

HIGH SCHOOL STUDENTS TAKING ONLINE COLLEGE COURSES:
A SEQUENTIAL MIXED METHODS STUDY

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by
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Abstract

HIGH SCHOOL STUDENTS TAKING ONLINE COLLEGE COURSES: A SEQUENTIAL MIXED METHODS STUDY

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In reviewing the research, there is a gap in the knowledge base regarding high school students taking online college courses. High school students have taken online high school courses for many years. In addition, high school students have taken Advanced Placement (AP) online courses. In both cases, the target population is high school students. However, the question is whether high school students are adequately prepared to take online college classes where the target population is traditional college students. Administrators at the secondary and postsecondary levels will not be able to make data-driven decisions in regards to the students and program offerings until the gap in the knowledge base is addressed through research.

The purpose of this sequential mixed methods study was to analyze the performance and demographics of the high school students and traditional community college students taking an online entry-level college technology course. In addition, the study explored the roles and perceptions of the stakeholders (community college faculty

and high school guidance counselors) concerning the high school students taking the course.

Findings from this study show that the high school students outperformed traditional community college students in an online entry-level technology course during the Fall 2007 – Fall 2011 semesters in the Learn and Earn Online program in the state of North Carolina. Furthermore, this study concluded that the high school students also outperformed the traditional community college students when controlling for the effects of race/ethnicity and gender.

Interviews of the stakeholders revealed that their perceptions of how well the high school students would perform when compared to the traditional community college students coincided with the actual results. The outcome of the qualitative analysis suggests that the differences in the environments between the high school students and traditional community college students may be a contributing factor as to why the high school students performed better than the traditional community college students performed. The qualitative analysis also suggests the dedicated environment afforded to the high school students may be a contributing factor as to why the withdrawal rate for traditional community college students within this study is approximately 50% higher than for the high school students.

Expansion in online learning in the secondary education environment has far outpaced research conducted on online learning in secondary education. The results of this study can begin to inform the literature in regards to high school students taking online college courses.

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Dedication

I dedicate this dissertation to my family, for without their sacrifices and support, this document would never exist. First, I would like to thank my parents, Mickey and Shelba Shellman. No child has ever received more love and support throughout his/her life. I will never be able to repay you for your continued support and dedication to all of my endeavors throughout my life. The only way I know how to attempt to repay you is to do the same for my children that you have done for me. I love you both very much.

Finally, I would like to thank my wife Sue and my two daughters Taylor and Kimberly for their sacrifices and support during this process. During the coursework through the dissertation, your constant love and support has enabled me to achieve a lifelong dream. It is now my turn to support each of you in achieving your dreams as you have for me. I love you all the world and more.

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Chapter 1: Introduction to the Research

Until recent years, options available to high school students in North Carolina to receive college credit were twofold. Students could enroll in Advanced Placement (AP) courses designed for high school students, and students could take traditional seated college courses through a variety of concurrent dual enrollment programs. The Learn and Earn Online (LEO) initiative, implemented in North Carolina in the Fall 2007 semester, gave students an additional option. Within the LEO initiative, high school students had the opportunity to take online courses at their local community college across the state and receive both high school and college credit (North Carolina Virtual Public Schools [NCVPS], n.d.). This marked the first time in North Carolina that high school students had the opportunity to take online college courses, yet no research exists regarding the outcomes and effectiveness of this type of initiative.

Research currently exists regarding online distance education offerings at all levels of postsecondary and K-12 education (Allen & Seaman, 2013; Watson, Murin, Vahsaw, Gemin, & Rapp, 2012). At the secondary education level, schools districts across the United States have successfully implemented AP courses in an online format to serve their student populations better. The design of AP courses is for high school students, whether offered in a traditional seated or online format. The student learning objectives of AP courses accommodate that group of learners. Students taking seated college classes, regardless of age, have the ability to communicate face to face with the instructor.

Students in many school districts also have had the opportunity to take traditional seated postsecondary classes through a variety of state-sponsored programs. For example, the Huskins program served this need in North Carolina. Within the Huskins program, students were able to take college-level courses at their local high school taught by a college instructor (North Carolina Community College System [NCCCS], 2004).

Beginning in 2005 in North Carolina, early college high schools started being developed. The purpose of early college high schools is to allow high school students to take their courses on college campuses and to allow students to obtain high school and college credit simultaneously. Students could potentially earn a partial or entire college degree while in a North Carolina high school (North Carolina Learn and Earn, n.d.). Currently, more than 200 early college high schools are open in 30 states nationally. North Carolina has become a national leader with 77 early college high schools open in 2013-2014, serving 71 counties and districts across the state (North Carolina New Schools, n.d.). Whether on the college campus or the high school campus, high school students earning college credit in these types of programs are taking classes where the target audience is high school students.

There has been research conducted in regards to learning styles of individuals in postsecondary and secondary education taking online courses (Battalio, 2009; Muir, 2001; Neuhauser, 2002; Richmond & Cummings, 2005; Valenta, Therriault, Dieter, & Mrtek, 2001). Due to my extensive background as a community college instructor and administrator, and personal experience with high school students and high school administrators in the LEO program, I question whether online college courses are suitable for high school students. The reasons behind my questioning high school student

participation in online college courses stems from my personal experience and interaction with faculty members within my department concerning LEO students. I found there were many issues with LEO students not present with traditional high school students. I feel that regardless of the success of an online postsecondary program, secondary school students may or may not be prepared to handle both the rigor and demand of an online postsecondary environment and postsecondary culture simultaneously. I believe further research to assess the effectiveness of providing postsecondary courses in an online environment to high school students is needed.

Study Purpose Statement and Research Questions

To begin to assess the effectiveness of providing postsecondary courses in an online environment to high school students, I conducted this mixed methods research study. My goal in conducting this study was to begin to fill in the gap in the knowledge base concerning high school students taking online college courses. The purpose of this sequential mixed methods study was to explore the performance of high school students taking an online entry-level college technology course. In addition, the study explored the perceptions of the stakeholders (community college faculty and high school administrators involved in the LEO program) concerning the high school students taking the online entry-level college technology course.

The definition of an online environment, for the purpose of this research, will be an environment where 100% of the activities are asynchronous and students access the course through a learning management system. In this sequential mixed methods study, quantitative research addressed the relationship between high school students and traditional college students taking the same online entry-level college technology course

for the academic years 2007-2008 to 2010-2011, which corresponds to the years of existence of the LEO program. Qualitative research addressed the perceptions of the stakeholders (community college faculty and high school administrators) involved in the LEO program concerning the high school students taking the online entry-level college technology course.

The research questions guiding the study were as follows:

1. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades?
2. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender?
3. Did the analysis of final grades of high school students compared to traditional college students in an online entry-level college technology course differ from the perceptions of the participating community college faculty and high school administrators concerning the high school students taking the course?

By being able to glean the perceptions of the stakeholders, I then compared and contrasted their perceptions with the performance of the high schools students in the online entry-level college technology course. In addition, it was possible to develop perception comparisons among the various groups of stakeholders to see if perceptions differed among stakeholders.

Through these guiding research questions, a determination can begin to emerge whether initiatives similar to LEO would be an effective alternative method for secondary school students to earn college credit in North Carolina and across the nation.

Significance of the Study

In reviewing the research, there is a gap in the knowledge base regarding high school students taking online college courses. High school students have taken online high school courses for many years. In addition, high school students have taken AP online courses (Clark, 2000; Setzer & Lewis, 2005; Watson et al., 2012). In both cases, the target population is high school students; however, the question is whether high school students are adequately prepared to take online college classes where the target population is traditional college students. Administrators at the secondary and postsecondary levels will not be able to make data-driven decisions in regards to the students and program offerings until the gap in the knowledge base is addressed through research.

Ideally, students perform best when placed in a position in which they have the opportunity to succeed in any educational endeavor in which they choose to undertake. Since the inception of online distance education, there have been critics and proponents of this type of delivery method. In order for the secondary students in our society to succeed, we need to ensure that we, as educators, adequately prepare them for what they are to encounter in their coursework. By filling the knowledge gap through research and understanding more about the LEO program and perceptions surrounding it, data collected and analyzed has the potential to affect the process of decision-making and practice in both the secondary and postsecondary educational environments. Students, instructors, and administrators can benefit from the research performed.

Three years have elapsed from end of the LEO program until the conclusion of this study. During this time, boundaries have been shifting in the online instructional landscape. Early college programs have been increasing across the state of North Carolina and across the country. The use of online courses is becoming even more prevalent in secondary education since the onset of this study. This study can begin to inform the literature in regards to secondary students taking online postsecondary courses and possibly have an impact on future directions of offering online courses in the secondary education environment.

Benefits of the Study

Students can gain from the research by becoming more aware of what is required of students in taking online college courses while enrolled in high school. The more students understand future initiatives similar to LEO, the better-informed decisions they can make about participating in online classes in a college environment.

College instructors may use the study to ascertain the differences in adult and adolescent learners. In doing so, college instructors may be able to adapt and teach based upon the learning styles of adolescents, as well as adults. At present, most college instructors have no formal training in teaching methods and have adapted to the learning styles of adult learners through experience (Anderson, 2010).

College administrators can use the study to create and promote instructor training for their respective faculty members. Since most faculty members are subject-matter experts and have had no formal training in teaching methodology, this research can serve a dual purpose for college administrators in providing professional development to faculty by exposing faculty to a wide variety of learning styles and teaching methodologies.

High school administrators can use the study to better assess student readiness to participate in online college courses. Just because such an initiative is available does not mean the initiative is in the best interest of an individual student to participate. Students may elect to take an online course because they do not have to meet a certain day and time, and may perceive that the course is easier because it is online. Students may find the course to be much harder than they perceived and not perform well in the class. It is up to high school administrators to convey the requirements and expectations to high school students wishing to take an online course.

The policy makers in North Carolina can benefit from the study through analyzing the outcomes of the study. In doing so, the state policy makers can determine what steps should exist prior to implementing such a program to lessen negative outcomes and to continue to emphasize areas where positive outcomes occur.

Personal Relationship to the Research

I currently serve as the chairperson of the Information Technology Department at Gaston College. Gaston College is a two-year community college in the North Carolina Community College System. I have served as the Chairperson for 21 years and have been in the department as an instructor for over 30 years. During this time, I have been able to be at the forefront of technological advances, both in education and in our society. I have researched and implemented new program offerings in information technology as we moved from mainframes to personal computers, and now to the online environment. Today, instructors have the options to use many modes of delivery for their courses. One mode of course delivery that I have embraced for courses within our department has been online course delivery.

I have been involved in online courses since their inception at Gaston College. In 1999, I played a key support role in aiding a fellow colleague/English instructor develop and deploy the first online course at Gaston College. I developed and deployed the second online course in the same year, and have been actively involved in online distance education at Gaston College ever since. It seems like decades have passed since the first online course offering at Gaston College; however, it has been a relatively short amount of time.

Online course development has drastically changed during the past decade at Gaston College. Numbers of online course offerings have grown dramatically over the past decade, from eight courses offered in 2000, to well over 225 courses offered in the Spring 2014 semester alone at Gaston College (Gaston College, 2013). Online courses are now the first sections of choice and are quickly becoming the preferred method of delivery by many students. Many students enjoy the flexibility inherent to online course delivery. No longer do students have to attend a class on Monday and Wednesday nights at a specified time. Instead, they can conduct their work for a class at their convenience whether at 2 p.m. or 2 a.m. This type of asynchronous communication is quite different from the traditional synchronous method of course delivery. Learning opportunities are available 24/7/365, not limited within the walls of a classroom.

There are several reasons I feel I needed to investigate this topic. The first reason is that it directly affects my job. I believe more research is necessary to determine whether future initiatives similar to LEO are beneficial educational opportunities for North Carolina students. In theory, the LEO initiative appeared to be a beneficial educational option for many students. Many people have commented to me that the younger generation is capable

of handling online college courses. I believe this may be an assumption. Just because the younger generation can send text messages and surf the World Wide Web does not necessarily mean they can endure the rigor of an online college course. The second reason for investigating this topic is due to my youngest child, who is currently a high school sophomore. While in high school, she may have the opportunity to take an online college class. As a parent, should I allow this to occur? What research is available to assist parents in making data-driven decisions?

Perhaps the LEO initiative will prove to be one of the most outstanding initiatives ever offered to secondary school students. Perhaps it will be one of the biggest mistakes ever implemented. I believe further research is necessary to provide data so that students, parents, and administrators are able to determine whether the LEO initiative, and any future similar initiatives, is an effective alternative method for our secondary school students in North Carolina to earn college credit.

Organization of the Study

This chapter introduced the research topic and the need for further research to assess the effectiveness of providing postsecondary courses in an online environment to high school students. This chapter also presented the purpose for the study and the research questions guiding the study. In addition, I have presented the significance and benefits of the study, as well as my personal relationship to the study. The definitions of the terminology used throughout the study are also included in this chapter.

Chapter 2 examines the literature surrounding the use of online distance education courses in secondary institutions. I believe there is a definite gap in the research regarding secondary students taking online college courses; hence, the research covered in the review

of the literature addressed research that is foundational to this topic. Chapter 3 provides an explanation of the methodology used in this study. Chapter 4 reports the findings of the quantitative and qualitative data analysis, including descriptive statistics, and Chapter 5 includes a summary of the findings, implications for practice and policy, conclusions, and recommendations for future research.

Definition of Terms

All definitions are from the International Association for K-12 Online Learning [iNACOL] (2011) unless otherwise noted.

Asynchronous learning: Communication exchanges which occur in elapsed time between two or more people. Examples are email, online discussion forums, message boards, blogs, podcasts, etc.

At-risk student: Any student who is performing poorly academically, or who may face learning impediments not limited to socioeconomic status, behavioral and learning disabilities, and home, family, and community stresses; may also specifically refer to students in danger of not passing a course or graduating.

Blended learning: Blended learning is any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace; often used synonymously with Hybrid Learning. (Horn & Staker, 2011)

Brick-and-mortar schools: Refers to traditional school or traditional school building, as contrasted with an online school.

Charter school: Public schools that operate under many of the same regulations and some additional unique regulations that do not apply to traditional public schools. Each school is

established with a “charter” which is essentially a performance contract detailing the school’s mission, program, goals, students served, methods of assessment, and ways to measure success. Charter schools are accountable to their sponsor (typically state and local education agencies) to produce positive academic results and adhere to the charter contract. (Treetops School International, 2011)

Course enrollment: The number of students formally in a course. Course enrollment data are influenced by registration periods, duration of course (semester, year-long, or flexible schedules for competency-based credits), drop/add periods and “count” dates that determine accuracy of number of students enrolled per course, completion and/or attrition rates.

Credit recovery: Refers to a student passing, and receiving credit for, a course that he/she previously attempted but did not succeed in earning academic credit towards graduation. (Watson et al., 2012)

Distance education: 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 separated in time (asynchronous vs. synchronous).

Face-to-face: When two or more people meet in person.

Full-time equivalent: The number of students at a given institution if every student were full time based on the local definition of full time.

Huskins: an amendment to North Carolina General Statute 115D-20(4) enacted in 1983 which provides for the availability of community college courses for high school students (North Carolina Community College System [NCCCS] & North Carolina Department of Public Instruction [NCDPI], 2003)

Internet: A vast computer network connecting users worldwide via TCP/IP protocol

Learn and Earn Online (LEO): an online dual credit program that awards high school and college credit to students attending public schools in North Carolina. (NCVPS, n.d.)

Learning Management System (LMS): The technology platform through which students' access online courses. A LMS generally includes software for creating and editing course content, communication tools, assessment tools, and other features for managing the course.

Online course: Any course offered over the Internet.

Online course provider: An organization that provides courses that are offered over the Internet.

Online learning: Education in which instruction and content are delivered primarily over the Internet. (Watson, 2005)

State virtual schools: Virtual schools created by legislation or by a state-level agency, and/or administered by a state education agency, and/or funded by a state appropriation or grant for the purpose of providing online learning opportunities across the state. (They may also receive federal or private foundation grants, and often charge course fees to help cover their costs.) (Watson et al., 2012)

Synchronous learning: Online learning in which the participants interact at the same time and in the same space.

Virtual school (Online school): A formally constituted organization (public, private, state, charter, etc.) that offers full-time education delivered primarily over the Internet.

Chapter 2: Review of the Literature

Distance education evolved as early as the mid-1800s, when the first distance education courses were correspondence studies (Jeffries, 2002). Distance education courses utilized a variety of modes, including radio, television, and two-way interactive video/audio (Sherry, 1996). The most recent developments in distance education have involved delivery of courses via the Internet, also known as online distance education (Moore & Kearsley, 1996).

For quite some time, higher education institutions have utilized distance education courses (Matthews, 1999). However, over the past several decades, initiatives across the country have allowed younger students the opportunity to participate in distance education (Setzer & Lewis, 2005; Sherry, 1996; Watson et al., 2012). Since the mid-1990s, North Carolina has delivered two-way interactive distance education courses through the North Carolina Information Highway that connects each county, higher education institutions, and research organizations within the state (Patterson & Smith, 1994). This has enabled high school students to take classes offered by higher education institutions within the state, as well as providing students the opportunity to take classes taught at other high schools (Cox, White, Brinson, & Ramey, 2000; Lollar, 1995).

Over the past decade, there has been a movement across the country to incorporate online classes into the distance education offerings of high schools. There have been multiple states creating virtual high schools that offer online distance education courses to the students within their states (Clark, 2000; Clark, 2001; Setzer & Lewis, 2005; Watson et

al., 2012). Following the lead of other states, the North Carolina General Assembly enacted legislation to create a virtual high school in North Carolina in 2003 (North Carolina General Assembly, 2003). The North Carolina Virtual Public School (NCVPS) became operational in the summer of 2007.

The original purpose of NCVPS was to provide online courses to students not otherwise available at their local high schools. In other words, NCVPS provides courses that augment an individual program of study at a school. All courses offered through the NCVPS have certified teachers in the subject areas, as well as the teachers holding North Carolina teaching certifications. Initial course offerings were for high school students. In subsequent years, course offerings were added for middle school students as well (NCVPS History, n.d.).

A study released by the U.S. Department of Education revealed that several states have been offering distance education courses to their middle and elementary school students for almost a decade (Setzer & Lewis, 2005). This number has increased significantly over the past decade (Watson et al., 2012).

