximately 30% annually" (p. 43). Students with disabilities and gifted students have been determined to be two groups, in particular, that may derive benefit from virtual learning. A school administrator survey revealed that online classes meet the needs of certain groups of students, particularly those who are advanced, lower level, and at risk for dropout (Picciano & Seaman, 2007). The following sections address literature and research reviewed about virtual learning issues related to (a) gifted students, (b) students with disabilities, (c) at-risk students, and (d) elementary students.

Gifted Students and Virtual Learning

Students who receive services under the "gifted" label are one category of exceptional students. Online courses were offered first to gifted students to provide them an opportunity to advance educationally. Virtual courses provided higher-level courses that may not have been accessible to challenge gifted students academically (Olszewski-Kubilius & Corwith, (2011).

Students labeled as gifted or advanced are able to expedite their educational careers by accessing higher-level classes not offered at their sites (Thomson, 2010; Wallace, 2009). Thomson noted that virtual learning provides gifted students with "the

opportunity to work at a pace consistent with their rate of learning as well as expanded access to advanced-level courses" (p. 32). Online learning has been viewed as allowing gifted students the opportunity to progress at their own level and pace, and as providing for an accelerated curriculum for students who would benefit from it (Dillon & Tucker, 2011; Washington, 1997). Olszewski-Kubilius and Corwith (2011) found that parents who enrolled their elementary age children in online educational programs "did so because they desired academic challenge for their children and because of their children's interest in the subject matter" (p. 20).

Proponents of virtual education also have expressed the belief that online learning allows students equal access to courses. Many rural and smaller districts have begun to offer online classes to accommodate the needs of their students and lack of personnel (Picciano & Seaman, 2007). Online courses, as explained by Olszewski-Kubilius and Corwith (2011) provide rural districts with smaller populations as well as larger districts that have faced major financial cutbacks with opportunities to meet the needs of their gifted students. They wrote, "One of the significant advantages of distance education for schools is the ability to provide appropriate courses for gifted students without having to separate them from their chronological peers or regular school environment, thus avoiding transportation costs" (Olszewski-Kubilius & Corwith, 2011, p. 20). Other districts have been able to provide advanced classes to students who otherwise may not have had access to certain courses were it not for virtual education opportunities. Huett et al. (2008) also spoke to the availability of online classes as broadening the variety of courses offered at smaller schools, thereby making education more equitable.

Sanderson and Greenberger (2010) addressed virtual learning for gifted students in terms of access, stating that its advantage lies in the "ability to provide greater access to academically rigorous curriculum, highly qualified instructors, intellectual peers, and 21st century skills" (p. 43). Thomson (2010) concurred and emphasized that because of the global and diverse environment of a virtual classroom, students "benefitted from exposure to the variety of different viewpoints (p. 37).

With the recent work performed in virtual learning, technology has improved. Wallace (2009) found that though research concerning gifted students and online learning has been limited, the results have been positive. Wallace noted that, in online courses, "greater emphasis is placed on skills such as writing, time management, technology literacy, and independent learning" (p. 315). Thomson (2010) made two observations in regard to the use of online learning with gifted students: (a) the importance of a specific layout of the online course regarding expectations, instructions, and directions so students clearly understand their responsibilities; and (b) the preference of virtual instructors for a virtual delivery model because they are able to focus more on intellectual content of the course and less on the bureaucratic constraints of brick and mortar schools.

A number of researchers have noted benefits for gifted students associated with online learning. "Distance education is often thought of as a lonely or solitary type of experience, but this is not necessarily the case with current technologies" (Olszewski-Kubilius & Corwith, 2011, p. 20). Gifted students can benefit from the collaborative learning and student discussion boards. "Students tended to be more thoughtful and

contemplative in their online interactions than in a face-to-face classroom" (Thomson, 2010, p. 34). Students can actively engage with one another.

Although students may be labeled as gifted, "there is still a full spectrum of learning styles and needs just like in any ordinary classroom (Thomson, 2010, p. 35). Individual teacher-student communication is a means for the instructor to tailor the course to meet the needs and interests of students while challenging their academic growth (Thomson, 2010; Wallace, 2009). Additionally, according to Olszewski-Kubilius & Corwith (2011), gifted students can have "a variety of learning experiences including virtual field trips to cultural institutions and historical sites" that allow them to have a broader educational experience.

Wallace (2009) asserted that gifted students are able to continue to accelerate their learning by continuing their studies during the summer months. Researchers have reported increased independence, higher order thinking skills, collaborative learning skills, problem-solving abilities, and confidence in one's own academic abilities as positive outcomes of virtual learning for gifted students (Olszewski-Kubilius & Corwith, 2011).

Students With Disabilities and Virtual Learning

At the other end of the spectrum, students with disabilities are accessing online coursework. The passage of the Education of All Handicapped Children Act (Public Law 94-142) in 1975 transformed educational experiences for students with disabilities. This legislation required that students with disabilities are provided equal access to

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educational opportunities in schools. In term of virtual education, this means that as virtual courses and schools multiply, legislators must ensure students with disabilities are provided equal access to classes. As a result, additional support services may need to be realigned and financial resources reallocated (Aron & Loprest, 2012).

Prior researchers have shown that students with disabilities have had a lower rate of high school completion (Aron & Loprest, 2012; Repetto, Cavanaugh, Wayer, & Liu, 2010). These students leave school for various reasons, including not keeping up with coursework and poor self-esteem. Virtual teaching, however, can provide individual instruction to meet specific needs and learning styles (Barbour & Reeves, 2008). This is particularly advantageous in working with the many disabilities among special education children, the most common being specific learning disabilities (Aron & Loprest, 2012). Repetto et al. (2010) maintained that students with disabilities do not have to worry about humiliation or intimidation because online learning permits students to work at their own pace.

The Response to Intervention which came about from the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004, created a need to focus on the appropriate instruction intervention to meet the individual needs of learning disabled students (Aron & Loprest, 2012). This process requires teachers to provide a tiered process of instruction. Virtual instruction can be tailored to meet the academic needs of individual students (Repetto et al., 2007). By nature of the online class, students communicate primarily through the written word, but students with learning disabilities often perform poorly on written work, and this affects their academic performance

(Englert, Zhao, Dunsmore, Collings, & Wolbers, 2007).   Programs that are computerized permit disabled students to use a scaffolded environment for writing successfully (Englert et al., 2007).). Providing technological support through virtual courses improves both the quality and the length of written assignments (Englert et al., 2007). The interactive communication between teacher and students as well as with peers creates a safe, caring community (Repetto et al., 2010). By providing a learning environment that is nonthreatening, students with disabilities "can be taught to take control of their learning" (Repetto et al., 2010). Instructors are able to connect personally with individual students who may need additional support. Physically disabled students can use adaptive technology without social stigmas (Englert et al., 2007; Repetto et al., 2010).

At-Risk Students and Virtual Learning

Students who are at-risk for dropout are able to participate in credit recovery (Dillon & Tucker, 2011; Ramaswami, 2009). Virtual courses increase the graduation rate which is a benefit for students at-risk and those with disabilities at the high school level (Archambault et al., 2010; Repetto et al., 2010). "Students with disabilities who remain in school until graduation are more likely to attend 2- or 4-year colleges" (Repetto et al., 2010, p. 92). As a result, these students will be more likely to be productive in the workforce, participate in community activities, and become independent adults (Repetto et al., 2010).

