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A Study of Persistence in the Northeast State Community College

Health-Related Programs of Study

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A dissertation

presented to

the faculty of the Department of Educational Leadership and Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor in Education in Educational Leadership

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by

Allana R. Hamilton

May 2011

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Dr. Terrence Tollefson, Chair

Dr. James Lampley

Dr. Jasmine Renner

Dr. Donald Samples

Keywords: Persistence, Retention, Health-Related Programs of Study, Community College

## ABSTRACT

A Study of Persistence in the Northeast State Community College

Health-Related Programs of Study

by

Allana R. Hamilton

The purpose of the study was to identify factors that were positively associated with persistence to graduation by students who were admitted to Health-Related Programs leading to the degree associate of applied science at Northeast State Community College. The criterion variable in this study was persistence, which was categorized into two groups the persister group (program completers) and the nonpersister (program noncompleters) group. The predictor variables included gender, ethnic origin, first- (or nonfirst-) generation-student status, age, specific major program of study, number of remedial and/or developmental courses taken, grades in selected courses (human anatomy and physiology I and II, microbiology, probability and statistics, composition I, clinical I, clinical II), and number of mathematics and science credit hours earned prior to program admission. The data for this *ex post facto* nonexperimental design were located in Northeast State's student records database, Banner Information System.

The subjects of the study were students who had been admitted into Health-Related Programs of study at a 2-year public community college between the years of 1999 and 2008. The population

size was 761. Health-Related Programs of study included Dental Assisting, Cardiovascular Technology, Emergency Medical Technology – Paramedic, Medical Laboratory Technology, Nursing, and Surgical Technology.

A combination of descriptive and inferential statistics was used in the analysis of the data. Descriptive statistics included measures of central tendency, standard deviations, and percentages, as appropriate. Independent samples *t*-tests were used to determine if the mean of a variable on one group of subjects was different from the mean of the same variable with a different group of subjects. It was found that gender, ethnic origin, first-generation status, and age were not significantly associated with persistence to graduation. However, findings did reveal a statistically significant difference in persistence rates among the specific Health-Related Programs of study. Academic data including grades in human anatomy and physiology I, probability and statistics, and composition I, suggested a relationship between the course grade and persistence to graduation. Findings also revealed a relationship between the number of math and science courses completed and students' persistence to graduation.

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## DEDICATION

This work is dedicated to my family and friends who have provided encouragement and support.

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## CHAPTER 1

### INTRODUCTION

The Tennessee Higher Education Commission (THEC) and the Tennessee Board of Regents Higher Education System (TBR) have required within their 2010-2015 strategic plans four priorities – Access, student success, resourcefulness and efficiency, and quality. A goal of the student success priority is enhanced retention and graduation efforts. Therefore, it is the intent of this researcher to study persistence toward graduation in a selected program of study at Northeast State Community College (NeSCC). Northeast State Community College provides programs of study leading to the associate of arts (A.A.), associate of science (A.S), and associate of applied science (A.A.S.) degree as well as programs leading to academic and technical certificates. The A.A.S degree programs provide students both general education and discipline-specific courses that will prepare them to become skilled workers in their respective vocations. Within the academic areas at Northeast State, the College provides health-related curricula designed for students who wish to receive their Associate of Applied Science degrees at a community college prior to entering the workforce. This researcher attempts to identify reasons why students majoring in Health-Related Programs of study at Northeast State Community College do not complete their programs of study and graduate with Associate of Applied Science degrees.

The American Association of Community Colleges (AACC) reported in 2010 that students who attended community colleges had unique needs and goals when compared to students who attended 4-year colleges and universities. Students often encountered challenges of balancing home, work, and school responsibilities. Historically, students attending community colleges have been less likely than students attending 4-year colleges and universities to persist to graduation, due to these various challenges (Hoachlander, Sikora, & Horn, 2003). Community

college faculty, staff, and administrators should have an awareness of such challenges and their likely effects upon student persistence to graduation. However, it is necessary to understand such challenges to increase retention and persistence to graduation among students majoring in health-related majors at a community college.

The education, retention, and completion rates of students majoring in Health-Related Programs of study are a global, state, and regional concern. Institutions are faced with the challenge of graduating students while ensuring the graduates are competent to pass required licensure examinations and function in an ever-changing and diverse health care environment (Glossop, 2001). Health care shortages are not new to the United States or Tennessee. Buerhaus, Staiger, and Auerbach (2003) reported that the then-current shortage in nursing and other Health-Related Professions had been going on for several years and projected the shortage would continue. Models have also been developed to project healthcare workforce needs. For example, the Nurse Demand Model was created by the U.S. Department of Health and Human Services as a means of providing data and projecting healthcare workforce needs (McKenzie, 2008). Regional models have also been developed by the two major health care systems in East Tennessee - Mountain States Health Alliance and Wellmont Health System (personal communication, December, 2010). Both systems have identified short-term and long-term needs and concerns and have submitted information to administrators and program directors at Northeast State Community College for selected Health-Related Programs of study regarding projected retirements and future workforce needs. The College is also working with public and private colleges and universities to ensure degree pathways from the associate level to the baccalaureate level. A gap analysis in selected majors of study, including Health-Related Programs, was conducted in December 2010 by four higher education institutions to identify