A new educational initiative was available beginning in the 2007-2008 school year in North Carolina. This new initiative was the Learn and Earn Online (LEO) program (NC 2008 Laws, n.d.). For the first time in North Carolina, high school students (grades 9-12) could enroll in online courses through a community college for simultaneous high school and college credit. This initiative was quite a departure from the previous programs, such as Huskins and concurrent dual enrollment, where students could only earn college credit via courses delivered in a seated format (NCCCS & NCDPI, 2003). Unlike Huskins and dual enrollment programs, community colleges could earn budget Full-Time Equivalence

(FTE's) for all LEO students. In addition, students participating in the LEO program had their tuition waived and books supplied to them. The courses offered within the LEO program by community colleges were courses included in two-year Associate of Arts and Associate of Science degree programs. Students could earn high school credit while also earning credit toward a two-year college degree (NCVPS, n.d.). In addition, some courses offered were included in the articulation agreement between the community college system and the university system within the state of North Carolina; therefore, these courses could potentially transfer to four-year institutions within the state.

The LEO program in the state of North Carolina was very successful from its inception in 2007. That year, 44 of the 58 community colleges in North Carolina participated in the LEO program, offering more than an estimated 500 college courses, and serving over 300 students (NCCCS, 2007). During the first two years after the implementation of the LEO program, course registrations more than tripled within the program (North Carolina Public Schools, 2009). The number of classes increased from 1,421 in the Fall 2007 semester, to 5,429 in the Spring 2009 semester.

For its efforts, North Carolina received an award for innovation from Harvard University's Kennedy School of Government (North Carolina New Schools Project, 2008). The award was for North Carolina's Learn and Earn program, which is a much broader initiative giving high school students the ability to earn college credit in a variety of formats. Honored separately within the award was LEO, a key component of the much broader Learn and Earn program.

After such a positive beginning, the LEO program ceased to exist effective December 31, 2011, and was absorbed into a broader initiative. Effective January 1, 2012,

Session Law 2011-145 House Bill 200 enacted the Career and College Promise (CCP) program. The CCP program replaced not only the LEO program, but also all existing high school transition programs: Huskins, concurrent dual enrollment, cooperative and innovative high schools, Learn and Earn, and LEO (North Carolina Public Schools, 2011).

Within the CCP program, community colleges in North Carolina may offer the following CCP pathways: (1) College transfer leading to a college transfer certificate; (2) Career and technical education leading to a certificate, diploma, or degree; and (3) Community college campus-based cooperative innovative high schools approved under Part 9 Article 16 Chapter 115C of the general statutes. Session Law 2011-145 defines cooperative innovative high schools as those programs with no more than 100 students per grade level that are located on college campuses. At present, Gaston College has an early college program on its campus meeting these criteria in addition to offering CCP courses. There is no specific verbiage in Session Law 2011-145 addressing online classes in regards to CCP.

This literature review includes a wide variety of research journal articles, publications, and websites related to the use of distance education courses in secondary institutions. Based upon the available literature, the following sections are included in the review of the related literature: (a) utilization of online courses in secondary education, (b) reasoning behind offering online courses in secondary education, (c) concerns in secondary online education, and (d) demographic predictors of performance in secondary online education. The number of studies covering different aspects of distance education at the postsecondary level exceeds the number of studies covering the different aspects of distance education at the elementary, middle, and secondary school level; however, the

number of studies focusing on research at the elementary, middle, and secondary school level is expanding (Clark, 2001; Cavanaugh, Barbour, & Clark, 2009; Means, Toyama, Murphy, Bakia, & Jones, 2010; Smith, Clark, & Blomeyer, 2005; Watson, 2005; Watson et al., 2012). I believe there is a definite gap in the research regarding secondary students taking online college courses; hence, the research covered in this review of the literature addressed research that is foundational to this topic.

Utilization of Online Courses in Secondary Education

Since online distance education courses have been available in the postsecondary environment for some time, it was only a matter of time before that trend permeated the secondary environment. The turn of the century marks the point when secondary education integrated the term “virtual” into their learning options. Online course offerings for secondary education institutions have increased dramatically over the past decade (Clark, 2000; Setzer & Lewis, 2005; Watson et al., 2012). During this time, many public school systems have added online learning options for their students. In addition, many charter schools have been offering courses to secondary students in virtual environments.

A New Millennium

In a 2000 study, *Virtual High School: State of the States*, Clark (2000) identified and described virtual high schools primarily funded through state governments. For the purpose of his study, Clark defined a virtual high school as “a state approved and/or regionally accredited school offering secondary courses through distance learning methods that include Internet-based delivery” (Clark, 2000, p.1). Until this point in time, there had not been a universal definition for what constituted a virtual high school.

Clark's study (2000), funded by Western Illinois University, had the intent of influencing decisions made by the state officials of Illinois in the development of a virtual school. The study analyzed several key forces driving the state's interest in virtual high schools. These driving forces included state initiatives, federal initiatives, curriculum equity concerns, and unique state attributes. The study included a descriptive analysis of some of the primary attributes of leading virtual high schools, including development platforms, delivery platforms, enrollments, and program offerings. The specific state-sponsored initiatives covered in the study were from the following states: Florida, Kentucky, Michigan, New Mexico, and Utah. Two other more collaborative initiatives from the states of Massachusetts and Nebraska were also covered. Included in the study were recommendations for other states considering the establishment of a virtual high school. The topics covered in the recommendations included technology, funding, curriculum, student services, professional development, access/equity, assessment, policy and administration, and marketing and relations. This study was the first to begin to identify the types of initiatives taking place with regard to secondary online education at the state level across the United States.

Broadening the Scope

The Clark (2000) study focused on state-level, state-sanctioned virtual schools. Clark (2001) conducted a follow-up study in 2001 that broadened the scope to encompass a wider range of initiatives regarding virtual schools across the United States. The Distance Learning Resource Network commissioned the *Virtual Schools: Trends and Issues. A Study of Virtual Schools in the United States* study in 2001. In the 2001 study, Clark

provided analysis of trends based partially on an online survey of state approved or regionally accredited schools.

Within the 2001 study, Clark (2001) identified not only state-sanctioned schools, but also many other types of virtual schools. The types of virtual schools included state-sanctioned, consortium and regionally based, local education agency-based, virtual charter schools, and private virtual schools. Information pertaining to for-profit providers of curricula, content, tool, and infrastructure was also covered. Clark gave an overview of each type of virtual school with specific examples of each type. As an example of how quickly the concept of virtual schools was spreading across the country, the number of planned or operational state-sanctioned virtual schools had nearly doubled from the previous year. At present, North Carolina currently ranks second in enrollments of any state virtual school in the nation, with 97,170 course enrollments for the 2011-2012 school year.

First Large Scale Research

With the acknowledgement that secondary online education courses were becoming more popular across the country, many researchers at the time believed additional studies needed to be performed (Clark, 2001; Litke, 1998). Researchers today continue to believe additional studies are necessary in regards to secondary online education (Means et al., 2010; Picciano, Seaman, & Allen, 2010; Watson et al., 2012). After reviewing distance education research in the K-12 environment, in 2003, the Office of Educational Technology within the U.S. Department of Education commissioned the first national wide scale, descriptive study on the utilization of distance education courses for public elementary, middle, and secondary schools. As a result, Setzer and Lewis (2005)

conducted the study, *Distance Education Courses for Public Elementary and Secondary School Students: 2002-2003*.

Setzer and Lewis' 2005 study was based upon data from the 2002-2003 school year. The study provided baseline data on the prevalence of technology-based distance education courses across the nation, as well as estimated enrollments within the courses. The study also provided the reasoning behind the offering of distance education courses within the public school environment, as well as any barriers that school districts may have encountered preventing them from expanding their offerings. Many of the reasons were similar to those defined later in this literature review.

The data for the Setzer and Lewis (2005) study originated from the National Center for Education Statistics survey in 2003 that contained a representative sample of 2,305 public school districts, including all 50 states and the District of Columbia. The sampling frame included 15,218 public school districts.

The primary focus of the report from the 2005 study was to present national estimates in regards to the utilization of distance education courses for public elementary, middle, and secondary schools. The selected findings of the report included distance education courses for public school students, technologies used for delivering distance education courses, entities delivering distance education courses, purposes of distance education courses, and future expansion of distance education courses. In addition, the 2005 study presented selected findings that included the district characteristics of enrollment size, metropolitan status, region, and poverty concentration.

Although there have been other research studies conducted regarding the utilization of distance education courses in K-12 public schools, the Setzer and Lewis (2005) study

contained the most complete national baseline data at the time of publication. While other studies have laid the foundation for research into distance education in the K-12 environment, I consider the study performed by Setzer and Lewis (2005) to be a seminal piece of work in the field due to the comprehensiveness of the research.

Continuing the Research

At the same time as the Setzer and Lewis (2005) study, other agencies around the United States understood the importance of research in regards to secondary online education and began conducting their own research. One such entity was the Southern Regional Education Board (SREB).

Beginning with the SREB 2005 study entitled *Report on State Virtual Schools* (SREB, 2005) the SREB conducts a study almost yearly concerning the status of virtual schools in their region. The latest study in the series from the SREB, *Trends in State-Run Virtual Schools in the SREB Region* (SREB, 2013), gives the most comprehensive look at the member states in the region, in addition to detailing trends that have begun to surface from the latest survey results and recent legislation in regards to state-run virtual schools in their region. The trends include

- More SREB states have formalized their relationships with school districts with respect to delivery of online courses.
- Funding structures for state-run virtual schools are being clarified.
- States are recognizing the need to ensure the quality of online courses.
- States are making online learning an integral part of high school education.
- States are ensuring that students have access to technology as a learning tool.

According to SREB (2013), the number of state-run virtual schools within the SREB region peaked in the 2008-2009 school year: 15 of the 16 states operated a state-run virtual school. Since, the 2008-2009 school year, three states no longer have state-run virtual schools within the SREB region, these states being Delaware, Mississippi, and Tennessee. In addition, Kentucky was in the process of closing its virtual school when the report became final. Even with the decline in state-run virtual schools, the SREB region led number of course enrollments across the nation in regards to state-run virtual schools (Watson et al., 2012). During the 2011-2012 school year, these following states within the SREB held the top four spots in regards to number of course enrollments: Florida, North Carolina, Alabama, and Georgia (Watson et al., 2012).

Keeping Pace

An additional entity that has contributed greatly to the research involving K-12 online learning has been the Evergreen Education Group. The Evergreen Education Group has a series of reports encompassing K-12 online learning with the titles of all of their publications in the series beginning with “Keeping Pace.” The first report in the series, published in 2004, responded to a request for timely online education policy information from the Colorado Department of Education (Watson, Winograde, & Kalmon, 2004). The first report only included data from the following states: Florida, Idaho, Illinois, Michigan, Minnesota, Ohio, Pennsylvania, Texas, and Wisconsin. The second report in the series, published in 2005, expanded the review of K-12 online learning to all 50 states (Watson, 2005). The latest Keeping Pace report in the series was published in 2012 (Watson et al., 2012). This section of the literature review will refer to this latest report as the 2012 Keeping Pace report.

The 2012 Keeping Pace report is rich in data surrounding the status of online learning across the United States. According to the 2012 Keeping Pace report, there were 619,847 enrollments in 28 state virtual high schools during the 2011-2012 school year. One student taking an online course for a single semester defines an enrollment. The number of enrollments represented an increase of 16% from the previous 2010-2011 school year. In addition, it is estimated that over 275,000 students attended fully online schools during the 2011-2012 school year; however, the growth across the nation in this category had somewhat slowed according to the report.

To provide continuity from the previous 2011 report (Watson, Murin, Vahsaw, Gemin, & Rapp, 2011), the 2012 Keeping Pace report covered similar themes in addition to new themes. One theme discussed in the report was that many states have created or allowed some type of online and blended learning, but only Florida has developed a full range of online learning options for students. The report noted that more students than ever are now taking online and blended learning courses; however, because many students are in programs not tracked, the exact number is unknown. The 2012 Keeping Pace report estimated that several million students are taking part in online and blended learning classes, which represents slightly more than 5% of the total K-12 student population across the United States.

An additional theme discussed in the 2012 Keeping Pace report involved how states must invest in methods to ensure that online and blended learning provides both opportunities and positive outcomes. In addition, the report noted that all stakeholders should be able to access student and school performance data accurately. Unfortunately, as of 2012, most states did not possess robust measures of student achievement.

The one major new addition to the 2012 Keeping Pace report involved blended learning. This was the first time the title of the report included “blended learning.” The authors used the definition of blended learning created by the Innosight Institute. The Innosight Institute defines blended learning as follows: “Blended learning is any time a student learns at least in part at a supervised brick-and-mortar location away from home and at least in part through online delivery with some element of student control over time, place, path, and/or pace” (Horn & Staker, 2011, p.5). The 2012 Keeping Pace report noted that the actual number of students in blended learning programs is not as reliable as compared to their virtual school counterparts, due to the inconsistent reporting of data for blended learning programs. For their next report, Evergreen Education group will be closely watching for growth and better reporting in this area.

A very closely watched area in the 2012 Keeping Pace report was the categorization of state virtual schools. The 2012 Keeping Pace report identified nine state virtual schools that were large enough to have a significant impact on opportunities for students across the state. These states included Florida, New Hampshire, North Carolina, Idaho, Alabama, Montana, South Carolina, Georgia, and Michigan. Conversely, the 2012 Keeping Pace report also identified four states not currently funding a state virtual school at a level that would allow for significant statewide impact: Connecticut, Illinois, Texas, and Kentucky.

A very interesting component of the 2012 Keeping Pace report denoted five states requiring students to complete an online course in order to graduate. These states included Alabama, Florida, Idaho, Michigan, and Virginia. Idaho became the first state to require students to take two online courses to graduate; however, Idaho amended the original

legislation to allow more flexibility in how students may achieve the requirement. West Virginia and New Mexico have passed legislation encouraging students to participate in online learning opportunities. Across the country, there have also been individual school districts that have considered adding online learning requirements. In December 2012, the North Carolina State Board of Education (NCSBE) directed the NCVPS to develop a plan requiring each student in North Carolina to complete a teacher-led online course before they graduate beginning with the class of 2020. The NCVPS was to conduct a pilot study during the 2013-2014 academic school year concerning the requirement (NC SBE, 2012).

Within the 2012 Keeping Pace report there was significant detail comparing North Carolina to other states across the nation. North Carolina currently ranks second in enrollments of any state virtual school in the nation, with 97,170 course enrollments for the 2011-2012 school year. At present, the NCVPS conducts all secondary online education in North Carolina. Legislation prohibits any state-funded entity from offering online learning opportunities without the approval of the NCVPS. North Carolina State Board policy also requires for-credit online courses supplied by vendors to gain approval of the NCVPS. An ongoing issue within North Carolina involves whether online charter schools should operate. At the time of the 2012 Keeping Pace report, there was ongoing litigation concerning this issue. Since 2013, virtual charters schools can operate in North Carolina, but with restrictions (Murin, 2013). In late 2014, legislators in North Carolina required that the State Board of Education approve two virtual charter schools as four-year pilot programs to open in 2015 (Bonner, 2014).

After this study was completed, the 2014 edition of the Keeping Pace report was released by the Evergreen Group (Watson, Pape, Murin, Gemin, & Vahsaw, 2014). The

title of this latest edition in the series is *Keeping Pace with K-12 Digital Learning*. The report provides an overview of the latest policies, practices, and trends affecting online learning programs across all 50 states. The Keeping Pace series published by the Evergreen Group is referenced throughout the educational community for their compilation of data concerning online education.

Reasoning Behind Offering Online Courses in Secondary Education

Researchers asked a panel of secondary students why they preferred learning online at the 2010 iNacol Virtual Schools Symposium. Some of the top reasons according to Nielsen (2010) were as follows: sleeping in, pursue passions outside of the normal school day, focus on work without classroom distractions, a schedule that meets my needs, and there are more choices online. I believe secondary school administrators have reasons why they prefer to offer online classes in a secondary environment and these reasons are well documented in the literature. The reasons are (1) mandates of new laws and availability; (2) accessibility for rural regions; (3) credit recovery, and (4) availability of advanced courses and Advanced Placement (AP) classes.

New Laws and Availability

One nationwide reason that secondary school students are taking online classes is because it is now a requirement to graduate from high school. An additional reason secondary school students are taking online classes is due to availability that was not there previously. Two new states added virtual schools for the 2012-2013 school year, bringing the total of state virtual schools to 31 (Watson et al., 2012). Other states are considering allowing fully online schools, but have not done so. North Carolina is one of the states

considering a fully online secondary school. Watson et al. (2012) believe the expansion rate of fully online schools is declining as compared to the rate in previous years.

Another opportunity for access to online classes by secondary school students resulted from increased capacity through demand. According to Flanigan (2012), the Louisiana state board increased capacity of the Louisiana state virtual school from 500 to 1,000 students. This was in response to over 4,000 applications for the 2011-2012 school year. While far short of the demand, this represented an increase of 100%. Michigan also enacted legislation that expands the maximum number of online charter school enrollments from 1,000 to 10,000, to take place over the next three years. Wisconsin lifted enrollment caps in a virtual charter school that has existed since 2008. This will give several thousand students on waiting lists in Wisconsin the opportunity to participate in online learning opportunities.

Rural Regions

More than 40% of all American schools are in rural areas and 30% of students attend rural schools (Hannum, Irvin, & de la Varre, 2010). Rural secondary schools use online courses to provide students access to a more comprehensive curriculum and advanced courses that rural schools often cannot provide. In order to meet the needs of their students, rural schools use online learning more often than urban schools (NRCRES Distance Education, n.d.). The National Research Center on Rural Education Support (NRCRES), established in 2004, conducts research that addresses significant problems in rural education. One area of focus at NRCRES is the distance education program, which examines the role that distance education can play in rural schools, especially for enrichment and advanced level courses.

The NRCRES conducted a national telephone survey called Rural Distance Education Survey (RDES) in 2005 of approximately 400 small and low-income rural districts in the United States (NRCRES Rural Barriers, n.d.). The purpose of the survey was to collect a wide range of information about distance education in order understand the use of, barriers to, and satisfaction with distance education in rural areas. RDES revealed that approximately 81% of school administrators report that they needed distance education to provide the advanced/enrichment courses requested by students. RDES also revealed that 85% of the surveyed rural districts had used distance education at some point in time. The most common courses offered via distance education were courses in foreign language, math, social science, language/composition, and history. Over 90% of those surveyed were satisfied or somewhat satisfied with their use of distance education. The RDES survey also identified why rural schools stopped using distance education: lack of student interest and participation, scheduling issues, and lack of support personnel.

Credit Recovery

According to Watson and Gemin (2008), “credit recovery refers to a student passing, and receiving credit for, a course that the student previously attempted but was unsuccessful in earning academic credit towards graduation.” One option of allowing credit recovery is via online learning. One of the earliest known methods of applying technology to assist with credit recovery was in 1992 in the Volusia County Schools in Florida (Watson & Gemin, 2008).

In their 2008 study, Watson and Gemin (2008) conducted and published the first extensive research on credit recovery methods via online learning in secondary education. The study was quite comprehensive in regards to the factors involved in credit recovery in

the secondary education environment. Also included was data indicating the potential lifetime loss of income by not graduating from high school. Chronicled in the report, the authors give examples of the different credit recovery efforts in various states around the country.