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Individualizing instruction is beneficial in both traditional and virtual settings (Archambault et al., 2010; Aron & Loprest, 2012). Many of the virtual schools provide increased support for at-risk students, e.g., establishing coaching teams for students when needed (Archambault et al., 2010). Some online schools use specific instructional programs to provide additional assistance for students who may struggle in a particular subject, including reading and mathematics (Archambault et al., 2010). Once identified as a student with disabilities, instructors are able to join with students and their families to make necessary educational accommodations for educational success (Archambault et al., 2010).

Another advantage of virtual classes cited by district administrators is the flexibility of hours for students who do not excel in a traditional education model (Barbour & Reeves, 2009; Washington, 1997). Virtual learners are able to balance outside work and family commitments (Mupinga, 2005). Barbour & Reeves (2009) discussed the flexibility of both scheduling and geography as a benefit for equal access for students. Thomson (2010) found that virtual instructors, though posting recommended due dates for assignments, allowed students to work at their own pace. This permitted students to meet their other commitments.

Opponents of virtual learning have been concerned with access and equity issues. The availability of computer access and Internet connection for mobile and low-income students is one concern. School administrators who are advocates of virtual education have communicated with school district officials to provide access to computer labs during the day and in the evening (Podoll & Randle, 2005). Repetto et al. (2010) also

spoke to the importance of accessibility and availability of equipment, particularly for low-income students and advocated for a computer lab setting solution. As most public schools provide computer and Internet access, this is not a concern for students in a traditional school. However, Barbour & Reeves (2009) noted the low percentages of students with access to computers or the Internet at home. Black and Hispanic minority students were found to have less than half the access to home computers than white or Asian students (Barbour & Reeves, 2009). Of those students whose household incomes were below $20,000, less than one-third had home computers (Barbour & Reeves, 2009). Virtual educators must create access to both computers and the Internet to safeguard against equity issues and permit all students equal access and experience.

Elementary Students and Virtual Learning

As has been indicated, the research focused on virtual learning for elementary students has been very limited. Some researchers, however, have alluded to some specific obstacles and benefits of online learning related to younger students (Cross, 2004; Eckstein, 2010; St. Cyr, 2004; Thomson, 2010).

St. Cyr (2004) embarked on a study to assist with research supporting distance learning for elementary students; however, the research was specific to one student in the subject of mathematics. The one negative comment of the research study was the technological difficulties in accessing the online coursework (St. Cyr, 2004).

One of the obstacles of virtual learning for elementary age students is the lack of maturity to use the informal discussion component tied to some courses (Eckstein, 2010;

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Thomson, 2010). Although younger children may not feel as comfortable speaking with or writing to their instructors, teacher-student interaction and frequent teacher feedback are linked with success in online learning (Thomson, 2010). Alternatively, Cross (2004) believes that the anonymity created by online learning gives feelings of safety and power as well as being adult-like to young children.

<p style="text-align:center">Successful K-12 Course Completion</p>

Successful course completion of K-12 students enrolled in virtual courses is a recent area of study for researchers. Prior to the 21st century, researchers compared college virtual education success with traditional education success (Cavanaugh et al., 2009). Research studies during the 1990s were often focused on the characteristics of college students and how these traits predicted successful online course completion (Rice, 2006). Virtual educators realized the importance of ascertaining specific characteristics connected with secondary student success in online learning (Ronsisvalle & Watkins, 2005). As virtual learning has made its way into the K-12 arena, researchers such as Roblyer et al. (2008) and Cavanaugh et al. have stressed the need to identify characteristics linked with K-12 student success in online learning. Of equal importance is the need to arrive at a uniform definition of "successful course completion" so that valid comparisons can be made between virtual and traditional education.

Dillon & Tucker (2011) asserted that there are no common methods to determine course completion. Olszewski-Kubilius and Corwith (2011) observed that most virtual "programs do not track enrollments and completion rates in detail" (p. 24). Roblyer et al.

(2008), in their research, reported that findings from studies concerning course completion have varied depending on whether grades of D and F are included. Naturally, the addition of final grades of D and F lead to the inflation of successful course completion rates.

Universities such as the University of Phoenix, Jones International, and CALCampus, opened the market for digital learning. Howell et al. (2004) noted that because of the relative youth of online learning, it is difficult to find research studies on virtual course completion. With the expansion of virtual education to the elementary school age population, Roblyer et al. (2008) have called for more attention to student characteristics for success. Ronsisvalle and Watkins (2005) also commented on the significance of generalizing research conducted for successful completion of virtual learning at the university level to students in K-12. Some researchers have found that prior online experience is linked with future success in virtual coursework (Hachey, Wladis, & Conway, 2012; Howell, Laws, & Lindsay, 2004).

Although some would argue that determination of successful course completion for students enrolled in traditional schools is uncomplicated, Howell et al (2004) viewed as problematic that schools or districts determine passing grades and keep files on student information and that "there is no national standard for calculating completion rates" (p. 245). They also observed that the inconsistent methods of analyzing course completion rates make it difficult to compare traditional and online course completion rates.

The calculation of successful completion of online courses has been recognized as more complex and the data therefore more difficult to analyze. Howell et al. (2004)

urged researchers to be cautious when interpreting online course completion data because of the lack of a uniform measurement. The length of time when a student can drop a virtual course varies from one to 185 days. Hawkins and Barbour (2010) reported in their study that one-fourth of schools studied set the time for dropping a virtual course at two weeks and one-fourth set it at 30 days. Howell et al. (2004) commented that some schools do not include students who leave during the withdrawal period in their course completion statistical data and that many students who drop out of virtual classes do so during the trial period. Barbour and Reeves (2009) found that low-achieving students are among those who frequently remove themselves during the trial period. This implication leads to the possibility that only average and high ability students are completing virtual courses.

The study of over 400 virtual high school students in 28 states and 23 countries conducted by Roblyer et al. (2008) noted that the low dropout/failure rate of their targeted population of 77% white students may not yield the same dropout/failure rate of a study conducted with a high minority population in an inner city setting. One of Roblyer et al.'s observations that was in agreement with Ronsisvalle and Watkins' (2005) earlier findings was that students enrolled in virtual schools who receive support during the online class are more likely to complete the course successfully.

As an example of the problem associated with completion rate, Howell et al. (2004) reported completion rates of 36%, 76%, and 71% for three courses based on all students who had initially enrolled in the courses When, however, the students who

withdrew from the courses during the drop period of the first two weeks were removed, the completion rates rose to 97%, 92%, and 91%.

Hawkins & Barbour (2010) cited statistics that compared the Florida Virtual School course completion rate before and after students removed themselves during the dropout period. When the students who dropped out were not included, there was a 20.1% increase in course completion. Whether these students count in the completion rate makes a substantial difference in course completion statistics.

Experience in the use of characteristics of K-12 students to predict successful completion of virtual courses is difficult, as the majority of research concerning the subject of student success in online course has been conducted at the higher education level (Ronsisvalle & Watkins, 2005). Cavanaugh et al. (2009) wrote that characteristics linked with online course success for adults are not necessarily the same for K-12 students, as children and adolescents learn differently from adults. Lahoud & Krichen (2010) supported the virtual class environment as a preference of adult learners who desire flexibility but did not make this connection for children. Whether the characteristics cited for adult success are the same as those for students in K-12 online courses success has yet to be determined (Ronsisvalle & Watkins, 2005). Ronsisvalle & Watkins (2005) quoted four areas important to the review of student online success: (a) self-regulation, (b) locus of control, (c) self-efficacy skills, and (d) motivation. Roblyer et al. (2008) also included past academic performance and learning conditions as characteristics for student success. The greater the number of these characteristics students possess, the more likely they are to be successful in completing online courses.