potential “gaps” in higher education in the East Tennessee region. Currently, the four institutions are researching these “gaps” and conducting needs assessments, as appropriate, to ensure that the region will have a trained workforce. Therefore, it is essential that institutions provide general knowledge and skills to students for their own satisfaction and to enable them to obtain and succeed in jobs requiring high levels of knowledge and skill. Institutions also have a responsibility to provide employers a qualified workforce and to support economic development and continuing education activities to meet the needs of business, industry, and government, thus, the importance of student retention and persistence.

#### *Statement of the Problem*

The purpose of this study is to identify factors that have been positively or negatively associated with persistence to graduation by students who were admitted to health-related associate of applied science programs at Northeast State Community College. President Obama has asked that community colleges increase the number of graduates (program completers) by 5 million students over a 10-year period (Obama, 2009). Former Governor Phil Bredesen and Governor Bill Haslam have also prioritized the completion of certificates or degrees within the state of Tennessee. As a result of the national and state emphasis on higher education, the Tennessee Higher Education Commission and the Tennessee Board of Regents have embedded within their 2010-15 strategic plans an emphasis on program completion. Such variables as demographics and academic data have been found to be key indicators related to student persistence and success (Phillips, Spurling, & Armstrong, 2002).

### *Research Questions*

The study is guided by the following research questions:

1. Is there a difference between male and female students regarding their persistence to graduation?
2. Are there differences among students of different ethnic origins regarding their persistence to graduation?
3. Is there a difference between first-generation students and non-first-generation students regarding their persistence to graduation?
4. Are there differences in students' ages at the point of program admission regarding their persistence to graduation?
5. Are there differences among students in varying health-related professions programs of study (cardiovascular technology, dental assisting, EMT-Paramedic, medical laboratory technology, nursing, surgical technology) regarding their persistence to graduation?
6. Is there a difference between students who took one or more remedial and developmental courses and students who did not take a remedial and developmental course regarding their persistence to graduation?
7. Is there a relationship between students' course grades in human anatomy and physiology I and II courses and their persistence to graduation?
8. Is there a relationship between students' course grades in microbiology and their persistence to graduation?
9. Is there a relationship between students' course grades in the required mathematics course (Probability and Statistics) and their persistence to graduation?

10. Is there a relationship between students' course grades in composition I course and their persistence to graduation?
11. Is there a relationship between the number of mathematics and science courses that students completed prior to their program admission and their persistence to graduation?
12. Is there a relationship between students' course grades for clinical I and clinical II and their persistence to graduation?

*Research (Null) Hypotheses*

The following null hypotheses were developed and tested based upon the research questions:

- H<sub>0</sub>1. There is no difference between male and female students regarding their persistence to graduation.
- H<sub>0</sub>2. There is no difference between students of differing ethnic origins regarding their persistence to graduation.
- H<sub>0</sub>3. There is no difference between status as a first-generation students and non-first-generation students regarding their persistence to graduation.
- H<sub>0</sub>4. There is no difference between students' age at the point of program admission regarding persistence to graduation.
- H<sub>0</sub>5. There is no difference between students' major programs of study regarding persistence to graduation.
- H<sub>0</sub>6. There is no difference between students' taking one or more remedial or developmental courses and students not taking a remedial or developmental course regarding their persistence to graduation.
- H<sub>0</sub>7. There is no relationship between students' course grade in human anatomy and physiology I and II courses and persistence to graduation.

H<sub>0</sub>8. There is no relationship between students' course grade in microbiology and persistence to graduation.

H<sub>0</sub>9. There is no relationship between students' course grade in the required mathematics course (Probability and Statistics) and persistence to graduation.

H<sub>0</sub>10. There is no relationship between students' course grade in composition I and persistence to graduation.

H<sub>0</sub>11. There is no relationship between number of mathematics and science credit hours completed prior to program admission and persistence to graduation.

H<sub>0</sub>12. There is no relationship between students' course grades in clinical I and clinical II and persistence to graduation.

#### *Significance of the Study*

The significance of this study is that it should enable us to use the data collected to improve student retention within the health-related majors, thus improving graduation rates among health-related majors at the College. Leaders of Health-Related Programs are faced with the challenge of providing qualified graduates for entry into the workforce to meet workforce development needs. The researcher seeks to identify factors (predictors of academic success) that are positively associated with persistence to graduation by students who are admitted to health-related associate of applied science degree programs at Northeast State Community College. The results may be used as a tool to improve institutional processes such as academic advising and in various support services in the division of Health-Related Professions. Information may be used to develop intervention strategies that would increase retention in the program of study, which may result in persistence to graduation.