Providing credit recovery solutions has become big business in the secondary education environment. Presently there are multiple companies that provide online credit recovery solutions to districts, depending upon their diverse needs (Dessoiff, 2009). One such entity is Pearson. Pearson is an example of a company that has strategically positioned itself within the secondary education market with regard to online learning. Not only does Pearson offers credit recovery solutions, but also in 2010, Pearson partnered with the Florida Virtual School to offer more than 100 courses in a wide variety of subject matters (Pearson, 2010). Pearson further positioned itself within secondary education in 2011 by purchasing Baltimore-based Connections Education that operated virtual schools in 21 states and served approximately 40,000 students (Ash, 2011).

Advanced Placement

The use of online learning for advanced courses and AP courses in secondary education is well documented (Means et al., 2010; Setzer & Lewis, 2005; Smith et al., 2005; Watson, 2005; Watson et al., 2012). Just as online learning can be used for access to advanced courses and AP secondary education courses for rural schools (Hannum et al., 2010), the same premise can be used for student access within any school district across the country. Due to the economic downturn across the country in recent years, educational technology budgets have also been shrinking accordingly. This has made it difficult for schools to secure the proper technology to allow access to the advanced courses and AP

courses (Ramaswami, 2008). An increase in the use of advanced technologies usually accompanies accessibility; however, just because school districts have the accessibility does not mean they can afford the costs associated with the advanced technologies (Krakovsky, 2010).

The way most students gain access to advanced classes and AP classes in the secondary environment is through consultation with a counselor within the school. Wood, Portman, Cigrand, and Colangelo (2010) conducted a national study of 149 practicing school counselors in regards to the counselors' perceptions and experiences referring students into accelerated courses. The findings of the study concluded that students did rely on counselors in assisting them with accelerated academic course selection; however, counselors did not have the proper training to assist the students. Instead, counselors were relying on informal information and limited knowledge when assisting students. Wood et al. (2010) believe that researchers should conduct additional research regarding school counselors' knowledge and ability to advise students on accelerated course selection.

Although there is access to advanced courses and AP courses in the secondary education environment, this does not mean students are prepared to take advantage of these opportunities. Hallett and Venegas (2011) performed a mixed methods study of high school students in a low-income urban high school. Results of the study indicated that even with an increase in availability of AP courses, students' sense of their own preparation and results of AP courses did not indicate adequate preparation for college. Iatarola, Conger, and Long (2011) believe that often students can access advanced and AP courses due to having above average eighth grade test scores, not necessarily through being properly prepared. Because acceptance at colleges may require advanced courses on a student

transcript, Iatarola et al. (2011) believe that most school districts offer advanced and AP classes if a minimum number of students wish to take the course, regardless of whether the school district feels the students are adequately prepared.

Concerns in Secondary Online Education

Proponents and critics have existed since online learning has permeated the secondary education environment. With every statement in support of online learning, there are an equal number of statements to the contrary. A great deal of research supports the potential benefits to online learning in a secondary environment; however, with the potential benefit comes concerns.

Technological and policy advances over the last decade have allowed the expansion of online learning in the secondary education environment to become unprecedented (Clark, 2001; Means et al., 2010; Smith et al., 2005; Watson, 2005; Watson et al., 2012). With schools incorporating newer technologies into their infrastructure and schools eager to incorporate online learning options, online courses started becoming a primary choice to many school districts. However, many believe there is not proper research to support the expansion of online learning. According to Molnar et al. (2013), the expansion in online learning in the secondary education environment has far outpaced research on the impact of teaching and learning in the online secondary environment. According to Molnar et al. (2013), “To date, claims made in support of expanding virtual education are largely unsupported by high quality research evidence (p. iv).”

According to Molnar et al. (2013), “Even a cursory review of media reports and a passing acquaintance with the research on virtual education reveals that policy is being made in an environment much like the legendary ‘wild west’ (p. 12).” There have been

numerous reports in the media in recent years concerning issues with online learning in the secondary education environment. Most of the articles reference issues with accountability and quality control (Bushweller, 2012; Gabriel, 2011; Kloberdanz, 2012; Wieder, 2013). For example, Gabriel (2011) reports that critics of online education believe that there is a definite cost savings since online education does not have to provide brick-and-mortar buildings for the students, which is a major cost for school systems; therefore, critics believe that the quality of education is being sacrificed to save money. This is especially true as school systems have had to deal with declining budgets due to the economic factors across the country over the past decade.

Another concern in online secondary education involves for-profit providers. K12 Inc. is the largest for-profit operator of virtual schools, enrolling over 77,000 students (Molnar et al., 2013). K12 Inc. offers virtual programs to over half of the fifty states and recently assisted Oklahoma in expanding their virtual offerings by 400% during a three year span (Eger, 2011). In 2012, K12 Inc. was involved in a lawsuit by one of its shareholders concerning accusations of K12 Inc. misinforming investors about the schools' academic performance (Quillen, 2012). Some individuals believe the for-profit providers, along with political lobbyists, have caused great damage to the K-12 education system within the United States (Fang, 2011).

On April 22, 2014, the National Collegiate Athletic Association (NCAA) announced that it would no longer accept coursework from student-athletes obtained from any of 24 virtual schools operated by parent company K12, Inc. beginning with the 2014-2015 academic school year. The NCAA categorizes all of the K12, Inc. schools as nontraditional high schools, and their courses incompliant with the NCAA's nontraditional

course requirements. Coursework completed from Spring 2013 through Spring 2014 will require additional evaluation prior to being accepted for eligibility purposes. Coursework from the Fall 2012 semester and prior is compliant without additional evaluation (Green, 2014). Even with all of the performance issues surrounding K12, Inc., North Carolina is proposing that K12, Inc. operate a fully online charter school as a test pilot beginning in 2015 (Bonner, 2014).

Demographic Predictors of Performance in Secondary Online Education

There are many studies related to the utilization of demographics as a predictor of student performance. In reviewing the literature, some of the most common predictors studied were age, gender and race/ethnicity (Coleman-Ferrell, 2001; Marley, 2007; Muse, 2003; Tucker, 2000). Even though several studies found used demographics as a predictor of student performance, most studies focused on students taking courses in a traditional seated environment. Only a small portion of the studies found focused on the utilization of demographics as a predictor of student performance in an online course environment (Jost, Rude-Parkins, & Githens, 2012; Ross & Powell, 1990; Rovai, Ponton, & Wighting, 2007). Of the research found relating to the use of demographics to predict online student performance, the research primarily addresses students in postsecondary education (Anthony, 2012; Arbaugh, 2000; Xu & Jaggars, 2013). There is very little research, much less significant studies, on the utilization of demographics as a predictor of student performance for secondary education students taking courses in an online environment. Since I will be using the demographic characteristics of gender and race/ethnicity within my study, this section of the literature review will focus on the literature related to these demographics.

Gender

Studies examining the effects of gender on student performance in online learning environments have been inconclusive, despite evidence that suggests that student learning skills and information processing skills differ based on gender due to biological and social constructs (Jost et al., 2012; Yukselturk & Bulut, 2007). Men and women have a tendency to interact in an online environment dependent upon their perceptions of the environment and technology (Arbaugh, 2000). There is a direct correlation between women's participation in online discussions and their comfort level with technology (Johnson, 2011). Men overall tend to be more comfortable with technology and therefore may have a slight advantage over women in an online environment based solely upon their comfort level (Ashong & Commander, 2012). As time progresses and more of the population in general become more proficient with technology, it is important to note that comfort levels based upon gender are becoming less prevalent (Anthony, 2012).

Communication is a key component to any online course. Men and women in society communicate differently; therefore, the assumption is that men and women would communicate differently in an online environment (Arbaugh, 2000). Women view the online environment as the opportunity to enhance dialogue and learn socially (Xu & Jaggars, 2013). For this reason, women would become more actively involved in discussion board posts and collaboration. Men, on the other hand, would view a discussion board posting as one small assignment and spend only the necessary amount of time completing the assignment (Xu & Jaggars, 2013). For this reason, women are more adept at communicating in an online environment and would have a more satisfying learning

experience than males (Gonzalez-Gomez, Guardiola, Rodriguez, & Alonso, 2012; Johnson, 2011; Rovai & Baker, 2005).

Ross and Powell (1990) conducted one of the earliest known studies on the relationship between performance in a distance education course and gender. Within their study, they found that the majority of the student populations for their distance education courses were women (over 63%) and the women consistently outperformed their male counterparts in all subject areas. Rovai and Baker (2005) reported similar findings.

Marley (2007) conducted a study specific to library and information sciences majors studying the possible effects of gender-related differences upon the students' learning experiences in online courses. The results identified six factors that gender differences may influence: (1) motivation for enrolling, (2) learning style, (3) attitude toward and use of technology, (4) communication style, (5) level of support/sense of community, and (6) dropout or failure rate. As Marley (2007) stated, "As virtual education assumes greater importance within training of students in all disciplines, research isolating and investigating the variables among students that either support or inhibit their ability to succeed within distance learning environments becomes increasingly important" (p. 13).

In a very recently published study, Kupczynski, Brown, Holland, and Uriegas (2014) conducted a study on education majors examining the relationship between the final grade received in a distance learning course and the student characteristic of gender. Findings indicated that for students with lower overall grade point averages, there were differences in online course achievement between males and females. For students with midlevel and higher overall grade point averages, no differences existed. Jost et al. (2012)

found similar results identifying the overall grade point average as a significant predictor of performance in a study performed on two-year college students in Kentucky.

From my review of the research pertaining to the effects of gender on student performance in an online learning environment, I agree with Jost et al. (2012) and Yukselturk and Bulut (2007) that the results are inconclusive. Results pertaining to specific disciplines may vary, yet there has not been enough research published to identify which disciplines may lend themselves to gender having an effect on student performance in an online environment, if at all. I believe that the results will continue to be inconclusive until additional researchers collect data on this topic. Since I have not been able to find any published research studies on secondary school students and the effect of gender on academic performance in an online learning environment, this is one topic where there is a definite gap in the research.

Race/Ethnicity

Unlike studies examining the effects of gender on student performance in an online learning environment, studies examining the effects of race/ethnicity on student performance in an online learning environment have been more conclusive. There is research to show that African American and Latino students consistently perform at a lower level when compared to Caucasian and Asian students (Bembenutty, 2007); however, some researchers suggest that if certain variables are controlled, then differences are no longer as significant (Ke & Kwak, 2013).

Over the past decade, the percentage of Caucasian American university college students has been decreasing, while the percentages of students belonging to other racial groups have been on the rise (Snyder, 2011). As populations of African American students

increase, so do the percentage of African American students enrolling in online courses. Research has shown that the performance gap that exists in the traditional classroom for African American students also exists in the online course environment (Rovai et al., 2007).

Communication is an essential component in any course environment, especially in an online environment. Merrills (2010) reports that African American students prefer frequent oral communication with classmates and the instructor, this being in seated and online courses. In addition, African American students in online courses wished to work in groups, which is much more difficult to accomplish than in a traditional seated course. According to Okwumabua, Walker, Hu, and Watson (2011), African American students report negative attitudes toward online learning, with the majority indicating they do not enjoy using computers for schoolwork. Students also indicated a low level of confidence in navigating online environments. An online environment does not often convey a sense of community to African Americans. Because educators have challenges supplying the necessary environment online to support collaboration and the sense of community, the result can sometimes be poor academic achievement (Rovai et al., 2007).

Ashong and Commander (2012) conducted a study that investigated the impact of ethnicity on perceptions of online learning. Specifically, the study examined African American students' perceptions of online learning as compared to their Caucasian American counterparts. The results of the study showed that instructors in online courses needed to implement strategies to address African American students' needs for verbal interaction and communication. Online discussions, group case-study projects, and paired

learning opportunities may be particularly beneficial to these students and may help increase academic achievement.

Jost et al. (2012) conducted a study investigating the effects of ethnicity on academic performance in online courses offered at a two-year college in Kentucky. Although differences in final grades were present when using the variable of ethnicity, these differences became negligible when controlling for cumulative grade point average. In summary, among the various ethnic groups represented, no significant differences existed after controlling for previous academic performance. African American students continued to perform lower than the mean grade for other ethnic groups, but the mean grade point averages for each group followed a similar pattern.

From my review of the research pertaining to the effects of race/ethnicity on student performance in an online learning environment, it is clear that this topic needs additional research. Studies have shown performance discrepancies between various ethnic groups in traditional seated environments, but there is very little research on examining online environments in comparison. Since I have not been able to find any published research studies on secondary school students and the effect of race/ethnicity on academic performance in an online learning environment, this is also a topic where there is a definite gap in the research.

Summary

The research contained within the literature review in this chapter is foundational to the research topic of high school students taking online college courses. By presenting the research surrounding the present state of online learning in the secondary education environment, reasons that online learning exists in the secondary education environment,

and presenting concerns of lack of research in regards to K-12 online education, I hope to paint a picture where a definite research gap exists. The gap includes the lack of research of high school students taking online college courses. I believe that additional research needs to exist on online learning in the secondary education environment.

Chapter 3: Methodology

Over the past several decades there has been much research conducted on online distance education. In the K-12 environment, research exists on students taking online courses designed for high school students (Clark, 2000; Setzer & Lewis, 2005; Watson et al., 2012). There has been research conducted on high school students taking traditional seated college courses (Kleiner & Lewis, 2005; Marken, Gray, & Lewis, 2013). Research also exists on high school students taking advanced online high school and Advanced Placement (AP) courses (Clark, 2000; Setzer & Lewis, 2005; Watson et al., 2012). Despite all of the research conducted on online distance education, I have been unable to find any published research conducted on high school students taking online college courses.

In reviewing the research, there is a definite gap in the knowledge base regarding high school students taking online college courses. For many years, high school students have taken online high school courses. In addition, high school students have taken AP online courses. In both cases, the target population is high school students. I believe administrators at the secondary and postsecondary levels cannot make data-driven decisions regarding the students and program offerings until this gap in the knowledge base is addressed. Just because a program is successful in an online format at the postsecondary level does not guarantee that secondary school students are prepared to handle both the exposure to an online environment and postsecondary culture simultaneously. I believe that in order to assess the effectiveness of providing

postsecondary courses in an online environment to high school students, additional research is needed.

Conceptual Framework

A research design involves the intersection of philosophy, strategies of inquiry, and specific methods (Creswell, 2009). I will identify the strategies of inquiry and specific methods for my research study in the next chapter. In this section, I will identify my philosophy.

During my undergraduate education, research was purely quantitative for me. Number crunching with a new device, known as a computer, enabled me to perform calculations more quickly and accurately than with my calculator. The scientific method, hypotheses, and theories, were all interrelated and I assumed the rest of world performed research in the same manner. My research revolved around empirical science and natural laws. These laws were absolute and linked with objectivity. Through this doctoral program, I now know the name associated with this type of theoretical framework: Positivism.

The term positivism has changed and grown over time, but is widely accepted as being linked to empirical science (Crotty, 2003). Because many believe scientific knowledge to be accurate and certain, positivism has its root in the objectivity of science. Furthermore, the basic belief system of positivism is also rooted in realist ontology, and there is a reality that exists that is driven by natural laws (Guba, 1990). With positivism, objects have meaning prior to, and independent of, any consciousness of them.

Although I was quite comfortable with my stance in positivism, I knew there was a component missing. Even in my scientific days, statistics opened up the possibility to me

that things were not always absolute. With a 95% confidence interval, the researcher is stating that there is a 95% chance of what the researcher is studying may occur or may not occur. Although not absolute, this still lends itself to a high degree of probability. While one's data may actually represent a 99.99% chance of success or failure, there is always the chance of the opposite occurring. Through the doctoral program, I finally found the term for the nonabsoluteness that I did not have a name for many years ago:

Postpositivism.

Postpositivism is a modified version of positivism (Guba, 1990). Positivism is linked with objectivity, and postpositivism is linked with subjectivity. While positivism claims that the observer and observed were independent of each other, there is scientific research to conclude that this may not be the case (Crotty, 2003). Many now believe that even in the scientific community, the observer can influence the observed (Phillips, 1990). With the natural laws of positivism, there is no meaning making; however, there is meaning making with postpositivism.

Because my personal, educational, and professional experiences came from an empirical background, postpositivism was a perfect fit. Postpositivism also gave me the term for nonabsoluteness for which I had been searching for many years. Scientists generate data that informs the decision making of other individuals. Until proven to a scientist that absoluteness does not occur, he/she moves forward on the premise that absoluteness does occur. I believe each scientist will concede that he or she bases conclusions upon what he or she knows, not what is unknown. This is the relevance of postpositivism; it brings into question the idea of absoluteness because of the unknown. After all, it takes an infinite amount of experiments to support a theory, but only one

experiment to disprove a theory. I can claim a postpositivist view to cover that once in a lifetime chance that the sun may not come up in the east and set in the west; after all, the chances of that may be very small, but not absolute, due to the unknown.

In summary, I am quite comfortable with my theoretical framework being postpositivism. The labeling and understanding of postpositivism has enabled me to fill the gaps previously left throughout my educational career. I had always believed that conducting research utilizing anything other than quantitative research methods would be sacrificing my ability to achieve a high degree of probability. I now see that by adopting postpositivism and utilizing mixed methods research, I will be able to not only achieve a high degree of probability, but I can also create meaning in the process. Prior to the doctoral program, I preferred obtaining the “what” with quantitative methods; mixed methods has allowed me to determine the “what” and “why,” creating the meaning making never afforded to me.

I derived the conceptual framework for this research study from my theoretical framework, my background as a community college faculty member and administrator, my experience in online distance education, and the literature surrounding secondary education in the online environment.

Introduction to the Research

Throughout my research, I explored the roles and perceptions of stakeholders (community college faculty and high school administrators) involved in the Learn and Earn Online (LEO) program, as well as the performance and demographics of the students taking the online college courses. I used the following questions to guide my research:

1. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades?
2. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender?
3. Did the analysis of final grades of high school students compared to traditional college students in an online entry-level college technology course differ from the perceptions of the participating community college faculty and high school administrators concerning the high school students taking the course?

I conducted a mixed methods research study. Mixed methods research is an approach that combines both quantitative and qualitative research. According to Creswell (2009), mixed method research "is more than simply collecting and analyzing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research (p. 4)." I believe that by choosing mixed methods research for my study, I have contributed additional insight and expanded the understanding of high school students taking online college courses.

My research study was exploratory in nature because it addressed a gap in the literature. Due to the nature of my study, none of the major research design strategies perfectly fit my study. Those considered were the sequential exploratory strategy, sequential explanatory strategy, embedded strategy, triangulation strategy, and the convergent parallel strategy. According to Creswell (2009), "The sequential exploratory

strategy involves a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis that builds on the results of the first qualitative phase” (p. 211). Because I conducted the quantitative phase first in my study, this design strategy did not fit my study, even though my study is exploratory in nature.