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Simpson (2006) noted one statistical method for predicting student success in traditional higher education. A logistic regression analysis was used to determine students' chance of withdrawal. Simpson (2006) suggested this algorithm could be applied to predict online student success. Gomory (2001) noted no difference in course outcomes for online learners as compared with traditional classroom students.

Moisey (2004) studied students with disabilities and successful course completion. The researcher reported a 45.9% completion rate which included students who withdrew during the first 30 days of the course. Allowing students with disabilities extended time to complete a course was one of the main predictors of successful course completion (Moisey, 2004).

Rauh (2011) examined the South Carolina Virtual Charter School (SCVCS). The study compared the scores on the SCVCS High School Assessment Program Examination for English Language Arts and Mathematics over a four-year period. Students who enrolled in SCVCS were required to withdraw from their traditional high school. The results indicated that students who were zoned to attend high poverty level schools who enrolled in the SCVCS performed academically better on the examination than those who remained in the traditional schools. Students from low to median poverty level schools performed better when remaining in the traditional school setting when compared with those who enrolled in the SCVCS.

Roblyer et al. (2008) found that a major predictor of online course success was a student's past grade point average. Despite this finding that high grade point average was one of the characteristics linked to successful completion of a virtual course, no model to

predict success was identified. Many high achieving students self-select virtual courses because it allows them the opportunity to advance more quickly. Barbour and Reeves (2009) characterized students who did well in online courses as those who were highly motivated and high achieving. Many high achieving students self-select virtual courses because it allows them the opportunity to advance more quickly. Barbour and Reeves (2009) questioned whether low performing students drop out of online courses prior to the configuration of successful completion rates. Roblyer et al. (2008) suggested that in order to encourage success, students should complete a pre-course orientation. This orientation would provide information regarding which students may need more support to be successful. Ronsisvalle and Watkins (2005) posited that students should be prescreened using several methods in order to improve the retention and completion rates of online learning. Harrell (2008) noted orientation and support of online learners increased the likelihood of virtual student success.

A report of the Florida Tax Watch Center for Educational Performance and Accountability (2007) indicated that FLVS students outperformed students enrolled in brick and mortar schools; however, there was still a question of course completion. Students enrolled in FLVS may begin courses at any time during the year. Although there is no specific end date, students are expected to finish the course in approximately 18 weeks (Watson & Ryan, 2006). Because online schools in Florida receive funding for students based on successful course completion, it is fiscally prudent to examine the definition and criteria used to make that determination (Tucker, 2009).

In contrast, course completion for students enrolled in brick and mortar schools is determined by whether or not the student is enrolled at the termination of the academic year. Successful completion is dependent upon criteria used by researchers. Some view only grades of A, B, and C as successful. Others consider a grade of D successful. Therefore, it is important to examine how grades have been determined in arriving at a definition of "successful" completion.

Measurement of Student Achievement in Florida

There are several ways to investigate student achievement. Two of the most common methods are through report card grades and standardized achievement tests. Regardless of the grading scale used, all public schools in the state of Florida issue a final report card grade at the end of the academic school year. Two of the core subjects reported for elementary students include reading and mathematics. Both of these subjects are tested on a state assessment administered to students in Grades 3-10.

In evaluating student success using final course grades, the state of Florida established the following statewide grading scale for public high schools in 1987 (Ch. 87-329): A = 94-100%, B = 85-93%, C = 75-84%, D = 65-74%, and F= 0-64%. In 1997, the Florida legislature altered the grading scale raising the scales to: C = 77-84% and D = 70-76% (Ch. 97-2). In an attempt to bring the grading scale used in high schools in line with the college grading scale, the 2001 Florida legislature changed the grading scale to a 10-point percentage spread for each letter grade (F.S. §2001-237). Beginning with the 2007-2008 school year, the grading scale established by Section 1003.437 of the

Florida Statutes also applied to Grades 6-8. The 10-point scale of A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, and F = 0-59% was in use in Florida public schools at the time of the present study (F.S. §2001.237).

The 1968 Florida legislature instructed the Commissioner of Education to develop a plan with the Department of Education to improve the state's educational programs. During the next two years, the Commissioner outlined nine principles which led to the 1971 Florida Legislature's enactment of the Educational Accountability Act requiring national and state standardized testing. The purposes of the statewide assessment program were to

> a) identify the educational strengths and needs of students, b) assess how well educational goals and performance standards are met at the school, district, and state levels, and (c) provide information to aid in the evaluation and development of educational programs and policies (Section 229.57, Florida Statutes, para 1).

The first statewide assessment took place in 1971-1972 in reading. The Florida Department of Education contracted with the Center for the study of Education at the University of California at Los Angeles to provide a list of objectives and items to assess students in Grades 2 and 4. The second statewide assessment followed in 1972-1973 with reading, writing, and mathematics test items supplied by two Florida districts and Florida State University. These samples were then reviewed by Harcourt Brace Jovanovich, Inc., commercial testing firm. The untimed test was administered to students in Grades 3, 6, and 9. Science objectives were reviewed in 1973-1974. (Florida Department of Education, 2012b).

In 1974, the Florida 1971 Educational Accountability Act was revised. The 1974 Act specified the grade levels and subject areas that were included in annual testing. Students in Grades 3 and 6 were assessed in reading, writing, and mathematics. The next step included testing of other subject areas though not specified. Other components of the 1974 Act included a comparison of statewide results to national indicators and reporting the school results to parents in an annual report of school progress. (Florida Department of Education, 2012b). By 1976, all students in Grades 3-6 were tested in all subject areas.

The Florida Legislature made a decision to discontinue its state accreditation practices in 1974, and Florida contracted with Westinghouse Learning Corporation in 1974-75 to replicate the reading and mathematics portions of the National Assessment of Educational Progress. February of 1975 marked the first time Florida tested all general education students in Grades 3, 6, and 9 in reading, writing, and mathematics. The following school year, 1975-1976, the statewide assessment was administered in October to all students in Grades 3 and 6 in order to make use of the results throughout the year. This year marked the end of the Florida National Assessment of Educational Progress duplication (Florida Department of Education, 2012b).

In 1976, the Florida Legislature passed the Educational Accountability Act which added two major changes. The first alteration was a change in terminology, adopting standards for a three-to five-year period. The second change included a mandatory passing score on a literacy exam for graduation beginning with the graduating class of 1978-1979. (Florida Department of Education, 2012b).

The statewide assessment administered in October 1976 was developed by the Department of Education in conjunction with three Florida universities: (a) reading items by the University of West Florida, (b) writing items by Florida International University, and (c) mathematics items by the University of South Florida. This test was given to all students in Grades 3 and 5. The following school year, all students in Grades 3, 5, 8, and 11 participated in the statewide testing. In late 1976, Florida contracted with the Educational Testing Service (ETS) to create literacy test items for the high school Functional Literacy Test, which changed its name to State Assessment Test, Part II in 1978. (Florida Department of Education, 2012b).

Students in Grades 3, 5, 8, and 11 continued to be tested in reading, writing, and mathematics. The new test was called the State Assessment Test, Part I. In 1982, a revised writing production test was administered to a sample population of students in Grades 3, 5, 8, and 10. (Florida Department of Education, 2012b). In September 1983, the Florida State Board of Education adopted Student Performance Standards of Excellence, adding science and social studies standards for students in Grades 3, 5, 8, and 12. Over the next several years, the Statewide Assessment Program encompassing the State Assessment Test, Part I and State Assessment Test, Part II continued with revisions made as item specifications were reviewed, and then Governor Lawton Chiles implemented a writing test, Florida Writes, in 1992. (Florida Department of Education, 2012b).