The phases of the sequential exploratory strategy are opposite of a sequential explanatory strategy as defined by Creswell (2009). Creswell (2009) states that a sequential explanatory strategy is “characterized by the collection and analysis of quantitative data in a first phase of research followed by the collection and analysis of qualitative data in a second phase that builds on the results of the initial quantitative results” (p. 211). Of the major research design strategies I investigated, the sequential explanatory strategy may be the closest to my design strategy; however, due to my study being exploratory in nature and filling a gap in the knowledge base, this design strategy still did not perfectly fit my study.

Because none of the major research design strategies perfectly fit my study, the design strategy used in this study was a sequential strategy. I have used a sequential design strategy in which the first phase consisted of quantitative data collection and analysis, followed by a second phase of qualitative data collection and analysis that built on the results of the first quantitative phase. Within my research study, I gave weight to the quantitative data, and the mixing of the data occurred when the initial quantitative results informed the qualitative data collection.

My sequential design strategy explains and interprets quantitative results by collecting and analyzing follow-up qualitative data. One of the main strengths of this type

of design is that it is straightforward and easy to implement because there are two distinct stages. This type of design also makes reporting much easier due to the distinct stages. One potentially noted weakness of this type of design is the length of time involved in the data collection because there are two distinct phases (Creswell, 2009).

The quantitative data used in this study came from internal data collected in support of the Quality Enhancement Plan (QEP) for the Southern Association of Colleges and Schools (SACS) at Gaston College, located in Dallas, N.C. For the QEP, Gaston College developed a comprehensive plan to improve all online courses. The title of the QEP was Strengthening Academic Internet Learning (SAIL). The specific data contained information pertaining to students taking an online entry-level technology course (CIS 110 – Introduction to Computers) for the academic semesters of Fall 2007 - Fall 2011. This data included final grades and demographics of the students, and included both high school students and traditional college students. All data consisted of archived anonymous data. The first phase of the research consisted of analyzing this data to answer my research questions of (1) how high school students' performance in an online entry-level college technology course compared to the performance of traditional college students based upon final grades, and (2) how high school students' performance in an online entry-level college technology course compared to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender.

The qualitative data collected and analyzed came from interviews of the various stakeholders involved with the high school students taking the online college entry-level technology course. The specific stakeholders were Gaston College faculty members and guidance counselors in the Gaston County School System. I conducted one open-ended

interview with each participant. These interviews involved a relatively small number of questions where I elicited views and opinions from the participants (Creswell, 2009). At the onset of my research, I had a general list of questions established for the participants regarding their roles and perceptions of the LEO program and their perceptions of the high school students in the LEO program. After I gathered the results of the quantitative phase of my research, the results of the quantitative phase informed the qualitative phase by building on the results and generating additional questions for the participants. I developed these additional questions after analyzing the quantitative data, unanticipated at the beginning of this research study.

Participants

The high school sites selected to interview the high school administrators were multiple high schools located within the Gaston County School System that had students participating in the LEO program at Gaston College. Gaston College served as a local community college where LEO students from the Gaston County School System enrolled in online courses. I selected guidance counselors as pertinent administrative personnel to interview because of their potential to influence student decisions regarding the selection of LEO courses. At each high school site, I obtained permission from the principal to interview guidance counselors. By obtaining permission in this manner, I hoped to share the background of my research and have a complete buy-in for my research. I utilized a lay summary to communicate my research plans to all participants. During my study, I interviewed three guidance counselors in the Gaston County School System. The guidance counselors were chosen from both small and large high schools in the Gaston County school system.

I have been an instructor at Gaston College for over 30 years and I have been highly involved in online education at Gaston College since its inception. I have also served in the capacity of chairperson of the Information Technology Department for 21 years. There are faculty members within the department that have previously taught LEO students. In addition to Gaston College granting permission to use the QEP data collected for SACS for the quantitative phase of my study, the Vice-President for Academic Affairs at Gaston College gave me written permission to interview faculty members within my department that taught LEO students (Appendix A). During my study, I interviewed three Gaston College faculty members. The three faculty chosen were all of the active faculty members, besides myself, that taught students in the LEO program.

Data Collection

The data collection for the study consisted of two distinct sequential phases. The first phase consisted of determining relevant data from Gaston College obtained through the QEP for SACS. This data contained information pertaining to students taking an online entry-level technology course for the academic semesters of Fall 2007 - Fall 2011.

During the Fall 2007 – Fall 2011 academic semesters at Gaston College, 3,565 students enrolled into the online version of CIS 110 (Introduction to Computers). CIS 110 is an entry-level technology course at Gaston College utilized by various departments across the college. Beginning in the Fall 2007 semester, high school students were allowed to enroll into the online version of CIS 110 through the LEO program. Of the 3,565 students enrolled during the period, 332 (9.3%) were high schools students in the LEO program. The remaining students (3,233 or 90.7%) were traditional community college students.

In analyzing the data collected by Gaston College for their QEP for SACS, some of the data profiles on the students were incomplete. Specifically, some of the students did not have their race/ethnicity or gender coded. Because this study examined the characteristics of race/ethnicity and gender, I removed the students having incomplete profiles from the dataset. After removing the students with incomplete profiles, there were 306 high school students and 2,904 traditional community college students with complete profiles. For the purpose of this study, I selected a sample of 306 traditional community college students from the 2,904 traditional community college students with complete profiles to equal the number of high school students with complete profiles and to remove bias related to disparate group sizes on the dependent variable. I selected the sample by assigning each of the 2,904 traditional community college students a random number in Microsoft Excel ranging from one to 2,904. Once assigned, I sorted the records in numeric ascending order and selected the first 306 students.

During the academic semesters of Fall 2007 – Fall 2011, Gaston College modified the policies concerning the student withdrawal process. In the beginning of the period, students were only withdrawn if they elected to do so themselves. Later in the period, college faculty withdrew students due to administrative mandates regarding financial aid and nonparticipation requirements. For this reason, I removed the high school students and traditional community college students with withdrawals during this period from the dataset. Noting the change in administrative withdrawal procedure, the withdrawal rate for the high school students participating in the LEO program during this period was 14% (42 out of 306 withdrew). For the entire population of traditional community college students for the period, the withdrawal rate was 20% (588 out of 2,904 withdrew). In analyzing the

randomly selected population of traditional community college students for the period, the withdrawal rate was 21% (64 out of 306 withdrew). The result of removing the students that withdrew during the period left 264 high school students and 242 traditional community college students remaining in the dataset. This yielded 506 students remaining in the dataset. A frequency analysis in Table 1 below shows the breakdown of the dataset into the two groups: High School Students and Traditional Community College Students for the purpose of analysis in SPSS.

Table 1
Frequency Analysis of High School and Traditional Community College Students

	Group	Frequency	Percent
Valid	High School Students	264	52.2
	Traditional Community College Students	242	47.8
	Total	506	100.0

The second phase of data collection consisted of open-ended interviews of the various stakeholders. The specific stakeholders were Gaston College faculty members and Gaston County Schools' guidance counselors. I conducted one open-ended interview with each participant. Each participant determined the site of each interview. At the onset of my research, I developed a general list of questions for the participants about their role and perceptions of the LEO program and their perceptions of the high school students within the LEO program. After I compiled the results of the quantitative phase of my research, the results of the quantitative phase informed the qualitative phase by building on the quantitative results and generating additional questions for the participants. I developed these additional questions after analyzing the quantitative data, which I could not have anticipated at the onset of this study. A copy of the interview questions informed by the conceptual framework and administered to the participants is located in Appendix C.

I audiotaped and transcribed each interview. In addition, I also made hand written notes when appropriate. Next, I organized and prepared the transcripts for analysis. I began by first reading through each transcript thoroughly. For the coding process, I utilized a combination of predetermined codes relating to my research questions and developed additional codes based on emerging information collected from the participants (Creswell, 2009). I performed a thematic analysis of the transcribed interviews.

Reciprocity

I believe that all stakeholders can benefit from the results of my research. My plan is to fully, and openly, share all related research findings with all stakeholders and those individuals within each organization in which I have come in contact throughout my research; however, any data associated with individual interviews will remain in the strictest confidence and remain anonymous. I do not uniquely identify any participants in this study.

No ethical issues arose during the course of the data collection. All participants adhered to their normal policies and procedures throughout the data collection process. Even with the utmost thought given to any potential issues, none arose.

Monitoring Bias

The most serious validity threat, which I acknowledged at the onset of my research, involved researcher bias. I have a professional interest in the LEO program due to my position at Gaston College and a long-established involvement in online education. I also have a personal interest in programs similar to the LEO program since my youngest daughter is currently attending high school and may have the opportunity to take online college courses in the future. I believed my professional and personal interests to be valid

threats to my study, although I believe they counterbalance each other. In other words, my professional interest in the LEO program will help inform my personal decisions regarding the possible participation of my daughter in this type of program.

Identifying and monitoring potential bias is crucial. I believe that I eliminated any potential bias by acknowledging the existence of it prior to the beginning of my research. However, I understood that throughout my research I would have to continue to monitor my subjectivity. I understand that I cannot fully suspend my assumptions; no one can fully accomplish this task. Instead, I realized that I must acknowledge my assumptions and prepare myself for whatever outcomes(s) I may encounter.

Subjectivity has led me to my topic. I believe that I do have a vested interest in the topic. I also believe this vested interest to be an asset to my research, as well as to stakeholders and decision makers. A similar program to the LEO program will affect far too many lives for additional research not to exist. I believe that I am the right person, in the right place, at the right time, to perform such research.

Trustworthiness of the Results

According to Creswell (2009), there are two types of threats to validity: internal threats and external threats. Creswell defines internal validity threats as “experimental procedures, treatments, or experiences of the participants that threaten the researcher’s ability to draw correct inferences from the data about the population in an experiment” (p. 162). Internal validity is restricted in this study due to the representation of only one course within the institution used for analysis. In addition, the community college faculty members interviewed were from a single department within the institution.

Creswell (2009) states that external validity threats “arise when experimenters draw incorrect inferences from the sample data to other persons, other settings, and past or future situation” (p. 162). External validity in this study is imperfect since the results are limited to high school students and traditional community college students attending a single community college. In addition, the community college faculty members were from a single community college and the high school guidance counselors were from a single school system.

Creswell (2009) defines qualitative validity as the “means that the researcher checks for accuracy of the findings by employing certain procedures” (p. 190). One such procedure Creswell recommends is the triangulation of different data sources to build a coherent justification for themes. According to Creswell, “if the themes are established based on converging several sources of data or perspectives from participants, then this process can be claimed as adding to the validity of the study” (p. 191). In this study, there was triangulation between the quantitative data results, the qualitative analysis of the community college faculty members, and the high school guidance counselors.

Research Ethics

I obtained the approval of the Vice-President for Academic Affairs at Gaston College to utilize the data collected in support of the QEP for SACS at Gaston College for the academic semesters of Fall 2007 - Fall 2011. I obtained written permission to use the collected data for the purpose of this study (Appendix A).

I obtained written permission from the superintendent of the Gaston County School System in order to interview each high school site’s administrators (Appendix B). In addition, I obtained informed consent from all interviewees to use the collected data for the

purpose of this study. The Institutional Review Board at Appalachian State University granted me permission to perform this study.

The second phase of data collection consisted of open-ended interviews of the various stakeholders. The specific stakeholders were Gaston College faculty members and Gaston County Schools' guidance counselors. I provided each participant with a lay summary of the research prior to electing or declining to participate in the study. I provided each participant with a copy of the consent form identifying contact information for myself, as well as the contact information of my dissertation chairperson and the Internal Review Board at Appalachian State University. I informed each participant that his/her name, and the name of the high school in the case of the guidance counselors in the Gaston County School System, would remain anonymous in the study. In order to assure anonymity of the participants within the study, I assigned each group of participants an identifier and a number for their name. I identified the Gaston College faculty members as Faculty 1, Faculty 2, and Faculty 3. I identified the Gaston County School System guidance counselors as Counselor 1, Counselor 2, and Counselor 3.

Summary

This chapter provided an overview of the procedures and methodology used in this study. The chapter included the research questions and design, along with the procedures used for data collection and analysis. The quantitative and qualitative data sources used in this study worked in tandem in addressing the research questions in this study. It was through utilization of a sequential design strategy with mixed methods in which the first phase consisted of quantitative data collection and analysis, followed by a second phase of qualitative data collection and analysis that built on the results of the first quantitative

phase that I implemented a successful strategy of inquiry. If the data collection methods used in this study were concurrent instead of sequential, there would not have been the opportunity to reflect the outcome of the quantitative analysis in the qualitative analysis; hence, much of what was learned would have been eliminated from the study. The Institutional Review Board at Appalachian State University approved the methodology and procedures used in this study. Chapter 4 reports the results of the quantitative and qualitative data analysis including descriptive statistics.

Chapter 4: Results

The purpose of this sequential mixed methods study was to analyze the performance and demographics of the high school students and traditional college students taking an online entry-level college technology course. In addition, the study explored the roles and perceptions of the stakeholders (community college faculty and high school administrators involved the LEO program) concerning the high school students taking the course. The following three research questions guided the study:

1. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades?
2. How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender?
3. Did the analysis of final grades of high school students compared to traditional college students in an online entry-level college technology course differ from the perceptions of the participating community college faculty and high school administrators concerning the high school students taking the course?

In this chapter, I present the descriptive statistics and results of the quantitative and qualitative analyses based upon the collected data. I used the Statistical Package for the Social Sciences (SPSS) Version 14 to conduct the statistical analyses for the quantitative

portion of the study. I performed a thematic analysis of the transcribed interviews for the qualitative analysis. I present the themes that developed among the community college faculty and high school administrators, as well as the common themes that developed between both of these groups. In the following sections, I present the research results organized by the descriptive statistics and the three research questions.

Descriptive Statistics

In analyzing the race/ethnicity of the students remaining in the dataset, I noted that there were only four students categorized as not being either Caucasian or African American. Three students were in the traditional community college student category and one student was in the high school student category. For this reason, I categorized the Caucasian students as “Majority” and the remaining students (African American and other) as being in the category of “Minority” for analysis and reporting purposes. A frequency analysis in Table 2 below shows the breakdown of race/ethnicity for the entire dataset.

Table 2
Frequency Analysis of Race/Ethnicity for the Entire Dataset

	Race/Ethnicity	Frequency	Percent
Valid	Majority	434	85.8
	Minority	72	14.2
	Total	506	100.0

In addition to the breakdown of groups and race/ethnicity, I analyzed gender in this study. A frequency analysis in Table 3 below shows the breakdown of gender for the entire dataset.

Table 3
Frequency Analysis of Gender for the Entire Dataset

	Gender	Frequency	Percent
Valid	Male	182	36.0
	Female	324	64.0
	Total	506	100.0

Table 4 gives a comprehensive view of the total number of students in each category broken down by their gender, and race/ethnicity within the gender, including the mean grade score and standard deviation for each group and subgroup.

Table 4
Comprehensive Frequency Analysis by Group, Gender, and Race/Ethnicity including the Mean Grade Score and Standard Deviation

Group	Gender	Race/Ethnicity	Mean	Std. Deviation	N
High School Students	Male	Majority	2.52	1.437	97
		Minority	1.83	1.472	6
		Total	2.48	1.441	103
	Female	Majority	2.97	1.346	145
		Minority	2.56	1.590	16
		Total	2.93	1.372	161
	Total	Majority	2.79	1.398	242
		Minority	2.36	1.560	22
		Total	2.75	1.414	264
Traditional Community College Students	Male	Majority	2.27	1.702	67
		Minority	1.25	1.545	12
		Total	2.11	1.710	79
	Female	Majority	2.80	1.555	125
		Minority	1.74	1.703	38
		Total	2.55	1.649	163
	Total	Majority	2.61	1.624	192
		Minority	1.62	1.665	50
		Total	2.41	1.678	242
Total	Male	Majority	2.41	1.550	164
		Minority	1.44	1.504	18
		Total	2.32	1.569	182
	Female	Majority	2.89	1.446	270
		Minority	1.98	1.699	54
		Total	2.74	1.527	324
	Total	Majority	2.71	1.502	434
		Minority	1.85	1.659	72
		Total	2.59	1.553	506

Research Question 1

The first research question I addressed in this study was as follows: How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades? I performed an independent-samples *t*-test in order to attempt to answer this first research question. An independent-samples *t*-test is used to determine whether a difference exists between the means of two independent groups on a continuous dependent variable. More specifically, the independent-samples *t*-test determines whether the difference between the two groups is statistically significant.

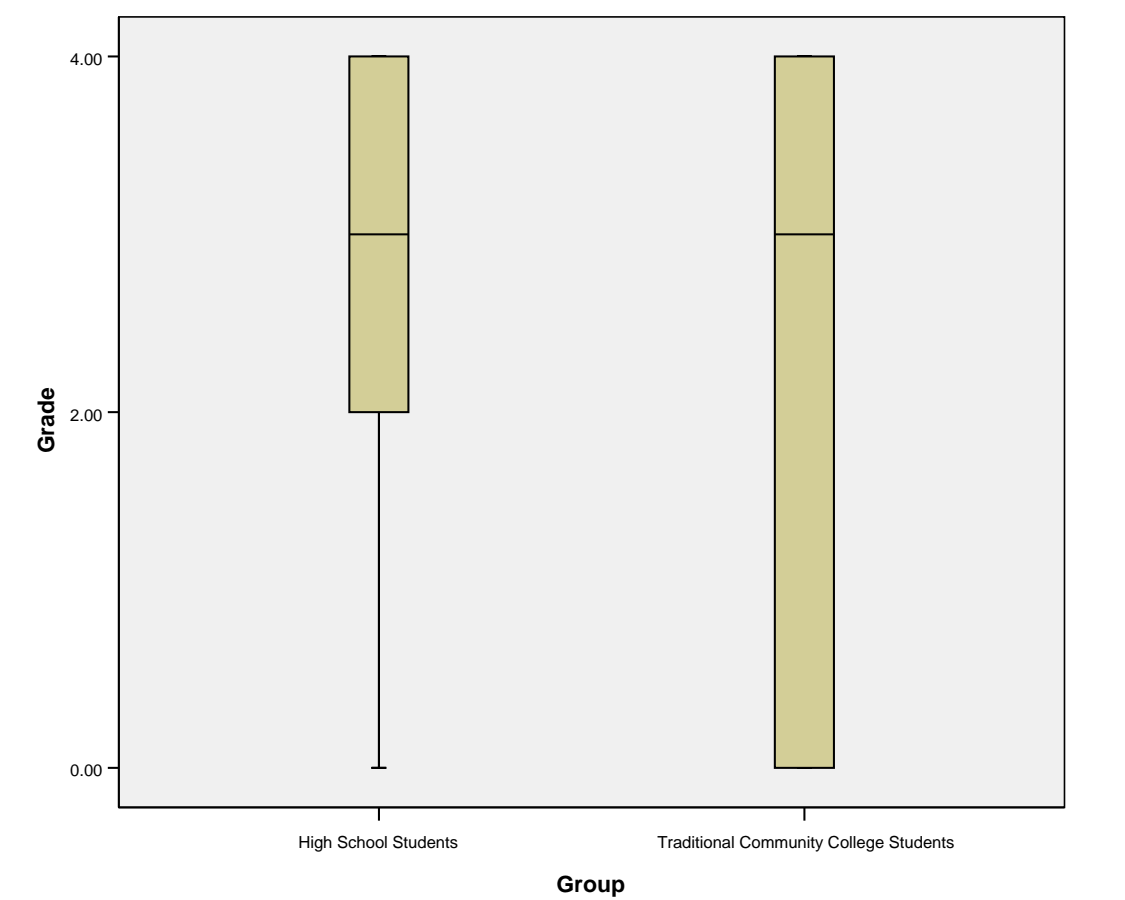
For my independent-samples *t*-test, the two groups were the high school students in the LEO program and the traditional community college students. The dependent variable was the final grade in the course. For analysis purposes, I converted the letter grade each student earned into a numeric equivalent in the dataset based upon quality points associated with the letter grade. The letter grade of 'A' received 4 points, 'B' received 3 points, 'C' received 2 points, 'D' received 1 point, and 'F' received 0 points. Gaston College does not use +/- in assigning final letter grades for each course.

The use of an independent-samples *t*-test is appropriate when there is an independent variable having two randomly drawn independent mutually exclusive groups (high school students and traditional community college students) and a continuous dependent variable (grade) (Howell, 2007). Because I did not randomly select the subjects in this study from the general population, but rather the subjects came from two distinct populations (high school students and traditional community college students taking a specific online course during a specific period), I accepted that the normal assumptions for

the independent-samples t -test would be violated to some extent. The independent-samples t -test also makes assumptions that relate to the nature of the data in order to support generalizable results. The three additional assumptions are (a) there should be no significant outliers in the two groups of the independent variable in terms of the dependent variable, (b) the dependent variable should be approximately normally distributed for each group of the independent variable, and (c) there is homogeneity, or equality, of variances between the two groups.

In determining whether any significant outliers existed in the two groups, I generated a boxplot of the data displayed in Table 5. There were no outliers in the data, as assessed by inspection of the boxplot for values greater than 1.5 box-lengths from the edge of the box. Inspection of the mean line and box sizes would also indicate that the two groups would have differing levels of variability with the traditional community college students having greater variability. I examined this more directly by other means presented below.

Table 5
 Boxplot of High School Students and Traditional Community College Students' Grades



To determine whether the dependent variable was approximately normally distributed for each group of the independent variable, I generated Quantile-Quantile (Q-Q) plots for the dataset. A Q-Q plot is a graphical technique for determining if two data sets come from populations with a common distribution. Table 6 and Table 7 below contain the Q-Q plots. Upon inspection of the Q-Q plots of grades for both the high school students and traditional community college students, the two sets of data appeared to have a similar distribution, but not a normal distribution. As is common in studies without random selection, the independent variable groups are often not normal which will lead to

other violations of assumptions. This may result in a statistic with lower power to identify differences (Essays, 2013).

Table 6
Q-Q Plot of Grade for High School Students

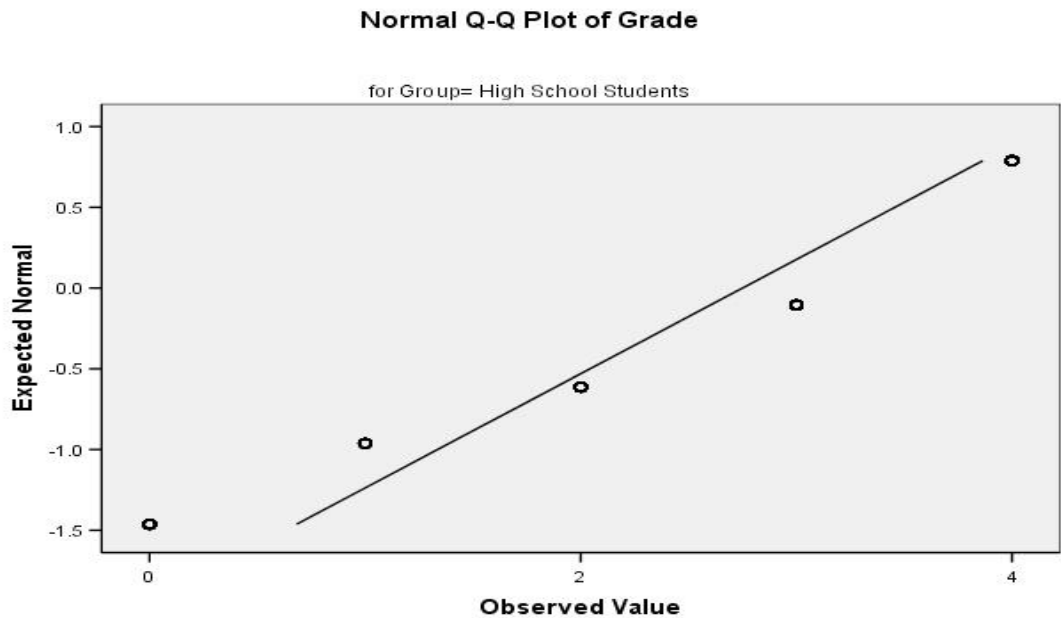
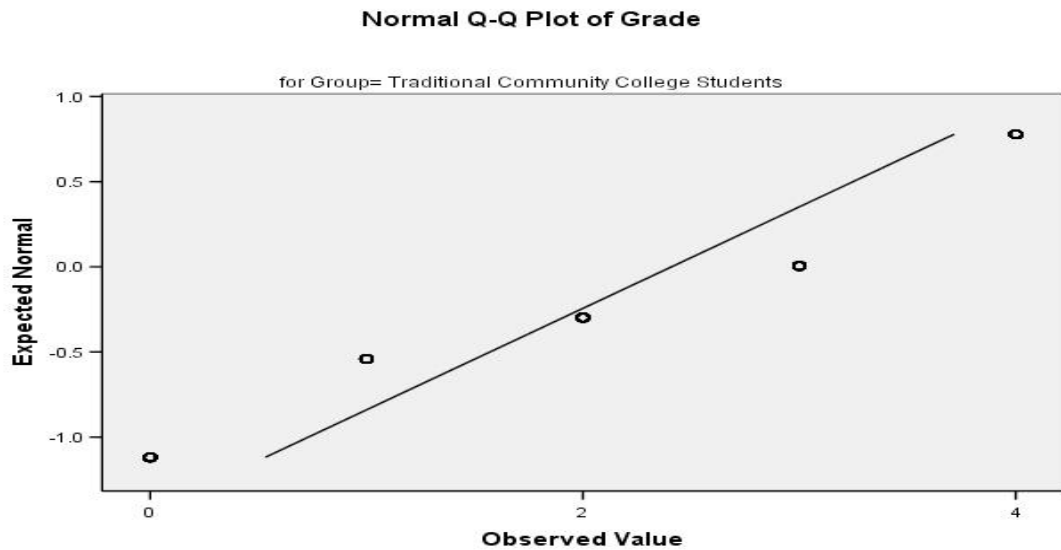


Table 7
Q-Q Plot of Grade for Traditional Community College Students



I used the outcome of the independent-samples *t*-test to determine whether there was homogeneity, or equality, of variances between the two groups. Part of the outcome of the independent-samples *t*-test determined if equality of variances existed, or not, and the test yielded a result based upon the outcome. Table 8 below presents the group statistics from the independent-samples *t*-test.

Table 8
Group Statistics of Independent-Samples *t*-Test

	Group	N	Mean	Std. Deviation	Std. Error Mean
Grade	High School Students	264	2.75	1.414	.087
	Traditional Community College Students	242	2.41	1.678	.108

Table 8 displays the means and standard deviation for each group. The standard deviation in grades for the high school students was 1.414 and for traditional community college students was 1.678. In this study, the standard deviation in grades for the traditional community college students was greater than for the high school students. To formally test whether the variances are different in the populations from which the samples were drawn, SPSS used the Levene's test for equality of variances.

During the execution of the independent-samples *t*-test, SPSS generated a Levene's test for equality of variances. See Table 9 below. The significance level (*p*-value) of the Levene's test determined if variances were equal in the population. If the population variances of both groups were equal, or the assumption of homogeneity was met, this test would return a *p*-value greater than 0.5. In this study, the assumption of homogeneity of variances was violated, as assessed by the Levene's test for equality of variances (*p* = .000). Note that SPSS returns a *p* = .000 value when *p* < .0005.

Table 9

Levene's Test for Equality of Variances within the Independent-Samples *t*-Test

		Levene's Test for Equality of Variances	
		F	Sig.
Grade	Equal variances assumed	28.991	.000
	Equal variances not assumed		

The independent-samples *t*-test generates an outcome based upon the assumption that equal variances are assumed, as well as an outcome that includes a statistical correction for instances where equal variances cannot be assumed. This second outcome, where equal variances cannot be assumed, is a modification to the standard *t*-test to accommodate unequal variances and still deliver test results with approximately equal power to detect differences. This modified *t*-test is also referred to as the unequal variance test, or Welch *t*-test. Because the result of the analysis in this study indicated the assumption of homogeneity of variances was violated through the Levene's test, interpretation of the results are shown under the row "Equal variances not assumed" as labeled in Table 9 and Table 10. It should be noted that the modified outcome generated equal significance as the standard outcome.

Table 10

T-Test for Equality of Means within the Independent-Samples *t*-Test

		<i>t</i> -test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
Grade	Equal variances assumed	2.478	504	.014	.34091
	Equal variances not assumed	2.460	473.093	.014	.34091

I analyzed Table 10 to determine whether the mean difference presented above was statistically significant. In Table 10, the “t” column indicated the obtained value of the t -statistic (obtained t -value), the “df” column represented the degrees of freedom, and the “Sig. (2-tailed)” column indicated the probability of obtaining the observed t -value if the null hypothesis was correct (p -value). For the independent-samples t -test, if $p < .05$, it means that the mean difference between the two groups is statistically significant. If $p > .05$, it means that there is no statistically significant mean difference between the groups. In this study, $p = .014$ ($p < .05$), indicating that high school students and traditional community college students had a statistically significant difference between mean grade scores, with high school students scoring significantly higher than traditional community college students, $M = 0.34$, 95% CI [0.07 to 0.61], $t(473.093) = 2.460$, $p = .014$.

I calculated the effect size using Cohen’s d (Cohen, 1977). I calculated the d value using the means and standard deviations of the two groups, which I presented in Table 8. The formula for Cohen’s d is as follows: $\text{Cohen's } d = (M_1 - M_2) / S_{\text{pooled}}$. In this study, M_1 represents the mean grade score of the high school students and M_2 represents the mean grade score of the traditional community college students. S_{pooled} represents the pooled standard deviation which is calculated as follows: $\sqrt{[(S_1^2 + S_2^2) / 2]}$, where S_1 represents the standard deviation of the grades for the high school students and S_2 represents the standard deviation of the grades for the traditional community college students. The value for $S_{\text{pooled}} = \sqrt{[(1.414^2 + 1.678^2) / 2]} = 1.552$. The value for Cohen’s $d = (2.75 - 2.41) / 1.552 = 0.219$.

Magnusson (n.d.) implemented an interactive website that gives a very detailed visual interpretation of Cohen’s d . Magnusson believes that the interpretation of Cohen’s d

is not straightforward for clinicians and laypersons. Magnusson states, “Even practicing scientists often turn to general guidelines, such as small (0.2), medium (0.5) and large (0.8) when interpreting the effect of an intervention.” Magnusson believes that other factors need considering beyond general guidelines. Magnusson states, “Factors like the quality of the study, the uncertainty of the estimate and results from previous work in the field need to be appraised before declaring an effect ‘large’.”

In this study, the value for Cohen’s d was 0.219. When entered into Magnusson’s interactive website, the website produced rich additional information. For a Cohen’s d value of 0.219, 58% of the high school students will be above the mean of the traditional community college students. In addition, 92% of the two groups will overlap, and there is a 56 % chance that a student picked at random from the high school students will have a higher score than a student picked at random from the traditional community college students. This represents the probability of superiority. For a Cohen’s d of 0.219, in order to have one more favorable outcome for the high school students compared to the traditional community college students, we need an additional 16.5 students. The interactive visualization lets the user see clearly how the effect size can influence these values in regards to the dataset.

In summary, there were 506 students in the dataset, consisting of 264 high school students and 242 traditional community college students. I performed an independent-samples t -test to determine if there were differences in grades in an online entry-level technology class between the high school students and traditional community college students. There were no outliers in the data, as assessed by inspection of a boxplot. Upon inspection of the Q-Q plots of grade for both the high school students and traditional

community college students, the two sets of data appeared to have a similar distribution, but not a normal distribution. The assumption of homogeneity of variances was violated, as assessed by the Levene's test for equality of variances ($p = .000$). The mean grade scores were higher for the high school students ($M = 2.75$, $SD = 1.41$) than the traditional community college students ($M = 2.41$, $SD = 1.68$), a statistically significant difference, $M = 0.34$, 95% CI [0.07 to 0.61], $t(473.093) = 2.460$, $p = .014$, $d = 0.219$.

Research Question 2

The second research question I addressed in this study was as follows: How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender? I performed an ANCOVA (analysis of covariance) in order to attempt to answer this question. An ANCOVA is similar to an ANOVA (analysis of variance), used to determine if there are any significant differences between two independent groups on a dependent variable. However, an ANCOVA can also statistically control for additional variables, or covariates, that may influence results between two groups of the independent variable.

For the ANCOVA in this study, the two independent groups were the high school students in the LEO program and the traditional community college students. The dependent variable was the final course grade. For analysis purposes, I converted the letter grade each student earned into a numeric equivalent in the dataset based upon quality points associated with the letter grade. The letter grade of 'A' received 4 points, 'B' received 3 points, 'C' received 2 points, 'D' received 1 point, and 'F' received 0 points.

Gaston College does not use +/- in assigning final letter grades for each course. The covariates were the race/ethnicity and gender of the students.

Prior to administering the ANCOVA, I addressed certain assumptions beyond having two independent groups (high school students and traditional community college students), a continuous dependent variable (grade), and independence of observations. Because no students in the high school student group were also in the traditional community college group, there was no relationship between the observations in each group. In addition, I addressed three additional assumptions from the independent-samples *t*-test from the first research question. These assumptions were (a) there should be no significant outliers in the two groups of the independent variable in terms of the dependent variable, (b) the dependent variable should be approximately normally distributed for each group of the independent variable, and (c) there is homogeneity, or equality, of variances between the two groups. Because the dataset for the independent-samples *t*-test was the same for the ANCOVA, I already addressed these assumptions in this study.

The same assumptions for the independent-samples *t*-test (normality, homogeneity of variance, and random independent samples) were required for the ANCOVA. In addition, the ANCOVA required the following additional assumptions:

- For each independent variable, the relationship between the dependent variable (*y*) and the covariate (*x*) is linear
- The lines expressing these linear relationships are parallel (homogeneity of regression of slopes)
- The covariate is independent of the treatment effects (i.e., the covariate and independent variables are independent)

In determining whether the covariates were linearly related to the dependent variable at each level of the independent variable, scatterplots were utilized. Table 11 and Table 12, respectively, contain scatterplots of the two covariate variables gender and race/ethnicity, with the dependent variable grade. Upon inspection of the scatterplots, there was a linear relationship between gender and grades, as well as a linear relationship between race/ethnicity and grades.

Table 11
Scatterplot of Gender and Grades

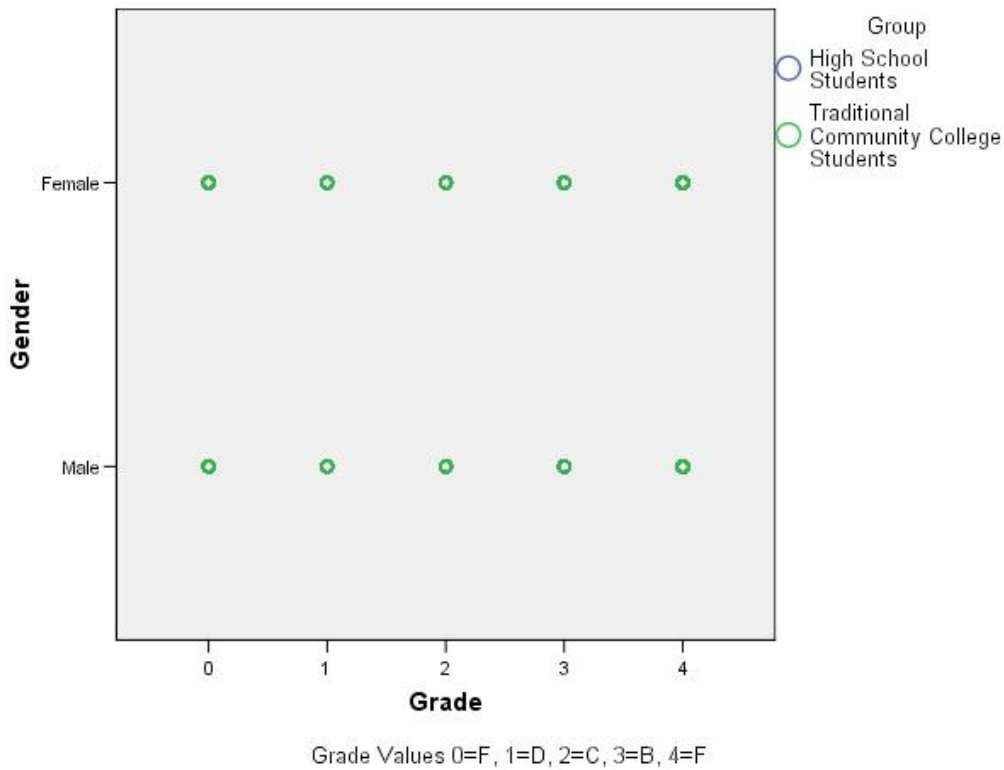
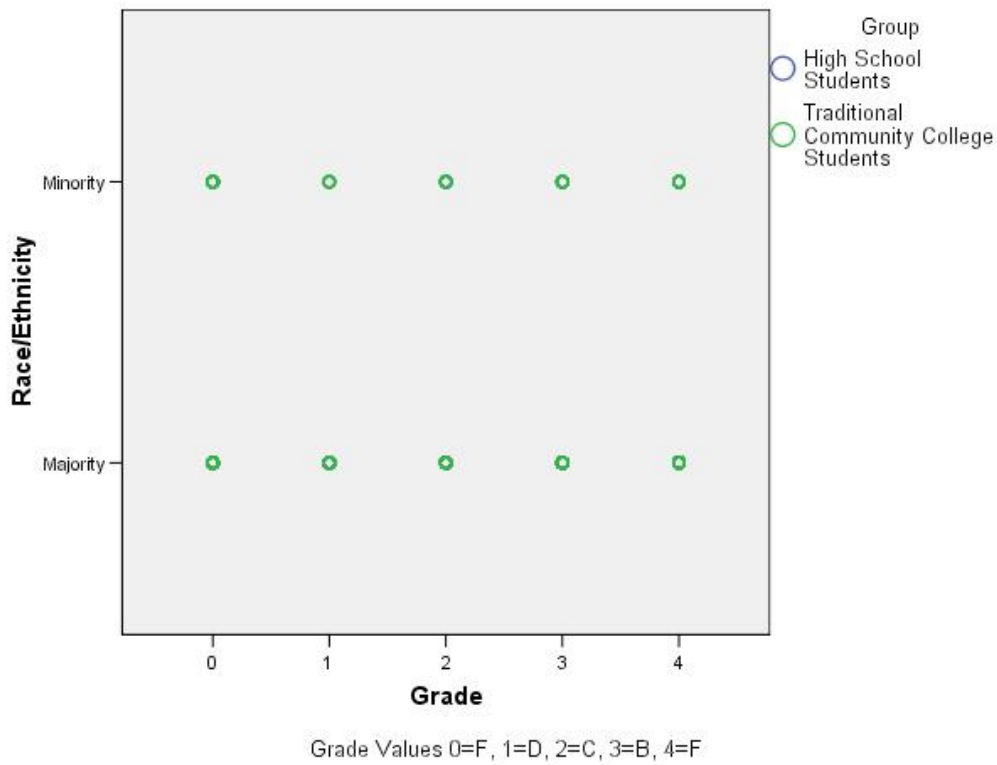


Table 12
Scatterplot of Race/Ethnicity and Grades



The assumption of homogeneity of regression of slopes validates that there is no interaction between the covariates (gender and race/ethnicity) and the dependent variable (grade). This assumption was tested statistically by determining whether there was statistically significant interaction terms, Group*Gender and Group*Race/Ethnicity. Table 13 and Table 14 provide the results of the analysis. The interaction term is not statistically significant and you have a homogeneity regression of slopes if $p > 0.5$. The regression of slopes as the interaction term Group*Gender was not statistically significant $F(1,502) = .002, p = .968$. The regression of slopes as the interaction term Group*Race/Ethnicity was not statistically significant $F(1,502) = 1.898, p = .169$.