CTB/McGraw Hill received a four-year contract in 1995 for new statewide testing in reading for Grades 4, 8, and 10 and mathematics in Grades 5, 8, and 10. This was in

addition to the writing assessment for Grades 4, 8, and 10. In 1996, the Florida State

Board of Education adopted the Sunshine State Standards, and the state contracted with

CTB/McGraw-Hill to develop a test that was aligned with the new standards. In 1997,

the field test of the Florida Comprehensive Assessment Test (FCAT) was administered in

Grades 4, 5, 8, and 10. (Florida Department of Education, 2012b). Thus, the first form of

FCAT, including reading and mathematics, was administered in January 1998 to all

students in Grades 4, 5, 8, and 10. The Florida Legislature also changed the law to

include FCAT scores for high school graduation in lieu of the High School Competency

Test. (Florida Department of Education, 2012b). School accountability for student

performance on the FCAT began in February 1999. Florida also approved expansion of

the statewide assessment program. Although there was a dispute over the bid process,

National Computer Services, now NCS Pearson was awarded the bid to score and report

the state FCAT results. (Florida Department of Education, 2012b).

     Although standardized testing has been in place in Florida since 1971, until the

implementation of FCAT, there were never high stakes attached to testing. Former

Governor Jeb Bush raised the stakes for public schools when the legislation passed

Bush's A+ Plan which required grading of schools. The purpose of the FCAT was to

increase student performance by implementing higher standards of education. The No

Child Left Behind Act of 2001 drew further attention to the FCAT results and the

discrepancies of subpopulation groups. Minority students, economically disadvantaged

students, students with disabilities, and English Language Learners were

underperforming in comparison to their majority counterparts.

The state of Florida transitioned from the Sunshine State Standards established by the Florida Board of Education in 1996 to the Next Generation Sunshine State Standards in 2007. The FCAT 2.0 was created to ensure alignment with the new standards taught in the schools. The state subsequently revamped the developmental scores for FCAT 2.0 in 2011, using the same developmental scale score at each grade level, thereby permitting a more accurate comparison of student progress. In 2010, the Florida Department of Education adopted the Common Core State Standards (CCSS). The state plan outlined full implementation of CCSS and administration of Partnership for Assessment Readiness for College and Careers (PARCC) assessments by 2014-2015. These continual changes in standards, tests, and grade levels of administration have complicated the comparisons of student progress over the year.

Summary

Technology has changed the American education system. Virtual education is expanding at all education levels annually. Because virtual classes at the elementary level are so new, limited research specific to this level has been conducted. It is essential for politicians and educators to have a clear understanding of the needs of the elementary school age child before making decisions to increase virtual education in the elementary school setting. Previous research studies have presented various benefits and challenges related to virtual learning experiences of student sub-groups with online learning. In addition, successful course completion examined at the secondary and higher education level is single course specific. Most elementary schools are designed with a single

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teacher instructing all content areas. There is no uniform definition of successful course

completion and no definitive evidence that elementary students in virtual education

settings performed differently on report card grades and standardized testing than

students in traditional education settings.

CHAPTER 3
METHODOLOGY

Introduction

This chapter describes the methods and procedures used to conduct the research

for this study. The chapter begins with sections describing the problem statement and

purpose. A description of the participants and data collection follows. The research

questions and hypotheses along with an analysis of the data are also included.

Problem Statement

Due to the increase in virtual education classes across the nation, many

organizations including charter schools are petitioning school districts and states to

implement virtual education programs. Although virtual education is on the rise, there

has been limited research concerning K-12 student success in virtual education courses to

support these options as positive educational alternatives for all students (Cavanaugh et

al., 2009; Glass, 2010; Huett et al., 2008; Rice, 2006; Ronsisvalle & Watkins, 2005).

In an age of educational accountability, the question arises as to whether students

enrolled in virtual education classes are held to the same standard as those in traditional

brick and mortar public schools. Numerous researchers have compared the completion

rate of students in online classes with those of students enrolled in traditional classes, but

their efforts have been hampered by their inability to define in a uniform manner

"successful completion." Without this uniformity of understanding, a reliable

comparison cannot be made (Hawkins & Barbour, 2010). Online students are often

encouraged to drop the class in the first few weeks if they display signs of failure to maintain the pace. There is little to no data available on those students who drop courses. The variations in student retention affect completion of virtual courses (Hawkins & Barbour, 2010).

Purpose of the Study

The purpose of this study was to determine how elementary students enrolled in virtual education classes performed on state assessments and final report card grades in reading and mathematics as compared with elementary students enrolled in traditional education classes and whether or not a relationship exists between the groups. Also explored was the difference, if any, in the successful course completion rate of students enrolled in virtual courses and students enrolled in traditional courses.

Participants

The population for this study included 11,435 students in Grades 3, 4, and 5 who were enrolled in the 54 Volusia County elementary schools and 12 students in Grades 3, 4, and 5 who were enrolled in the Volusia Virtual School for the 2011-2012 academic year. The population for this study included all Volusia County students in Grades 3, 4, and 5 who received final report card grades for 2011 and 2012 and who received 2012 FCAT 2.0 scores.

Data Collection

The researcher originally presented a proposal to the Educational Leadership faculty at the University of Central Florida and the Superintendent of the Volusia County School District. Upon approval, the researcher submitted the proposal to the University of Central Florida Institutional Review Board (UCF IRB) for full consideration and received authorization to conduct the research.

Once approval from the UCF IRB was received, the researcher then submitted a request for approval for access of student data to the Office of Program Accountability of Volusia County Schools. Due to the use of individual student data, all identifying information was eliminated to maintain confidentiality.

Research Questions

Five research questions and hypotheses were formulated for this study. These questions, which were used to guide the research, follow:

1. What difference, if any, is there in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher?

   H_{01} No significant difference exists in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher.

2. What difference, if any, is there in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings?

H$_{02}$ No significant difference exists in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings.

3. What difference, if any, is there in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings?

   H$_{03}$ No significant difference exists in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings.

4. What difference, if any, is there in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings?

   H$_{04}$ No significant difference exists in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings

5. What difference, if any, is there in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings?

   H$_{05}$ No significant difference exists in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings.

Sources of Data

Data required to conduct the study were obtained from the district that was the focus of the research. All data required to perform the statistical analyses were provided by the Office of Program Accountability of Volusia County Schools.

Data Analysis

Due to the large disparity in sample sizes between the virtual students and traditional students, one-way Chi-square analyses were first run. One of the necessary assumptions for a one-way Chi-square analysis is to meet a minimum requirement for expected cell counts. For these analyses, the expected cell counts were based on the percentages in each category from the traditional population. For example, assume that 40% of the non-traditional population failed the course and 60% passed a course and one wanted to determine if the likelihood of these percentages was similar among the virtual students. If the virtual student population consisted of 20 students, the expected cell count for failing would be eight students (20 x .4) and the expected cell count for passing students would be 12 (20 x .6). For Chi-square analyses, it is recommended that these expected cell counts be at least five or more.

In this study, there were only 12 students in the virtual school sample. Thus, when divided into many cells, the expected counts were small. To minimize the effects of expected count violations for the one-way Chi-square analysis, each of the research questions was reduced to a binary value. Under this method, there was a minimum of one expected count of less than 5. As a result of these limitations associated with the

analysis, the results should be interpreted with caution. To run the Chi-square tests, the frequencies for each of the variables in question for the traditional student group were recorded and used as expected counts. The Chi-square test was then run for only the virtual students using the aforementioned expected counts. This methodology was applied to all five of the research questions. In regard to presentation of the data, Chi-square test statistics and exact significance (p-values) are presented, and all tests were conducted at the $\alpha = .05$ level of significance. The comparisons were re-run using a one-sample t-test which is considered a more powerful test by most statisticians. Because of the large disparity in the two groups, the traditional group was considered the general population for the one-sample t-tests. The virtual population was considered the sample population. This approach was taken for the Reading and Mathematics course grades, as well as FCAT 2.0 Achievement Scores.

<u>Summary</u>

This chapter presented the methods and procedures used to accomplish this study. The problem statement and purpose of the study were restated, and the population and sample were described. The research questions along with the null hypotheses were presented, and the methods and procedures used to conduct the study were detailed. The chapter concluded with a clarification of the procedures used in the collection of data and the statistical procedures used in analyzing the data. The results of the data analysis are presented in Chapter 4. Chapter 5 contains a summary of the findings, discussion, implications, and recommendations.

CHAPTER 4
DATA ANALYSIS

Introduction

     This study was conducted to determine how elementary students enrolled in

virtual education classes performed on state assessments and final report card grades in

Reading and Mathematics as compared with students enrolled in traditional classes and to

examine whether there was a difference in the successful course completion rates

between the two groups. The population included 11,435 students in Grades 3, 4, and 5

who were enrolled in the 54 Volusia County elementary schools and 12 students in

Grades 3, 4, and 5 who were enrolled in the Volusia Virtual School for the 2011-2012

academic year. The analysis of data from the 2011 and 2012 database of the School

District of Volusia County is presented in this chapter. This chapter is divided into four

sections: (a) Introduction, (b) Descriptive Statistics, (c) Testing the Research Questions

and Hypotheses, and (d) Summary.

Descriptive Statistics

     For the purpose of this study, the final report card grades of A, B, C, and S were

considered representations of students' success for the year. The grades of D, F, U, and I

were representations of students' unsuccessful achievement for the year. Table 1

presents the final report card Reading grades for traditional and virtual students. For the

letter grade of A/S, 29.8% of traditional students and 75% of virtual students earned this

grade in 2011 and 29.3% of traditional and 91.7% of virtual students earned this grade in

2012. For the letter grade, B, 39.9% of traditional and 16.7% of virtual students earned

this grade in 2011, and 40.9% of traditional and 8.3% of virtual students earned this grade

in 2012. For the letter grade, C, 24.3% of traditional and 8.3% of virtual students earned

this grade in 2011, and 24.2% of traditional and no virtual students earned this grade in

2012. For the letter grade, D, 4.2% of traditional and no virtual students earned this

grade in 2011, and 4.0% of traditional and no virtual students earned this grade in 2012.

For the letter grade U/F, 1.7% of traditional and no virtual students earned this grade in

2011, and 1.6% of traditional and no virtual students earned this grade in 2012.

Table 1

Reading Grades 2011 and 2012: Traditional and Virtual Students

	2011				2012			
	Traditional ($n = 11,371$)		Virtual ($n = 12$)		Traditional ($n = 11,367$)		Virtual ($n = 12$)	
Grade	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
A/S	3,388	29.8	9	75.0	3,330	29.3	11	91.7
B	4,537	39.9	2	16.7	4,651	40.9	1	8.3
C	2,759	24.3	1	8.3	2,747	24.2	0	0
D	482	4.2	0	0	451	4.0	0	0
U/F	191	1.7	0	0	185	1.6	0	0

Table 2 contains the 2012 successful Reading course completion frequencies and

percentages for traditional and virtual students based on 2011 data. A total of 89.5% of

traditional students ($n = 11,364$) and 100% of virtual students (n = 12) experienced

reading success as determined by report card grades in Reading.

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Table 2

2012 Reading Success: Traditional and Virtual Students

Grade	Traditional (*n* = 11,364)		Virtual (*n* = 12)	
	n	*%*	*n*	*%*
Successful	10,235	89.5	12	100.0
Unsuccessful	1,200	10.5	0	0.0

Table 3 compares the final report card Mathematics grades for traditional and virtual students. A total of 36.9% of traditional students and 100% of virtual students earned a grade of A/S in 2011, and 32.6% of traditional and 91.7% of virtual students earned this grade in 2012. For the letter grade of B, 38.9% of traditional and no virtual students earned this grade in 2011. In 2012, 39.8% of traditional and no virtual students earned this grade in 2012. A total of 20.1% of traditional and no virtual students earned a C grade in 2011, and 22.1% of traditional and 8.3% of virtual students earned a C grade in 2012. For the letter grade D, 2.8% of traditional and no virtual students earned this grade in 2011, and 4% of traditional and no virtual students earned this grade in 2012. In 2011, only 1.2% of traditional and no virtual students earned a U/F, and 1.5% of traditional and no virtual students earned this grade in 2012.

Table 3

Mathematics Grades 2011 and 2012: Traditional and Virtual Students

	2011 Students				2012 Students			
	Traditional (*n* = 11,371)		Virtual (*n* = 12)		Traditional (*n* = 11,367)		Virtual (*n* = 12)	
Grade	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
A/S	4,201	36.9	12	100	3,709	32.6	11	91.7
B	4,429	38.9	0	0	4,521	39.8	0	0
C	2,286	20.1	0	0	2,517	22.1	1	8.3
D	318	2.8	0	0	453	4	0	0
U/F	137	1.2		0	167	1.5	0	0

Table 4 displays the frequencies and percentages of 2012 successful Mathematics course completion of traditional and virtual students based on their 2011 data. The data revealed that 91.1% (n = 11, 367) of traditional students were successful and 100% (n = 12) of virtual students were successful as evidenced by report card grades in Mathematics.

Table 4

2012 Mathematics Success: Traditional and Virtual Students

Grade	Traditional (*n* = 11,367)		Virtual (*n* = 12)	
	n	*%*	*n*	*%*
Successful	10,415	91.1	12	100.0
Unsuccessful	1,020	8.9	0	0.0

For the purpose of this study, FCAT 2.0 achievement levels of 3, 4, and 5 were considered successful, and achievement levels of 1 and 2 were considered unsuccessful. Table 5 presents a comparison of 2012 Reading FCAT 2.0 achievement level scores for traditional and virtual students. For FCAT 2.0 achievement level 5, 9.6% of traditional students and 25.0% of virtual students earned this level in 2012. For FCAT 2.0 achievement level 4, 24.2% of traditional and 16.7% of virtual students earned this level. For FCAT 2.0 achievement level 3, 26.9% of traditional students and 33.3% of virtual students earned this level in 2012. For FCAT 2.0 achievement level 2, 25.0% of traditional students and 25.0% of virtual students earned this level. For FCAT 2.0 achievement level 1, 14.3% of traditional students and 0% of virtual students earned this level in 2012.

Table 5

2012 Reading Florida Comprehensive Assessment Test (FCAT) Achievement Level Scores: Traditional and Virtual Students

	Traditional (*n* = 11,363)		Virtual (*n* = 12)	
Score	*n*	*%*	*n*	*%*
5	1,096	9.6	3	25.0
4	2,750	24.2	2	16.7
3	3,060	26.9	4	33.3
2	2,837	25.0	3	25.0
1	1,620	14.3	0	0.0

Table 6 compares the 2012 Mathematics FCAT 2.0 Achievement Level scores for traditional and virtual students. For FCAT 2.0 achievement level 5, 9.8% of traditional students and 25.0% of virtual students earned this level in 2012. For FCAT 2.0 achievement level 4, 17.6% of traditional and 16.7% of virtual students earned this level. For FCAT 2.0 achievement level 3, 29.2% of traditional students and 25.0% of virtual students earned this level in 2012. For FCAT 2.0 achievement level 2, 24.8% of traditional students and 25.0% of virtual students earned this level. For FCAT 2.0 achievement level 1, 18.6% of traditional students and 8.3% of virtual students earned this level in 2012.