Table 13
Regression of Slopes Group*Gender Interaction Result

Dependent Variable: Grade

Source	Type III Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	37.598(a)	3	12.533	5.327	.001
Intercept	134.584	1	134.584	57.203	.000
Group	1.205	1	1.205	.512	.475
Gender	22.714	1	22.714	9.654	.002
Group*Gender	.004	1	.004	.002	.968
Error	1181.076	502	2.353		
Total	4605.000	506			
Corrected Total	1218.674	505			

(a) R Squared = .031 (Adjusted R Squared = .025)

Table 14
Regression of Slopes Group*Race/Ethnicity Interaction Result

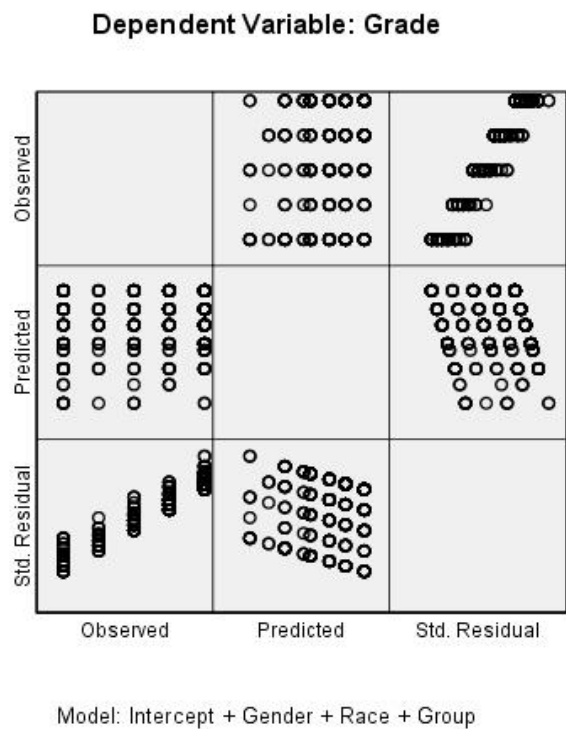
Dependent Variable: Grade

Source	Type III Sum of Squares	df	Mean Squares	F	Sig.
Corrected Model	57.497(a)	3	19.166	8.286	.000
Intercept	451.821	1	451.821	195.331	.000
Group	1.576	1	1.576	.681	.410
Race/Ethnicity	26.810	1	26.810	11.591	.001
Group*Race/Ethnicity	4.391	1	4.391	1.898	.169
Error	1161.177	502	2.313		
Total	4605.000	506			
Corrected Total	1218.674	505			

(a) R Squared = .047 (Adjusted R Squared = .041)

I addressed the final assumption, homoscedasticity, by the analysis of the residuals of the ANCOVA. Table 15 displays a plot of the residuals of the ANCOVA for this data set. Upon inspection of the plot, the assumption of homoscedasticity was not violated. There were no overlaps between cells, which indicate that the covariates were not related to the main treatment effect.

Table 15
 Plot of Residuals of ANCOVA



Tables 16-18 display the results of the ANCOVA analysis. The effect size for this study is determined upon examination of the value of η_p^2 (partial eta squared) for the corrected model (.067). Partial eta squared represents the proportion of the variance in the dependent variable explained by the independent variable. In this study, 6.7% of the overall variance in grades between the groups of high school students and traditional community college students is explained by group.

Table 16
 Groups from ANCOVA

Value Label			N
Group	1	High School Students	264
	2	Traditional Community College Students	242

Table 17
Descriptive Statistics from ANCOVA

Dependent Variable: Grade			
Group	Mean	Std. Deviation	N
High School Students	2.75	1.414	264
Traditional Community College Students	2.41	1.678	242
Total	2.59	1.553	506

Table 18
Tests of Between-Subjects Effects from ANCOVA

Dependent Variable: Grade						
Source	Type III Sum of Squares	df	Mean Squares	F	Sig.	Partial Eta Squared
Corrected Model	81.404(a)	3	27.135	11.977	.000	.067
Intercept	173.077	1	173.077	76.397	.000	.132
Gender	28.298	1	28.298	12.491	.000	.024
Race/Ethnicity	43.810	1	43.810	19.338	.000	.037
Group	8.675	1	8.675	3.829	.051	.008
Error	1137.270	502	2.265			
Total	4605.000	506				
Corrected Total	1218.674	505				

(a) R Squared = .067 (Adjusted R Squared = .061)

In summary, I conducted an ANCOVA to determine if there was a significant difference in grades between high school students and traditional community college students when controlling for the effects of race/ethnicity and gender. Upon inspection of scatterplots, there was a linear relationship between gender and grades, as well as a linear relationship between race/ethnicity and grades. The regression of slopes as the interaction term Group*Gender was not statistically significant $F(1,502) = .002, p = .968$. The regression of slopes as the interaction term Group*Race/Ethnicity was not statistically significant $F(1,502) = 1.898, p = .169$. There were no outliers in the data, as assessed by inspection of a boxplot. Upon inspection of the Q-Q plots of grade for both the high school

students and traditional community college students, the two sets of data appeared to have a similar distribution, but not a normal distribution. The assumption of homogeneity of variances was violated, as assessed by the Levene's test for equality of variances ($p = .000$). There was homoscedasticity and homogeneity of variances, as assessed by visual inspection of a scatterplot. After adjustment for gender and race/ethnicity, the corrected model indicated a statistically significant difference in the grades between the high school students and traditional community college students, $F(3,502) = 11.977$, $p = .000$, $\eta_p^2 = .067$.

Research Question 3

The third research question I addressed in this study was as follows: Did the analysis of final grades of high school students compared to traditional college students in an online entry-level college technology course differ from the perceptions of the participating community college faculty and high school administrators concerning the high school students taking the course? To attempt to answer this question, I conducted interviews with community college faculty at Gaston College and with high school counselors from the Gaston County School System in order to gain an understanding of their roles and perceptions of the LEO program and their perceptions of the high school students participating in the LEO program. I conducted a total of six interviews, three with Gaston College faculty and three with Gaston County Schools' guidance counselors.

I audiotaped and transcribed each interview. I performed a thematic analysis of the transcribed interviews. As a result, I discovered common themes among the community college faculty members, common themes among the high school guidance counselors, as well as common themes between both of these groups. The following sections present the

themes that emerged, relevant information that emerged from the interviews, and excerpts from the interviews in support of the themes developed.

Community College Faculty

I interviewed three Gaston College faculty members during this study. These faculty members have a combined 34 years of service in higher education. Faculty 3 also taught in a high school for several years. All faculty members taught students in the LEO program at some point in time during its existence. Each faculty member also had significant experience in development and teaching courses in online distance education. Faculty 2 served as the distance education director at another community college. Faculty 2 and Faculty 3 have taken online courses as part of their personal educational experience during their graduate degree program processes.

The majority of the faculty members believed the high school students would perform better than the traditional community college students would perform in the course. Faculty 2 states, “I am going to say better. And the reason is because they have a block of time at their school to do that work.” Faculty 3 states, “I would think that if they were in a class environment with a facilitator, I would believe the high school students would perform better than the community college students.” Faculty 1 did not believe the high school students would perform better than the traditional community college students would perform by stating: “I don’t think they would perform quite as well. Just because they are not as prepared and not motivated.”

In addition to Faculty 2 believing the high school students having an advantage over the community college students due to having a block of time during the day to perform their LEO class work, another faculty member felt similarly. Faculty 1 states,

“High school students have dedicated time during their school day with a facilitator present to do their work. This is a great advantage as compared to the community college students.”

Even though the faculty members were not supposed to know the students in their classes were high school students, all of the faculty members had been contacted by high school personnel at some point in time. Faculty 2 states, “Sometimes I would get e-mails from facilitators about them having to take their final exam, but at that point, I didn’t know who they were. They had been just like any other student all the way through.” All of the faculty members felt there were other issues unique to the LEO students. For example, parents of high schools students contacted multiple faculty members concerning the status of their children in the LEO courses. Per Gaston College policy, faculty cannot discuss a student with a parent without written permission from the student on file. Faculty 1 states:

Some things that are concerning is parents calling to want to talk about their child and we don’t discuss with the parent about the student. Yes, they can sign a waiver, but that still is a little problem there because it is between me and the student, not me and the parent, on any issues that arise.

Faculty 1 and Faculty 3 felt the high school students did not fully understand the complexities of taking a college course as compared to a high school course. Faculty 1 and Faculty 3 felt some of the LEO students in their courses were highly motivated, which contributed to the students’ success. Faculty 1 and Faculty 3 also felt that some of the LEO students were not as motivated and apparently took the course to fill their schedules, potentially resulting in their poor performances. Faculty 1 and Faculty 3 felt some students were very underprepared in regards to communicating with the instructor, which caused students to fail to engage fully in the initial weeks of the semester.

All of the faculty members believed an initiative similar to LEO should continue. Faculty 1 states, “I do think some students could benefit from that to know if they are even college ready.” Faculty 3 gave a very positive statement in support of high school students taking online college courses. Faculty 3 states:

Yes, I do. It gives the high school student a better preparedness for not only college work, but kind of the real world and how it works. They need to know that they are not only always going to be taught to the test. They do need critical thinking skills and I think our college classes present critical thinking on a different level than the high school does. It gives the high school student an opportunity to actually come out of high school with college credit which is a definite benefit for everyone, not only for those that may have issues financially getting it. Everyone benefits, so I do think that it is a very beneficial program for the high schools that I would like to see us to continue to have and grow.

After asking the faculty members about their overall perceptions of the LEO program, including advantage and disadvantages, Faculty 1 and Faculty 3 gave the same response. However, Faculty 3 listed the response as an advantage and Faculty 1 listed the response as a disadvantage. Both faculty members responded that LEO courses were late start courses, beginning three weeks later than the normal Gaston College semester courses and only lasting 13 weeks rather than the traditional 16 weeks. Because high school students in Gaston County do not end their fall semester until several weeks into the new Julian calendar in January, high school students cannot begin another community college course until their fall semester ends. For this reason, the spring LEO courses begin as late start courses. Faculty 1 listed the late start courses as a disadvantage because there were three less weeks to complete the coursework. Faculty 3 listed the late start course as an advantage and felt the three weeks leading up to the beginning of the course gave the school time to work out any technical issues with the college before the course started.

In summary, the themes that emerged from the community college faculty members were as follows:

- The majority of the community college faculty members believed the high school students would perform better than the traditional community college students would perform.
- All of the community college faculty members understood the high school students had dedicated time and resources to work on their LEO courses, not afforded to the traditional community college students.
- All community college faculty members were often able to identify LEO students, even though student status was supposed to remain anonymous.
- All of the community college faculty members felt there were issues unique to the LEO students, not normally present with traditional community college students.
- The community college faculty members felt there were some very dedicated and motivated LEO students, but some students who were far less dedicated and motivated.
- All of the community college faculty members felt an initiative similar to LEO should continue in the future.
- The LEO course starting three weeks into the semester was seen as an advantage by some faculty and a disadvantage by others.

High School Guidance Counselors

I interviewed three high school guidance counselors during this study. These guidance counselors had a combined 49 years of service in secondary education. Counselor

1 served previously as an assistant principal in another school. Counselor 2 served as a counselor for several years in a higher education institution. All guidance counselors referred students into the LEO program at some point in time during its existence. None of the guidance counselors had taken an online course as part of their personal educational experiences.

Similar to the community college faculty members, the majority of the guidance counselors also believed the high school students would perform better than the traditional community college students would perform in the course. Counselor 1 states,

I would probably anticipate, honestly, the Learn & Earn students doing better because they are still in a high school mindset of they have to do things, whereas community college students are a little more fluid in what they are doing and sometimes life intervenes, I think, for them more so than a high school student.

Counselor 3 did not believe the high school students would perform better than the traditional community college students would perform, stating:

I would think that they would do worse. Just because, like I said, the not understanding the online course, not putting the time into it, that it's a college-level course and maybe not having that real dedication to completing the work. So sometimes, like I said, the students that we would have take it, were not your tip-top students. They were good students; they could certainly do the work, but the motivation, I guess, behind it or understanding it was a college class; it affects your college GPA and those types of things, really didn't set, you know, for a high school student in the moment. So that's where I would kind of think that they wouldn't do very well. I mean, ability, yes. Motivation, is where I would think that they would kind of fall to the side.

All of the guidance counselors believed the LEO program gave high school students an excellent opportunity to earn college credit while still in high school. The cost of the LEO program courses was free to students, including textbooks. All guidance counselors mentioned the LEO program gave students at smaller high schools the

opportunity to take courses not currently offered at their schools due to school size and/or restricted course offerings. Counselor 1 states:

Well, I think the initiative was to broaden the opportunities for students at the schools, and to really bring some equity, I think, because some of the maybe the larger schools had more AP offerings and maybe IB programs and things like that. Whereas, there were other schools that just didn't have the faculty or the demand, but you didn't want to slight the one or two students who maybe did need those. So I think it was to do that and also to make college more accessible.

After initial startup challenges, all of the guidance counselors believed the LEO program eventually functioned well administratively and that there was excellent communication between high school personnel and Gaston College personnel. All of the guidance counselors preferred college courses offered in a seated format at their school rather than in an online format. The high school guidance counselors felt they could better serve the students when they could communicate face-to-face with the instructor. All of the guidance counselors believed an initiative similar to LEO should continue, even though all of the guidance counselors preferred having high school students take a seated college course versus the course being online. Counselor 2 states:

I think having online courses will be beneficial moving into the future. I would hate to see them get away from face-to-face time. But I still see that there is value and still think that it's a good program, a good option to have online options for students to be able to take online courses. And I like the fact that students are able to get college credit, that they can take. As long as they have that C or better, I think there is value in that too. Because as much as it costs to get a college degree now, the more courses that they can get while they are in high school or even after that, the community college level is going to save them a lot of money. So I think there is value. I didn't like it when they totally removed the face-to-face and the students didn't really have that option. I like the combination.

In each guidance counselor's specific high school, students had a designated location and school period for LEO coursework. In most of the cases, this location was the

library because it was relatively quiet and free of distractions. In the library, library staff was available to assist the student with any technical issues. Counselor 3 conveyed that in some cases students might have also been assigned to the distance learning lab. This distance learning lab was dedicated for transmission of courses to other schools in the school system. In this lab, there was a dedicated systems operator available to answer questions and/or field problems. All of the guidance counselors believed the dedicated locations and time afforded to the high school students were very beneficial to the high school students as compared to the traditional community college students.

All of the guidance counselors stressed to the high school students the importance of taking the college course seriously, whether seated or online. The guidance counselors informed the students that by taking the college courses, they would be beginning their college transcript that would follow them into the future. For those students who performed well in the courses, this would be a definite benefit. However, for those students who performed poorly, there could be severe consequences as one guidance counselor explained in a story about a student. Counselor 1 states:

In Huskins courses, I had a student who had done very well in everything, senioritis set in senior year, failed a community college class, and the college was going to take his acceptance away. So he entered college on probation because he blew off a Huskins' course. So that is even more higher potential for that, I think, with online, where like I said, I am not getting that feedback from a college regularly. And we had worked with him and told him. That's just the risk. I think it's a great program. I think it does expand opportunities and provide more equity of programs across school districts and across the state. But I just think we just really need to work hard to make sure the students are prepared.

In summary, the themes that emerged from the high school guidance counselors were as follows:

- The majority of the high school guidance counselors believed the high school students would perform better than the traditional community college students would perform.
- All of the guidance counselors believed the LEO program gave high school students an excellent opportunity to earn college credit while in high school.
- All of the guidance counselors mentioned the LEO program gave students at smaller high schools the opportunity to take courses that otherwise may not be offered.
- All of the guidance counselors believed the LEO program functioned well administratively and there was a good working relationship with Gaston College.
- All of the guidance counselors preferred college courses to be offered in a seated format at their schools rather than in an online format.
- All of the high school guidance counselors described how the high school students had dedicated time and resources to work on the their LEO courses, not afforded to the traditional community college students.
- All of the high school guidance counselors cautioned the students about taking the college courses seriously because they were actually beginning their college transcript that would follow them into the future.