Table 6

*2012 Mathematics Florida Comprehensive Assessment Test (FCAT) Achievement Level
Scores: Traditional and Virtual Students*

	Traditional (n = 11,382)		Virtual (n = 12)	
Score	*n*	*%*	*n*	*%*
5	1,119	9.8	3	25.0
4	1,999	17.6	2	16.7
3	3,324	29.2	3	25.0
2	2,825	24.8	3	25.0
1	2,115	18.6	1	8.3

Testing the Research Questions and Hypotheses

Due to the large disparity in sample sizes between the virtual students and

traditional students, a one-way Chi-square analysis was used to analyze the data. In

presenting the data, Chi-square test statistics and exact significance (*p*-values) are

reported. All tests were conducted at the α = .05 level of significance. Comparisons

were re-run for Research Questions 2 through 5, using *t*-tests. Because of the large

disparity in the two groups, the traditional group was considered the general population

for both the Chi-square and one-sample *t*-tests for all research questions. The virtual

population was used as the sample population for Research Questions 2 through 5. This

approach was taken for the analyses of Reading and Mathematics report card grades and the Florida Comprehensive Assessment Test (FCAT) 2.0 Achievement Scores.

Research Question 1

What difference, if any, is there in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher?

H_{01} No significant difference exists in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher.

To prepare the data for this question, the grades of A, B, C, and S were considered successful for the year and the grades of D, F, U, and I were considered to represent students' lack of success for the year. Students were considered to be successful in terms of the question if they earned grades A/S, B, and C in both the 2011 and 2012 years. There was no significant difference, $\chi^2(1, n=12) = 1.41, p = .24$, between percentage of traditional and virtual students who were successful in Reading. All students (100%) were successful in Reading as evidenced by their Reading report card grades of C or higher in 2011 and 2012.

Table 7

Chi-Square Goodness-of-Fit Test for Students' Reading Success: 2011 and 2012 (N =
12)

Value	Successful	Unsuccessful
n (Observed)	12	0
n (Expected)	10.7	1.3
% of Total (Observed)	100.0	0.0
Standardized Residual	0.4	-1.1

Note. $\chi^2(1, n=12) = 1.41, \ p = .24.$

There was no significant difference, $\chi^2(1, n=12) = 1.18, p = .28$, between the

percentages of traditional and virtual students who were successful in Mathematics. All

students (100%) were successful in Mathematics as evidenced by their Mathematics

report card grades of C or higher in 2011 and 2012.

Table 8

Chi-Square Goodness-of-Fit Test for Students' Mathematics Success: 2011 and 2012 (N = 12)

Value	Successful	Unsuccessful
n (Observed)	12	0
n (Expected)	10.9	1.1
% of Total (Observed)	100.0	0.0
Standardized Residual	0.3	-1.0

Note. $\chi^2(1, n=12) = 1.18$, $p = .28$.

Research Question 2

What difference, if any, is there in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings?

H_{02} No significant difference exists in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings.

For this question, the grades of A, B, C, and S were considered successful and the grades of D, F, and U were considered unsuccessful. The Incomplete (I) grade was ignored for this question as it was unknown if students receiving an I grade eventually passed the subsequent semester. In the analysis, there was no significant difference, $\chi^2(1, n = 12) = 0.71$, $p = .40$, between traditional and virtual students. All (100%) students were successful as evidenced by the 2012 final report card Reading grades of elementary

students participating in traditional and virtual school settings. The results are located in

Table 9.

Table 9

Chi-Square Goodness-of-Fit Test for Students' Reading Success: 2012 (N = 12)

Value	Successful	Unsuccessful
n (Observed)	12	0
n (Expected)	11.3	0.7
% of Total (Observed)	100.0	0.0
Standardized Residual	0.2	-0.8

Note. $\chi^2(1, n=12) = 0.71, \ p = .40.$

The data were converted from categorical to interval using a numerical scale;

A=4, B=3, C=2, S=2, D=1, F=0, and U=0. On the *t*-test, the virtual group indicated

significantly higher final Reading course grades as compared with the traditional group,

$t(11) = 11.96, p < .001$. The probability that observed difference between the sample

mean of 4.92 and the traditional population mean of 3.93 was due to mere chance rather

than to a real difference in achievement is <0.1%. These results are shown in Tables 10

and 11.

There was a statistically significant difference in the final Reading grades of the

virtual population when compared with the traditional population on the one-sample *t*-

test. Although the Chi-square test did not show a statistical difference, the *t*-test, which is

considered a more powerful test by some statisticians, did demonstrate a significant

difference. Caution should be used when interpreting these results due to the extremely

small sample size and the wide discrepancy in the numbers of traditional and virtual

students.

Table 10

Descriptive Statistics for t-Test: 2012 Final Reading Grades (N = 12)

				95% CI	
Status	*M*	*SD*	*LL*	*UL*
Virtual	4.92	0.29	4.73	5.10
Traditional (*n* = 11,245)	3.93	0.91	3.91	3.94

Note. t(11) = 11.96, *p* < .01. CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 11

t-Test: 2012 Final Reading Grades (N = 12)

					95% CI	
Status	*t*	*df*	*p*	Difference	*LL*	*UL*
Reading Grade	11.96	11	< .001	1.00	0.81	1.18

CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

Research Question 3

What difference, if any, is there in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings?

H_{03} No significant difference exists in student performance on 2012 FCAT 2.0 Reading of elementary students participating in traditional and virtual school settings.

To prepare the data for this question, FCAT scores at achievement levels 3 through 5 were considered successful, and those scores at achievement levels 1 and 2 were considered unsuccessful. Students taking a different standardized examination, such as the alternate assessment given to students with disabilities, were excluded from the analysis to preserve consistency. There was no significant difference, $\chi^2(1, n = 12) = 1.02$, $p = .31$, between traditional and virtual students' 2012 FCAT 2.0 Reading achievement levels. Of the students, 75% were successful, and 25% were unsuccessful. The results of the analysis are displayed in Table 12.

Table 12

Chi-Square Goodness-of-Fit Test for Students' Success: Florida Comprehensive Assessment Test (FCAT) Reading in 2012 (N = 12)

Value	Successful	Unsuccessful
n (Observed)	9	3
n (Expected)	7.3	4.7
% of Total (Observed)	75.0	25.0
Standardized Residual	0.6	-0.8

Note. $\chi^2(1, n=12) = 1.02$, $p = .31$.

The results of the *t*-test performed are displayed in Tables 13 and 14. When a *t*-test was conducted, no significant differences were found in student performance on the 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings, $t(11) = 1.54$, $p = .15$. The probability that the observed difference between the virtual mean of 3.42 and the traditional population mean of 2.91 was due to mere chance rather than to a real difference in achievement was 15%.

Table 13

*Descriptive Statistics for t-Test, 2012 FCAT 2.0 Reading Achievement Level Scores (N =
12)*

			95% CI	
Status	*M*	*SD*	*LL*	*UL*
Virtual	3.42	1.17	2.68	4.16
Traditional (*n* = 11,245)	2.91	1.20	2.89	2.93

Note. $t(11) = 1.54$, $p = .15$. CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 14

t-Test: 2012 FCAT 2.0 Reading Achievement Level Scores (N = 12)

					95% CI	
Status	*t*	*df*	*p*	Difference	*LL*	*UL*
Reading Score	1.57	11	0.15	0.52	-0.22	1.26

CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

What difference, if any, is there in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings?

H_{04} No significant difference exists in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings.

To prepare the data for this question, the grades of A, B, C, and S were considered successful, and the grades of D, F, and U were considered unsuccessful. The Incomplete (I) grade was ignored for this question as it was unknown if the student eventually passed the subsequent semester. The methodology described earlier was used to conduct the test. There was no significant difference, $\chi^2(1, n=12) = 0.69, p = .41$, between traditional and virtual students' 2012 final report card Mathematics grades. As shown in Table 15, all (100%) of students were successful.

Table 15

Chi-Square Goodness-of-Fit Test for Students' Mathematics Success: 2012 (N = 12)

Value	Successful	Unsuccessful
n (Observed)	12	0
n (Expected)	11.3	0.7
% of Total (Observed)	100.0	0.0
Standardized Residual	0.2	-0.8

Note. $\chi^2 (1, n = 12) = 0.69$, $p = .41$.

As indicated in the *t*-test displayed in Tables 16 and 17, the virtual group

indicated significantly higher 2012 final report card Mathematics grades as compared

with the traditional group, $t(11) = 5.12$, $p < .001$. The probability that the observed

difference between the virtual mean of 4.83 and the traditional population mean of 3.99

was due to mere chance rather than to a real difference in achievement is <0.1%. There

was a statistically significant difference in the final Mathematics grades of the virtual

population when compared with the traditional population on the one-sample *t*-test.

Although the Chi-square test did not show a statistical difference, the *t*-test, which is

considered a more powerful test by most statisticians, did demonstrate a statistical

significance. Caution should be used when interpreting these results due to the extremely

small sample size and the wide discrepancy in the numbers of traditional and virtual

students.

Table 16

Descriptive Statistics for t-Test: 2012 Final Mathematics Grades (N = 12)

			95% CI	
Status	*M*	*SD*	*LL*	*UL*
Virtual	4.83	0.58	4.47	5.20
Traditional (*n* = 11,245)	3.99	0.92	3.97	4.00

Note. t(11) =5.12, *p* < .01. CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 17

t-Test: 2012 Final Mathematics Grades (N = 12)

					95% CI	
Status	*t*	*df*	*p*	Difference	*LL*	*UL*
Mathematics grade	5.12	11	< .001	0.85	0.49	1.22

Note. CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

What difference, if any, is there in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings?

H$_{05}$ No significant difference exists in student performance on 2012 FCAT 2.0 Mathematics of elementary students participating in traditional and virtual school settings.

In analyzing the data for this question, FCAT score at achievement levels 3 through 5 were considered successful. Achievement levels 1 and 2 scores were considered unsuccessful. Students taking a different standardized examination, such as the alternate assessment given to students with disabilities, were excluded from the analysis to preserve consistency. There was no significant difference, $\chi^2(1, n=12) = 0.50$, $p = .48$, between traditional and virtual students' 2012 FCAT 2.0 Mathematics achievement levels. As shown in Table 18, 66.7% of virtual education students were successful, and 33.3% of virtual education students were unsuccessful.

Table 18

Chi-Square Goodness-of-Fit Test for Students' Success: Florida Comprehensive
Assessment Test (FCAT) Mathematics in 2012 (N = 12)

Value	Successful	Unsuccessful
n (Observed)	8	4
n (Expected)	6.8	5.2
% of Total (Observed)	66.7	33.3
Standardized Residual	0.5	-0.5

Note. $\chi^2(1, n=12) = 0.50$, $p = .48$.

Tables 19 and 20 contain the results of the *t*-test analysis. No significant

difference was found in the *t*-test for 2012 FCAT 2.0 Mathematics achievement levels of

elementary students participating in traditional and virtual school settings, $t(11) = 1.28$, p

$= .23$). The probability that the observed difference between the virtual mean of 3.25 and

the traditional population mean of 2.76 was due to mere chance rather than to a real

difference in achievement was 23%.

Table 19

Descriptive Statistics for t-Test, 2012 Mathematics FCAT 2.0 Achievement Level Scores (N = 12)

			95% CI	
Status	*M*	*SD*	*LL*	*UL*
Virtual	3.25	1.36	2.39	4.11
Traditional (*n* = 11,245)	2.76	1.22	2.74	2.78

Note. t(11) =1.28, *p* = .23. CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 20

t-Test: 2012 Mathematics FCAT 2.0 Achievement Level Scores (N = 12)

					95% CI	
Status	*t*	*df*	*p*	Difference	*LL*	*UL*
Math Score	1.28	11	0.23	0.50	-0.36	1.36

CI = confidence interval, *LL* = lower limit, *UL* = upper limit.

<u>Summary</u>

This chapter was designed to analyze the data gathered in the study. After a brief review of the population and the problem, descriptive statistics were presented in tabular form and discussed. The analyses of the data were organized around the five research

questions used to guide the study. The results of the one-way Chi-square tests and one-sample *t*-tests performed were presented to compare performance of students in a virtual school setting with those in a traditional school setting. Chapter 5 contains a summary of the findings, discussion, implications, and recommendations for further study.

CHAPTER 5
SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the study, discussion of the findings, implications for practice, and recommendations for further research. The summary and discussion expand upon the concepts that were studied in an effort to provide an understanding of the impact of virtual education and present suggestions for future research in the field of virtual education.

Summary of the Study

This study examined how elementary students in the School District of Volusia County enrolled in virtual education classes performed on state assessments and final report card grades in Reading and Mathematics as compared with students enrolled in traditional classes and examined whether there was a difference in the successful course completion rates between the two groups. There was a large disparity in the population of the two groups involved in this research study: 11,435 traditional students and 12 virtual students.

One-way Chi-square analyses were run using the frequencies of the traditional students as the expected counts. The Chi-square test was then run for the virtual population. The results were used to answer the five research questions. A one-sample t-test was run to determine if there was a difference in the findings for Research Questions

2 through 5. The traditional group was considered the population for the one-sample *t*-test.

Discussion of the Findings

The focus of this research was to determine whether elementary students enrolled in virtual school settings performed differently than elementary students enrolled in traditional school settings as evidenced by final report card grades and state achievement tests. This section discusses the findings for each of the five research questions.

Research Question 1

What difference, if any, is there in the successful course completion of elementary students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher?

The findings from Research Question 1 indicated that there was no statistical significant difference in either the Reading or Mathematics course completion of students participating in traditional and virtual school settings in 2011 and 2012 as measured by a final report card grade of C or higher. The one-way Chi-square analysis indicated that 100% of all students achieved a final report card grade of C or higher in both 2011 and 2012. All students who were enrolled in virtual school settings for 2012 were successful on their 2011 final report card grades. These findings were supported by those of prior researchers. Roblyer et al. (2008) and Cavanaugh et al. (2009) specifically linked past grade performance as an indicator for future online success. Although Rice (2006) and

Ronsisvalle and Watkins (2005) found most studies related to student characteristics were conducted on college students, past academic performance was mentioned as a predictor of online success.

The number of students who initially enrolled in Volusia County virtual education courses and withdrew is unknown, and this may have inflated the course completion results of this study. This notion of inflation is supported by research conducted by Barbour and Reeves (2009) and Howell et al. (2004) who found that low achieving students were among those students who frequently withdrew from virtual courses during the trial period, leaving a study population comprised largely of average and high-ability students.