Common Themes

When I analyzed the information produced from the qualitative analysis, two primary themes emerged between the groups of faculty members and guidance counselors. The first common theme that emerged was that prior to knowing the results of the

quantitative analysis, the majority of each group (faculty members and guidance counselors) believed that the high school students would perform better than the traditional college students.

The second primary theme that emerged from the qualitative analysis was that each participant (faculty members and guidance counselors) unanimously understood that the high school students had dedicated time built into their daily schedule to work on their LEO courses. Students had a dedicated location during one of the class periods in their school day at each of the high schools represented by the guidance counselors who participated in this study. At this location, there were adult facilitators present to assist the students with any technical issues that arose at this dedicated location. The high school provided all of the necessary resources to each student for the LEO course. The participants acknowledged that community college students are not afforded dedicated technology resources, adult facilitators, nor the time the high school students were afforded.

In summary, the two primary common themes that emerged between the groups of community college faculty members and high school guidance counselors were as follows:

- Both groups believed the high school students would perform better than the traditional community college students would perform.
- Both groups acknowledged that high school students had dedicated time and resources to work on their LEO courses, not afforded to the traditional community college students.

Summary

In Chapter 4, I have presented the descriptive statistics of the sample. In addition, I have presented the statistical analyses in addressing the first two research questions for this study. Statistical analyses included an independent-samples *t*-test and an analysis of covariance. In addition to the statistical analyses, I have presented the findings from the qualitative research performed.

After I compiled the results of the quantitative phase of my research, the results of the quantitative phase informed the qualitative phase by building on the quantitative results and generating additional questions for the participants. I developed these additional participant questions after analyzing the quantitative data, which I could not have anticipated at the onset of this study. After combining the quantitative and qualitative approaches through mixed methods, I obtained a deeper meaning from the analyses presented. The mixed methods approach also allowed me to inform the conclusions presented in Chapter 5, as well as to inform the literature. Chapter 5 includes a summary of the findings, implications for practice and policy, assumptions and limitations, recommendations for future research, and the conclusions.

Chapter 5: Finding, Conclusions, & Recommendations

The purpose of this sequential mixed methods study was to analyze the performance and demographics of the high school students and traditional college students taking an online entry-level college technology course. In addition, the study explored the roles and perceptions of the stakeholders (community college faculty and high school administrators involved the LEO program) concerning the high school students taking the course. In this chapter, I summarize the findings of the study, present the conclusions, give implications for policy and practice, and make recommendations for future research. I list and discuss the assumptions made in conducting the study, as well as present any limitations as they relate to the findings of the study.

Summary of Findings

In the following sections, I present the research findings based upon the descriptive statistics and the three research questions: 1) How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades? 2) How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender? 3) Did the analysis of final grades of high school students compared to traditional college students in an online entry-level college technology course differ from the perceptions of the participating community college

faculty and high school administrators concerning the high school students taking the course?

Descriptive Statistics

Online course offerings for secondary institutions have increased dramatically over the past decade (Clark, 2000; Setzer & Lewis, 2005; Watson et al., 2012). During this time, many public school systems have added online learning options for their students.

Beginning in the 2007-2008 academic school year in North Carolina, the LEO initiative allowed high school students (grades 9-12) the opportunity to take online courses through a local community college for simultaneous high school and college credit (NC 2008 Laws, n.d.). Effective January 1, 2012, the LEO program was absorbed into a broader initiative, the CCP (CCP Enactment, 2011). During the Fall 2007 – Fall 2011 semesters, there were 3,565 students enrolled in the online version of CIS 110 (Introduction to Computers), an entry-level college technology course at Gaston College. Of the 3,565 students enrolled, 332 (9.3%) were high school students in the LEO program. Although high school students taking courses in the LEO program did take other community college courses, this study only examined enrollments in CIS 110 during the study period. This increase of high school students during the past decade in courses at Gaston College reflects what is taking place across the country and recorded in the literature.

Withdrawal rates. During the examination period of the study, I determined through the analysis of the data that 14% of the high school students withdrew from the course, compared to a withdrawal rate of 21% for the traditional community college students. The percentage of withdrawals for the traditional community college students was approximately 50% higher than for the high school students in the LEO program

during the Fall 2007 – Fall 2011 semesters. The difference between the withdrawal rates for the high school students and the traditional community college students is very significant and informative. There must have been an underlying reason behind the wide disparity in the withdrawal rates and I believe the reason emerged in the common themes produced from the qualitative analysis.

One theme was that both groups interviewed (community college faculty members and high school guidance counselors) acknowledged that high school students had dedicated time and resources to work on their LEO courses not afforded to the traditional community college students. It was apparent to me that the unique guidance, resources and support given to the high school students resulted in a much smaller withdrawal rate for the high school students as compared to the traditional community college students. When students have dedicated time and resources available to them for their courses, their ability to perform the required work for any course dramatically increases. High school students potentially have a more stable environment for food, clothing, and shelter, where a parent/guardian looks after basic needs. Community college students may have very different roles with adult responsibilities that take precedence over learning.

I have not been able to find any comparisons among withdrawal rates between high school students and traditional community college students taking the same course in the literature; however, I was able to find withdrawal rate comparisons between students taking seated courses and online courses in the literature. Research shows that students taking online courses have a 10-20% higher withdrawal rate as compared to students taking seated courses (Brown, 2012; Carr, 2000). Because students in a seated course have

a regular interaction with an instructor, students stay more engaged and can work through any issues they may be having in the course.

I believe that if instructors in online courses did a better job engaging their students on a regular basis, retention rates would increase in online courses. The smallest of support in an online course by the instructor can have a huge impact on the student. Park and Hee Jun (2009) believe that lower withdrawal rates can be achieved if online program developers could simply enhance the relevance of the course in which they are teaching. The support does not have to come from the instructor. Park and Hee Jun (2009) also believe that lower withdrawal rates can be achieved for adult learners if they are supported by their workplace in order for them to finish online courses.

After examining the results of this study, I feel the facilitators in the schools were a definite outside support mechanism for the high school students in the LEO program. This was a support mechanism traditional community college students do not have in many cases. The facilitators acted like a workplace of sorts to the students, and encouraged and supported them to complete the online course. Hannum, Irvin, Lei, and Farmer (2008) examined the effectiveness of training facilitators in secondary schools to follow learner-centered principles to support students in online courses. The results found that the students accompanied by those facilitators that were trained with learner-centered principles outperformed those students that had a facilitator that did not have the training.

Due to my background, I was involved with many facilitators during the existence of the LEO program. During this time, I found that facilitators provided a varying degree of human support to the LEO students. Some facilitators were simply a warm body to monitor the students, while other facilitators were very active with the students and

constantly reminded them of due dates in their courses. If there were multiple students present at a single school, the students could have banded together to give themselves a sense of community. This type of internal support mechanism would definitely be beneficial in an online course, and would have been an environment not present with the traditional community college students.

Race/Ethnicity. I analyzed race/ethnicity in my study and found that the mean grade scores for the students in the minority category were consistently lower than the mean grade scores for the students in the majority category. This was true for the high school students, traditional community college students, and overall. This finding is consistent with those found in the literature. Jost et al. (2012) found that African American students continued to perform lower than the mean grade for other ethnic groups in a study investigating the effects of ethnicity on academic performance in online courses offered at a two-year college in Kentucky. Research shows that African American and Latino students consistently perform at a lower level when compared to Caucasian and Asian students (Bembenuddy, 2007). Research also shows that the performance gap that exists in the traditional classroom for African American students also exists in the online course environment (Rovai et al., 2007). According to Okwumabua et al. (2011), African American students report negative attitudes toward online learning, with the majority indicating they do not enjoy using computers for schoolwork.

Gender. In relation to gender in this study, females consistently outnumbered males by a nearly 2:1 margin. This was true of the high school students, traditional community college students, and overall. Ross and Powell (1990) conducted one of the earliest known studies on the relationship between performance in a distance education

course and gender and found that the majority (over 63%) of the student population for their distance education classes were females. Through analysis of the data, I also found the mean grade scores for females in this study were consistently higher than for their male counterparts. This was true for the high school students, traditional community college students, and overall. Ross and Powell (1990) and Rovai and Baker (2005) have reported similar findings to those in this study that females consistently outperform their male counterparts in all subject areas within distance education courses. I found the mean grade score for females was higher than the mean grade scores for males in this study. However, studies examining the effects of gender on student performance in online learning environments have overall been inconclusive, despite evidence that suggests that student learning skills and how information is processed differ based on gender due to biological and social constructs (Jost et al., 2012; Yukselturk & Bulut, 2007).

Research Question 1

The first research question I addressed in this study was as follows: How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades? I implemented an independent-samples *t*-test in order to answer this question. The dependent variable for the test was the final grade in the course, and the independent variable was the group (high school students and traditional community college students).

The results of the independent-samples *t*-test showed that the mean grade scores were higher for the high school students than the mean grade scores for the traditional community college students, and that the differences in the means were statistically significant. Although the differences in the means were statistically significant, the effect

size calculated through Cohen's d indicated a small effect size because the two means only differed by 0.219 standard deviations. Even though some of the assumptions for the independent-samples t -test were violated to some degree, I feel the analysis still produced solid results. I believe this study shows that researchers can still perform a good analysis with a non-random model due to the robustness of the test.

The outcome of the independent-samples t -test clearly answers this research question to say that with statistical significance the high school students outperformed the traditional community college students based upon final grades. However, the outcome of the Cohen's d calculation indicated that while the result was statistically significant, there was a small practical significance to the result.

The literature is clear in stating that online courses are present in secondary education today (Clark, 2001; Means et al., 2010; Smith et al., 2005; Watson, 2005; Watson et al., 2012). At the onset of this study, I questioned whether high school students were adequately prepared to take online college classes where the target population is traditional college students. Regardless of the success of an online postsecondary program, I believed secondary school students may or may not be prepared to handle both the rigor and demand of an online postsecondary environment and postsecondary culture simultaneously.

The group of high school students represented in this study show that high school students do have the ability to perform at a level not only equivalent to, but higher than, traditional community college students if given the proper time and resources. While my recommendations for future research would never include removing the time and resources provided to the high school students in a future study, undermining student learning

opportunities, I believe this analysis would show a true comparison of the groups. What we as educators could do instead, is to work with the traditional community college students to make them understand the importance of having dedicated time and resources to help ensure their success. In addition, community college faculty can do a better job of engaging students and making the course more relevant.

Research Question 2

The second research question I addressed in this study is was as follows: How did high school students' performance in an online entry-level college technology course compare to the performance of traditional college students based upon final grades when controlling for the effects of race/ethnicity and gender? I performed an ANCOVA in order to attempt to answer this question. For the ANCOVA in this study, the dependent variable was the final course grade. The two independent groups were the high school students in the LEO program and the traditional community college students. The two covariates were the race/ethnicity and gender of the students.

Unlike the independent-samples *t*-test that I used to address the first research question, the ANCOVA statistically controlled for the effects of race/ethnicity and gender that may influence the results between the high school students and the traditional community college students. The independent-samples *t*-test incorporated the effects of race/ethnicity and gender when generating its result.

After adjustment for gender and race/ethnicity, the corrected model of the ANCOVA indicated a statistically significant difference in the grades between the high school students and traditional community college students. Although the differences in the grades between the high school students and traditional community college students

when controlling for the effects of race/ethnicity and gender were statistically significant, the effect size calculated upon examination of η_p^2 indicated a moderate effect size because only 6.7% of the overall variance in grades between the groups of high school students and traditional community college students is explained by the group. As with the independent-samples *t*-test, even though some of the assumptions for the ANCOVA were violated to some degree, I feel the analysis still produced solid results. I believe this study shows that researchers can still perform a very good analysis with a non-random model due to the robustness of the test.

The outcome of the ANCOVA clearly answers this research question to say that with statistical significance the high school students outperformed the traditional community college students based upon final grades when controlling for the effects of race/ethnicity and gender. However, while the result may have been statistically significant, upon examination of η_p^2 there was a moderate practical significance to the result.

Given the outcome of Research Question 1 and the results of analysis of the descriptive statistics concerning race/ethnicity and gender, the outcome of Research Question 2 was not surprising to me. All of the descriptive statistics concerning race/ethnicity and gender were similar between the group of high school students and the group of community college students in this study.

Research Question 3

Two primary themes emerged from the interviews between the groups of community college faculty members and high school guidance counselors. The first common theme that emerged was that prior to knowing the results of the quantitative

analysis, the majority of each group (community college faculty members and high school guidance counselors) believed that the high school students would perform better than the traditional college students. This result coupled with the answer to Research Question 1 answers Research Question 3. In this study, the outcome of Research Question 1 indicated that the mean grade scores for the high school students were higher for the high school students than the traditional community college students, and the difference was statistically significant. Therefore, the perceptions of the participating community college faculty and high school administrators concerning the high school students taking the course did not differ from the actual results. The majority of the participants believed the high school students would perform better than the traditional college students would perform.

The second primary theme that emerged from the qualitative analysis was that each participant (community college faculty members and high school guidance counselors) unanimously understood that the high school students had dedicated time built into their daily schedules to work on their LEO course. Students had a dedicated location during one of the class periods in their school day at each of the high schools represented by the guidance counselors who participated in this study. At these locations, adult facilitators were available to assist the students with any technical issues that arose. The high school provided all of the necessary resources to each student for the LEO courses. The participants acknowledged that the traditional community college students were not afforded dedicated technology resources, adult facilitators, or the time the high school students were afforded. When told that the high school students did perform better than

their community college counterparts performed, Faculty 3 gave a very detailed reason for why by stating:

My feelings as to why it would occur is because if the high school students are required to be there like on a 5-day week basis and if they are in a controlled classroom environment where they have the resources in front of them with classroom management, they are more likely to get their assignments done if they have the resources available to them ... And, again, the college student may have more responsibility, so not only do they lose the hours of the actual resource and physically having someone in contact with them, they may have responsibilities that the high school students do not have.

I found this quote from one of the community college faculty members to be very revealing and concise given the results of the qualitative analysis yielded the exact sentiments held by the faculty member.

Although the community college faculty members interviewed in this study had a great deal of experience with online course development and delivery, most faculty members are subject-matter experts and have had no formal training in teaching methodology. At present, most college instructors have no formal training in teaching methods and have adapted to the learning styles of adult learners through experience (Anderson, 2010).

I found the high school guidance counselors interviewed in this study to care very much about their students. The high school guidance counselors took great care in conveying to the students the expectations of them in taking a college course. Although the high school guidance counselors informed students of the expectations and consequences of taking online college courses, the counselors' advice did not prevent situations like those described by Counselor 1 from occurring. In addition, the high school guidance counselors addressed the use of online courses by rural and smaller schools to provide

students the access to a more comprehensive curriculum and advanced courses that otherwise were not provided (NRCRES Distance Education, n.d.). The use of online learning for advanced courses in secondary education is well documented (Means et al., 2010; Setzer & Lewis, 2005; Smith et al., 2005; Watson, 2005; Watson et al., 2012).

The way most students gain access to advanced classes in the secondary environment is through consultation with a counselor within the school. Wood et al. (2010) conducted a national study of 149 practicing school counselors in regards to the counselors' perceptions and experiences with referring students into accelerated courses. The findings of the study concluded that students relied on counselors in assisting them with accelerated academic course selection; however, counselors did not have the proper training to assist the students. Instead, counselors were relying on informal information and limited knowledge when assisting students. Wood et al. (2010) believe that researchers should conduct additional research regarding school counselors' knowledge and ability to advise students on accelerated course selection.

Although I believe the guidance counselors I interviewed took great care in placing students into the LEO courses, I am unsure as to whether other guidance counselors followed the same principles. Because the LEO program allowed students in grades 9-12 to participate, some students the age of 14 were eligible to take an online college course. Upon examining the dataset, I found that students 14-15 years of age did take the online CIS 110 course. I believe in these cases that students may have self-selected themselves into the course without much oversight. For this reason, I fully agree with Wood et al. (2010) concerning future research on guidance counselors.

In summary, I have answered Research Question 3 through the mixed methods approach of this research study. The more important question addressed is why did the high school students perform better than the traditional community college students in the online entry-level college course? In this study, the qualitative analysis suggests the difference in environments to be a contributing factor as to why the high school students performed better than the traditional community college students performed in an online entry-level technology course offered at Gaston College during the existence of the LEO program. The qualitative analysis also suggests the dedicated environment and resources afforded to the high school students to be a contributing factor as to why the withdrawal rate for traditional community college students within this study was approximately 50% higher than for the high school students.

I found the results of the qualitative analysis to be enlightening and the mixed methods approach to be invaluable. Although I was aware initially that the high school students were provided dedicated time and resources not afforded to the traditional community college students at the onset of the study, it was not until I conducted the interviews with the community college faculty members and high school guidance counselors that this issue was brought into proper context. Even though I realized the difference in the environments at the onset of the study, I would have believed the high school students would have performed worse than the traditional community college students would have performed in this study. Hence, I believe I performed admirably in suspending my assumptions and conducting this study.

Reflection on the Study

In reviewing the literature surrounding secondary students taking online courses, I was quite surprised to find the lack of literature surrounding high school students taking online college courses. Upon reflection on this study and its findings, I found myself wondering why there has not been more research conducted on high school students taking online college courses. In serious reflection, I wonder whether college and university educators never conducted such a study because of what they would find. If college and university educators were to find the high school students performed better than the college students performed, did it mean that the college and university educators were not teaching at a true postsecondary level? I personally do not believe so. Having the maturity to handle the rigors of an online college course while still in high school is very separate from the age of the student. Similarly, many traditional college-aged students do not possess the maturity to handle the rigor of an online college course. I believe that college and university educators are too busy with daily operations to perform such research. Instead, it is only when doctoral students investigate such information or grants enable the college and university educators to pursue the research, that the research is undertaken.

Educators at the university level historically perform research as part of their professional duties in addition to teaching and learning, while educators at the community college level historically focus solely on teaching and learning. Community college faculty and staff rarely have the opportunity to investigate new programs prior to their implementation. An example would be the LEO program. The decision to implement the LEO program was made just prior to the Fall 2007 semester. There was very little organization and structure in place. Instead, community colleges and high schools

scrambled at the last minute to have program offerings in place for the Fall 2007 semester. Instead of being able to make data-driven decisions, most community colleges end up making reactionary decisions to compete and look good in the current competitive educational environment. These situations are due to policy makers simply not making data-driven decisions and being reactionary. This places both the community colleges and high schools in an unfamiliar situation with no road map to guide them.