Research Question 2

What difference, if any, is there in 2012 final report card Reading grades of elementary students participating in traditional and virtual school settings?

The findings from Research Question 2 revealed that there was no statistical significant difference in the 2012 final report card grades in Reading of elementary students participating in either traditional or virtual school settings for the Chi-square test. The one-way Chi-square analysis indicated that 100% of all students achieved grades of A/S, B, or C, defining them all as successful in passing. The use of report card grades in reaching this determination was supported by Roblyer et al. (2008) who emphasized the need for determining which grades constitute successful passing. Howell et al. (2004) also emphasized the need for a uniform measurement of success.

The one-sample *t*-test indicated that students enrolled in virtual school settings scored statistically significantly higher on final report card Reading grades than students enrolled in traditional school settings. This may be explained, in part, by the small number of students in the virtual population compared to the much larger number of students in the traditional population. This was supported by Barbour and Reeves (2009) who posited that students enrolled in online classes were highly motivated and high performing.

Research Question 3

What difference, if any, is there in student performance on 2012 FCAT 2.0 Reading achievement levels of elementary students participating in traditional and virtual school settings?

The findings from the research conducted to respond to Research Question 3 indicated that there was no statistical significant difference in traditional or virtual elementary students' 2012 FCAT 2.0 Reading achievement levels. Both the one-way Chi-square analysis and the one-sample *t*-test indicated there is no statistically significant difference in the performance of the two groups. These findings may be the result of the continual changes in Florida educational standards, standardized tests, and scoring systems over the last two decades (Florida Department of Education, 2012b).

Research Question 4

What difference, if any, is there in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings?

The findings from Research Question 4 revealed no statistical significant differences in 2012 final report card Mathematics grades of elementary students participating in traditional and virtual school settings for the Chi-square test. The one-way Chi-square analysis indicated that 100% of all students achieved grades of A/S, B, or C, defining them all as successful in passing. Roblyer et al. (2008) emphasized the need for determining which grades constitute successful passing, and Howell et al. (2004) suggested the need for a uniform measurement of success.

The one-sample *t*-test indicated that students enrolled in virtual school settings scored statistically significantly higher on final report card Mathematics grades than students enrolled in traditional school settings. This finding may be explained, in part, by the disparate numbers of students in the virtual and traditional populations. Barbour and Reeves (2009) supported these results in their portrayal of students enrolled in virtual education courses as being highly motivated and high achieving.

Research Question 5

What difference, if any, is there in student performance on 2012 FCAT 2.0 Mathematics achievement levels of elementary students participating in traditional and virtual school settings?

The findings for Research Question 5 indicated that there was no statistical

significant difference in traditional and virtual elementary students' Mathematics

achievement levels on the 2012 FCAT 2.0. Both the one-way Chi-square analysis and

the one-sample *t*-test indicated there was no statistically significant difference in the

performance of the two groups. These findings may be the result of the continual

changes in Florida educational standards, standardized tests, and scoring systems over the

last two decades (Florida Department of Education, 2012b).

The findings of this study were supported by the review of literature. As cited by

Glass (2010), Rice (2006), and Ronsisvalle and Watkins (2005), there has been limited

research conducted regarding the successful academic performance of elementary

students in virtual education. The results of this study are supported by the narrow body

of research available.

<u>Implications for Practice</u>

The findings of this research study can be used to guide the School District of

Volusia County as it continues to expand the virtual education opportunities for

elementary school students. Although the Chi-square analyses demonstrated no

statistical differences, the results of the study showed statistical significance as measured

by the one-sample *t*-test in the 2012 final report card grades for both Reading and

Mathematics. There was no statistical significance in the successful course completion

and the 2012 FCAT Reading and Mathematics grades. Descriptively, there were

differences, but the very small sample size kept the results from being significant. It is

noteworthy for the district that even though no statistical significance was found, no disadvantages were identified, thus making virtual education a viable option to continue to explore. The following are offered as recommendations for practice:

1. Expand available technology at each of the elementary school sites. In this study, it was found that availability of technology was limited at the elementary level. Without technology, students and teachers cannot be expected to increase their support of or engagement in virtual education courses.

2. Allocate financial resources to purchase programs for virtual courses and for repairs of equipment. Virtual course offerings are limited at the elementary level due to financial constraints. To expand virtual offerings for elementary students, additional funds must be set aside for the necessary programs and maintenance of equipment.

3. Increase virtual offerings for students in Grades 3-5, especially in gifted and Exceptional Student Education programs. Researchers have found that there are benefits of virtual courses for gifted and special education students. Without the opportunity to enroll in virtual courses, these populations are limited to classes offered in brick and mortar schools.

4. Introduce virtual K-2 level offerings with support through a blended model. In this study, limited virtual education offerings at the elementary level were found with only minimal research regarding K-2 students. Due to their developmental level, children in grades K-2 cannot be expected to be successful in virtual

education without the support of a teacher which can be provided through the blended model.

5. Standardize the measurement of course success at each grade level. It was found in this study that there is no standard measure of success for virtual coursework. Creating a uniform measurement of success would permit researchers to make valid comparisons of student achievement.

6. Create a universal drop period for all virtual courses to ensure consistency when analyzing course completion rates. Inconsistencies in the drop period for virtual courses were identified in this study. Developing a uniform period of time for all virtual courses would allow researchers to analyze and compare course completion rates with accuracy.

Recommendations for Further Research

The need to continue research regarding students in virtual education is frequently mentioned by researchers (Glass, 2010; Rice, 2006; Ronsisvalle & Watkins, 2005). The results of this study generated the following recommendations for future research:

1. Expand the study to include other school districts which have larger virtual student populations.

2. Expand the study to compare student performance between the school districts within the state of Florida.

3. Expand the study to compare student achievement in virtual settings among the states throughout the country.

4. Initiate a longitudinal study to track student performance and include data over a period of years of virtual course offerings.

5. Create a longitudinal study to track and compare student performance on the SAT and final grade point average for high school graduation.

6. Create a longitudinal study to examine whether or not there is a difference for virtual education students in the amount of time it takes to complete their formal education.

7. Create a study to determine possible differences between virtual education and traditional education on other indicators of student success, such as: communication, social interaction, and leadership.

APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Janet M. Garzia**

Date: **September 21, 2012**

Dear Researcher:

On 9/21/2012, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	A Study of Elementary Student Course Completion and Achievement in Virtual and Traditional Format Courses within Volusia County School District
Investigator:	Janet M. Garzia
IRB Number:	SBE-12-08684
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 09/21/2012 01:56:22 PM EDT

Joanne Muratori

IRB Coordinator

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APPENDIX B
SCHOOL DISTRICT APPROVAL TO CONDUCT RESEARCH

September 18, 2012

Ms. Janet Garzia
639 Overlook Trail
Port Orange, FL 32127

Ms. Garzia,

I have received your request to conduct research within Volusia County Schools and approved your topic of "Elementary Course Completion and Achievement in Virtual and Traditional Courses in Volusia County Schools."

As with all requests to do research; participation is at the sole discretion of the principals, teachers and parents of all students involved. Parent Consent Forms will be necessary for all data gathered from the students of Volusia County Schools.

By copy of this letter, you may contact the school principals who allow this research to be conducted with their faculty and students. We request that you conduct your survey with as little disruption to the instruction day as possible.

I would appreciate receiving a copy of your findings upon completion of the study.

Sincerely,

Bambi J. Lockman, LL.D.
Deputy Superintendent, Instructional Services

BJL/mh

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