This study determined that the environments differed in regards to the high school students and traditional community college students participating in the study. Furthermore, I believe this difference in environments contributed to the outcomes of the study. Although this study may have focused on the difference in grades between the two groups, it ultimately brought into focus the learning environment and social environment in which the two groups were taking the same course. I believe that regardless of the course, seated and/or online, preparation time and resources are a key component in whether the student is successful or unsuccessful in any course. The more students understand what is required of them to take an online course, the more successful they will be. It is our job as educators to not only teach the material, but also help students place themselves in the best environment to be the most successful.

In this study, I compared high school student outcomes to community college student outcomes based upon quantitative data. To clarify these results further, I gathered qualitative data from key stakeholders. After compiling all of the quantitative and qualitative data and answering the research questions in this study, I realize that I attempted to compare two groups of students who are not similar because of their unique learning environments and their unique social living environments. Thus, there are more

contributing factors unique to each group of students (high school students and traditional community college students) that influence the educational outcomes.

Implications for Practice and Policy

The results of this study have implications for practice and policy in regards to allowing or not allowing high school students to enroll into online college courses in programs similar to LEO in the future. Students, college instructors, college administrators, high school administrators, and policy makers in North Carolina, as well as across the country, have a stake in any future endeavors.

The most important stakeholders in any future endeavor similar to LEO would be the high school students. In this study, the high school students showed that they could perform at the level required to take the online entry-level technology course. However, the high school students had conditions not provided to most traditional community college students. Although provided the unique environment, high school students need to become more educated about the requirements and expectations concerning taking online college courses while still in high school in the event the environment should change in the future.

College educators have a difficult job in today's educational environment. Not only must they stay current in their fields, they must also adapt to new modes of delivery, such as online delivery. Although many college instructors embrace new technologies, the methods used in a seated environment often do not translate into the online environment. Because most college instructors are subject-matter experts and many have had no formal training in teaching pedagogy, they have adapted to teaching adults through experience.

When introducing adolescents into the picture, coupled with the online environment, college instructors face a daunting task.

Having adolescents in community college courses in the future will require community college faculty to adapt to the learning styles of adolescents. The literature suggests that community college instructors are subject-matter experts and have no formal training in teaching methodology; they have simply adapted to the learning styles of adults through experience. This will have many policy implications for community colleges. One such implication is the implementation of professional development for community college faculty on learning styles of adolescents.

As long as colleges allow high school students to participate in their online college courses, college administrators need awareness of the needs of their college faculty. College administrators should provide the appropriate professional development resources in regards to adolescent learning styles, as well as providing the most current professional development resources in regards to online learning. College administrators should be in constant contact with high school administrators to ensure the high school students fully understand the expectations placed upon them in order to create an optimal environment for high school students' success.

High school administrators need to be in constant contact with college administrators concerning requirements and expectations for online college courses. Only then can the high school administrators relay pertinent information to the students wishing to take online college courses. Technology constantly changes in the online environment. Unless the high school administrators are staying abreast of the requirements and expectations, the high school students will be at a disadvantage.

The policy makers in North Carolina, and across the country, are the entities that will ultimately make decisions regarding programs similar to LEO in the future. These entities also need to do the research in regards to the best way for the students in their school systems to be successful. Although new endeavors are often viewed as innovative, new endeavors should only place students in optimal situations for success. Policy makers need to perform the research prior to allowing students to participate in future programs similar to LEO.

Because boundaries are shifting in the secondary, postsecondary, and online environments, the current climate suggests that community colleges may be a viable option to perform credit recovery for secondary school students. If private companies can perform credit recovery, certainly states would prefer their own entities to perform such activities. Why should the states pay other entities when they can pay themselves?

In summary, there are no easy answers whether to allow high schools students to participate in online college courses. To conduct the research and to educate all of the stakeholders is a monumental task. However, everyone working together is the only way online learning will be beneficial to the high school students. Policy makers need to allocate the resources necessary to continue to investigate high school students taking online college courses.

Assumptions and Limitations

This study was subject to assumptions and limitations that contributed to the development and implementation of this study. One of the first limitations of this study was that I conducted an analysis on a single community college course. This limitation may result in limited generalizability among other courses at this community college.

Given my background and experience with the subject matter, the course and group of students was a logical beginning to inform the literature in this arena. A similar limitation of this study was that the study only examined the online entry-level technology course at a single community college. This limitation may also result in limited generalizability among other community colleges. By expanding the scope beyond a single course and/or a single community college, researchers could obtain additional information that may support the results of this study or refute them.

The community college faculty members interviewed in this study were from a single community college. By expanding the scope of the study beyond a single community college, researcher could discover other perceptions from the participants. Because faculty members from other community colleges would have interacted with additional school systems other than those in this study, different relationships could emerge through the qualitative analysis. Because this study was limited in the availability of the number of community college faculty members to interview, expanding the scope beyond a single institution would eliminate this limitation.

The high school guidance counselors interviewed in this study were from a single school system. By expanding the scope of the study beyond the community college and high school in this study, researchers could discover other perceptions from the participants as noted with the limitation with the community college faculty members above. Because this study was limited in the availability of the number of high school guidance counselors to interview, expanding the scope beyond a single school system would eliminate this limitation.

An assumption of this study was that the learning objectives for each course remained constant. Each instructor used the same learning objectives within each semester during the examination period of the study. However, the learning objectives for the course changed slightly from semester to semester throughout the examination period of the study. Therefore, the change in the learning objectives could have made an impact on grades during the study.

During the examination period of this study, the structure and design of each online section of the course may have varied, even though all instructors teaching the course used the same learning objectives each semester. Beginning in 2012, the course used in this study underwent a thorough examination. As a result, the online course structure became uniform for all instructors teaching the course.

The assumptions and limitations listed above all contributed to the development and implementation of this study. Each assumption and limitation had a unique impact, or a potential impact, on this study in some fashion. Researchers could address each of the assumptions and limitations in future studies. If researchers were to focus on eliminating the limitations of this study in future studies, they may gain an expansive amount of information. The following section addresses recommendations for future research.

Recommendations for Future Research

My review of the literature revealed many aspects pertaining to the use of online courses in secondary education. The gap that exists in the literature involves high school students taking online college courses. This study only begins to address this gap and inform the literature by examining how well the high school students performed in a single college online entry-level technology course compared to traditional community college

students. This study further informs the literature by interviewing stakeholders (community college faculty and high school guidance counselors) concerning their perceptions of the high school students taking the online college course. Although this study begins to address the gap in the literature, I believe additional research is necessary concerning high school students taking online college courses.

This study focused on a single online course taught at a single community college. A future recommendation would be to expand the scope of this study by investigating this same course across multiple community colleges throughout North Carolina. Such a statewide study would be possible for two reasons. The first reason is that the course used in this study, CIS 110 (Introduction to Computers), is listed in the North Carolina Community College System's Common Course Library. The second reason is all of the North Carolina community colleges who choose to offer CIS 110 must teach such course using the same general course description as defined in the Common Course Library.

Expanding the scope of the research beyond a single community college will address some of the limitations of this study, including additional availability to community college faculty and high school guidance counselors. Furthermore, researchers could make comparisons between the various community colleges and school systems throughout the state.

Researching similar efforts in other states offering a similar course will also expand the scope of the investigation. Although the course may not have the same description, researchers can locate courses with similarities in learning objectives in order to make comparisons. This approach will greatly expand the availability to stakeholders involved in the programs.

Utilizing one course and expanding the research across the state and country are but two avenues to attempt to fill in the gap in the knowledge base. Adding an additional course(s) in different disciplines to the existing study would allow researchers to determine how high school students performed in a variety of disciplines in an online college environment. Researchers could expand this concept across the state and country to incorporate a wide range of disciplines.

Expanding the scope of the research to multiple disciplines is an excellent way for researchers to assess outcomes based upon grade performance; however, I also investigated how demographics played a role in this study. This study only examined the characteristics of gender and race/ethnicity in the dataset. Future research considerations should include additional confounding variables that may influence performance in an online environment. These additional characteristics could be unique to the secondary students and/or the postsecondary students. Some of the additional characteristics that should be considered are age, outside responsibilities, marital status, employment status, number of children, technology self-efficacy, and motivation.

One area of interest that emerged in regards to demographics in this study was that the number of minority high school students in this study (22) was a much smaller than the number of minority traditional community college students (50), although there was not a large discrepancy between the total number of students in each category. I did not investigate this outcome in the literature, but a future research consideration would be to determine if this outcome is common or an anomaly in other settings. If an anomaly, additional research could determine why this particular set of high school students had

such a small percentage of minority students. Any discrepancies could be due to the underlying student population or other contributing factors.

Separate from overall demographics and comparisons between the high school students and traditional community students, an additional future research consideration would be to focus solely on the high school students taking the online courses. By doing so, researchers can make comparisons among the specific demographics of the high school students. For example, researchers could use the age or classification (freshman, sophomore, junior, senior) of the high school student in determining if there were differences in grades between ages or classifications.

In addition to more complex quantitative data analysis, I believe additional qualitative data analysis would provide additional rich information. Although I did not interview any high school students in this study due to the lack of availability, a future research consideration would be to interview actual high school students taking online college courses. Researchers could gather a great deal of information by interviewing the high school students themselves to gain their own unique perceptions concerning taking online college courses. An even more enlightening study would be to track the high school students into college and interview them once again after they have taken an online course while in the college environment.

The high school students in this study had dedicated time to work on their LEO course during the normal school day. During this time, a facilitator monitored them. Due to my background, I believe there were varying degrees of human support of the students by the facilitators. A future research consideration would be to interview the facilitators at each school to find out their level of interaction with the students, and determine if the

interaction had any influence on the performance of the students. Broadening the scope across the state and country, researchers could conduct surveys to find out if other school districts utilize facilitators while students are working on online courses, and the role of such facilitators in the educational process.

In addition to investigation of the facilitators, the literature shows that guidance counselors play a key role in assisting students in selecting courses while in high school. The literature also questions whether guidance counselors have the proper training to assist students in selecting advanced courses. Because guidance counselors play such an important role in the educational process of each student, a future research consideration would be to investigate current training criteria for guidance counselors in school systems today.

The literature also suggests that most college instructors are subject-matter experts and have had no formal training in teaching methodology. Furthermore, these instructors have adapted to the learning styles of adults through experience. Although not directly connected to the core components of this study, a future research consideration would be to investigate the background of college faculty in regards to teaching methodology. If the current online course delivery trend continues, and additional secondary students are allowed to take online college courses, there will need to be a shift in professional development at the postsecondary instructional level. There should be a baseline of data from which to begin the professional development.

Because there is a definite gap in the knowledge base concerning high school students taking online college courses, this study only begins to contribute to the literature. Researchers should explore and investigate any facets concerning high school students

taking online college courses in order to fill in the gap in the knowledge base on this topic. What do we need to ask ourselves to begin this process? I believe we begin by asking what is in the best interest of our students. As a 30-year veteran of the community college system, I fully understand that my future will be dependent upon the students of today. We owe it to ourselves, and future generations of learners, to properly investigate new educational endeavors and consistently place students in the optimal situations in which they will succeed.

Conclusion

Technological and policy advances over the last decade have allowed the expansion of online learning in the secondary education environment to become unprecedented (Clark, 2001; Means et al., 2010; Smith et al., 2005; Watson, 2005; Watson et al., 2012). According to Molnar et al. (2013), the expansion in online learning in the secondary education environment has far outpaced research conducted on the impact of teaching and learning in the online secondary environment. Molnar et al. (2013) state, “To date, claims made in support of expanding virtual education are largely unsupported by high quality research evidence” (p. iv).

The purpose of this sequential mixed methods study was to analyze the performance and demographics of the high school students and traditional college students taking an online entry-level college technology course. In addition, the study explored the roles and perceptions of the stakeholders (community college faculty and high school administrators involved the LEO program) concerning the high school students taking the course. Furthermore, the ultimate goal of this study was to begin to fill in the gap in the literature concerning high school students taking online college courses. I feel the

conceptual framework used for this study derived from my theoretical framework, my background as a community college faculty member and administrator, my experience in online distance education, and the literature surrounding secondary education in the online environment, coupled with the utilization of mixed methods produced enlightening results.

This study found that high school students outperformed traditional college students in an online entry-level technology course during the Fall 2007 – Fall 2011 semesters in the LEO program with statistical significance. However, after calculating the effect size, there was only a small practical significance to the result. Furthermore, this study found that the high school students also outperformed the traditional college students when controlling for the effects of race/ethnicity and gender with statistical significance. Although after calculating the effect size, there was a moderate practical significance to the result.

Interviews of the stakeholders (community college faculty and high school guidance counselors) revealed that their perceptions of how well the high school students would perform when compared to the traditional community college students coincided with the actual results. The majority of the stakeholders believed that the high school students would perform better than the traditional community college students would perform, and the results proved the stakeholders correct. Furthermore, the stakeholders acknowledged that community college students were not afforded dedicated technology resources, adult facilitators, nor the time the high school students were afforded. The outcome of the qualitative analysis suggests that the differences in the environments between the high school students and traditional community college students may be a contributing factor as to why the high school students performed better than the traditional

community college students performed. The qualitative analysis also suggests the dedicated environment afforded to the high school students may also be a contributing factor as to why the withdrawal rate for traditional community college students within this study was approximately 50% higher for the traditional community college students than for the high school students.

I agree wholeheartedly with Molnar et al. (2013) that there needs to be an additional amount of high quality research conducted regarding online education today. The results of this study can begin to inform the literature in regards to high school students taking online college courses. The results of this study can also begin to assist educational policy makers throughout the country in making decisions and implementing policy that will contribute to the success of high school students taking online college courses.

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Appendix A: Gaston College Permission Document

Letter of Agreement

April 3, 2014

To the Appalachian Institutional Review Board (IRB):

I am familiar with William Mark Shellman's research project involving high school students taking online college courses. I understand the involvement of Gaston College to be two-fold. First, Gaston College will allow faculty within the college that taught high school students online to be interviewed. Second, Gaston College will allow internal data collected in support of our Quality Enhancement Plan for SACS to be used in Mr. Shellman's dissertation to assist Gaston College in determining the best format in which to offer future courses to high school students. This data will be provided in an archived anonymous form.

As Mr. Shellman conducts this research project I understand and agree that:

- This research will be carried out following sound ethical principles and that it has been approved by the IRB at Appalachian State University.
- Employee participation in this project is strictly voluntary and not a condition of employment at Gaston College. There are no contingencies for employees who choose to participate or decline to participate in this project. There will be no adverse employment consequences as a result of an employee's participation in this study.
- To the extent confidentiality may be protected under State or Federal law, the data collected will remain confidential, as described in the protocol. The name of our agency/institution may be reported in the results of the study.

Therefore, as a representative of Gaston College, I agree that William Mark Shellman's research project may be conducted at our agency/institution, and that William Mark Shellman may assure participants that they may participate in interviews and provide responsive information without adverse employment consequences.

Sincerely,



Dr. Don Ammons
Vice-President of Academic Affairs, Gaston College

Appendix B: Gaston County Schools Permission Document

Letter of Agreement

December 18, 2013

To the Appalachian Institutional Review Board (IRB):

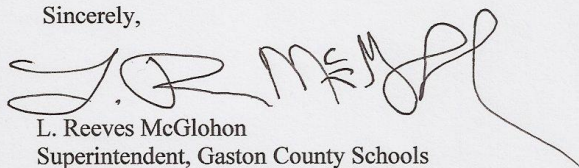
I am familiar with William Mark Shellman's research project involving high school students taking online college courses. I understand the involvement of Gaston County Schools to be allowing employees within the school system involved with the high school students to be interviewed. The types of employees at each high school where students are taking online college courses could be the principal, counselors, facilitators, etc., any employee interacting with students taking the online college courses.

As Mr. Shellman conducts this research project I understand and agree that:

- This research will be carried out following sound ethical principles and that it has been approved by the IRB at Appalachian State University.
- Employee participation in this project is strictly voluntary and not a condition of employment at Gaston County Schools. There are no contingencies for employees who choose to participate or decline to participate in this project. There will be no adverse employment consequences as a result of an employee's participation in this study.
- To the extent confidentiality may be protected under State or Federal law, the data collected will remain confidential, as described in the protocol. The name of our agency/institution may be reported in the results of the study.

Therefore, as a representative of Gaston County Schools, I agree that William Mark Shellman's research project may be conducted at our agency/institution, and that William Mark Shellman may assure participants that they may participate in interviews and provide responsive information without adverse employment consequences.

Sincerely,



L. Reeves McGlohon
Superintendent, Gaston County Schools

Appendix C: Interview Questions Informed by the Conceptual Framework

1. Tell me a little bit about yourself and your background in education.
2. Prior to the LEO (Learn and Earn Online) program being implemented in the fall of 2007, what has been your involvement in distance education? This could have been as an educator or a student.
3. Describe for me, in your own words, what you believed to be the main initiative of the LEO program.
4. What involvement did you have with the LEO program?
5. What was your overall perception of the LEO program? Please address any advantages and/or disadvantages you saw for the students.
6. Do you feel the LEO program functioned well from an administrative point of view? Were there any components/links that needed addressing in your opinion?
7. What types of interactions have you had with LEO students? Please feel free to share positive and/or negative interactions.
8. What are your perceptions of the students taking LEO courses? Do you feel the students are adequately prepared to take LEO courses?
9. Are there any other facets of the LEO program that you would like to comment on or discuss?

9B – (For Guidance Counselors Only)

What was the setup in the high school for the high school students taking the college courses? My understanding was that they had dedicate time and a dedicate place during the school day to do their work. Is that correct?

10. Do you anticipate the high school students would perform better/worse/equivalent to the community college students? Why?

<< The outcome of the quantitative analysis is shared with the participant >>

11. Were you surprised at the results of the quantitative analysis? Why?
12. Do you feel this type of program would be beneficial going forward?

Vita

William Mark Shellman was born in Gastonia, North Carolina, to Milton Spry Shellman and Shelba Jean Packard Shellman. He graduated from South Point High School in Belmont, North Carolina in May 1979. The following fall, he entered North Carolina State University in Raleigh, North Carolina to study Nuclear Engineering. During his tenure at North Carolina State University, he changed majors to Computer Science. In May 1984, he was awarded a Bachelor of Science degree in Computer Science. In 1990, Mr. Shellman enrolled into the graduate program in Computer Education at Barry University in Miami Shores, Florida. In 1992, he was awarded a Master of Science degree in Computer Education. In 2004, Mr. Shellman enrolled into the Education Specialist degree program in Higher Education at Appalachian State University in Boone, North Carolina. In 2006, he was awarded an Education Specialist degree in Higher Education. In 2007, Mr. Shellman commenced work toward his Ed.D. in Educational Leadership at Appalachian State University.

Mr. Shellman remains active in his local community and volunteers in the local school system and with the local chapter of the American Red Cross. He resides in Gastonia, North Carolina with his wife and two children.