### *Delimitations and Limitations*

1. The study is delimited to the population of students who were making their first attempts at completing Health-Related Programs in a public Tennessee Board of Regent community college.
2. The study does not include consideration of students who entered health-related professions with postsecondary degrees or previous type of licensure or certification.
3. The study does not recognize that preclinical academic data may vary should students transfer into the program course grades not completed at Northeast State Community College.
4. The study does not address variations in grading scales and grading inflation.
5. The study does not address variations in teaching styles of specific instructors.
6. The study does not address variations in faculty teaching experience.
7. The study does not address faculty turnover rates.
8. The study is delimited to the health-related professions student population at Northeast State Community College; therefore, the results may not be generalized to other populations.
9. The study is limited by the fact that some variables were self-reported by the students including gender, ethnic origin, first-or non-first-generation status, and age.
10. The study may reflect my personal biases due to my professional experience as Vice President for Academic Affairs at Northeast State Community College.
11. The study does not differentiate between full-time and part-time students in preclinical coursework.
12. The study does not differentiate between entrance requirements for the different Health-Related Programs of study.

13. The study does not control for any Student Affairs functions (e.g. advising, counseling, tutoring) during the students' college experience.

#### *Assumptions*

1. The grades assigned are based on the evaluation criteria described on each course syllabus.
2. The data collected on all students are accurate.

#### *Definitions*

1. Associate of applied science degree program – “a program for individuals who desire to enter a specialized occupational career immediately after graduation. The degree program is a terminal 2-year undergraduate degree that is approximately 60 credit hours in length” (Northeast State Community College, 2010, p. 13).
2. Community college – an institution that is accredited to award the associate degree and may also award selected baccalaureate degrees (American Association of Community Colleges, 2010 ).
3. Cumulative grade- point average (GPA) - a measure of average scholastic success obtained by dividing the number of grade points earned by the total number of hours of coursework. (Northeast State Community College, 2010).
4. Grades are based upon a 4.0 quality point system: A = 4.0, B = 3.0; C = 2.0; D =1.0 and F = 0.0.
5. Demographic data –information regarding gender, ethnic origin, first or non-first-generation status, age at the time of program admission, and specific health-related major.
6. Preclinical data – Data concerning remedial and developmental education courses and general education courses required of all health-related students. The courses include

remedial and developmental courses, human anatomy and physiology, microbiology, composition I, and probability and statistics.

7. Clinical data – Data concerning health-related specific courses that combine theory and clinical practice.
8. 14<sup>th</sup> day data – the census date for community colleges in the TBR system indicating official enrollment data.
9. Full-time student – a student who registers for 12 or more course credit hours per academic term (Northeast State Community College, 2010).
10. Health-related program of study – a program of study that provides instruction in Cardiovascular Technology, Dental Assisting, Emergency Medical Technology, Medical Laboratory Technology, Nursing, and Surgical Technology (Northeast State Community College, 2010).
11. Nontraditional student –an individual who does not immediately enroll in college after high school graduation, is married, is a parent, is 22-years-old or older, is enrolled part-time more than two semesters consecutively, and/or obtains a General Education Diploma (Horner, 2007).
12. Nonpersister (program noncompleter) – A student who does not graduate with an associate degree.
13. Persister (program completer) – A student who does graduate with an associate degree.
14. Postsecondary education – education that occurs after the completion of a high school diploma (Glossary of Terms, n.d.).
15. Remedial-Developmental Education – “courses (e.g. Writing, Mathematics, Reading, and Learning Strategies) designed to assist academically underprepared students to acquire basic

academic skills necessary to complete successfully the higher level developmental studies courses and college-level courses” (Northeast State Community College, 2010, p. 15).

16. Retention – Student persistence from one term to the subsequent term. The re-enrollment of students through the completion of a college degree (National Center for Educational Statistics, 2011).
17. Traditional student – an individual under 21 years old who enrolls continuously from the first term until completion of the program (Horner, 2005).
18. Withdrawal – A release from the enrollment in all classes (Northeast State Community College, 2010).

#### *Overview*

Chapter 1 contains an introduction to the study that includes the importance of the study as well as the research questions and hypotheses, delimitations and limitations, assumptions, and definitions of terms. Chapter 2 provides a review of literature designed to describe pertinent information and issues related to the study. Chapter 3 identifies the research design and methods. Chapter 4 presents research findings and analyses presented in summary data tables and provides narrative explanations. Chapter 5 discusses the findings, conclusions, recommendations for research, and recommendations to improve practice.

## CHAPTER 2

### LITERATURE REVIEW

#### *Introduction*

According to a report published by the National Center for Education Statistics called *Special Analysis 2008*, p. 10,

Given the great diversity of community college students, their varying reasons for attending community colleges, and their different levels of commitment, and analysis of their different levels of commitment, any analysis of community college students – especially one that looks at their access to postsecondary education and their persistence and attainment once enrolled is complicated.

Based upon December 2009 data, there were 1,173 community colleges in the United States with a distribution of 987 public, 155 independent, and 31 tribal community colleges. Fall 2007 head count enrollment was 11.8 million with an average age of 28 (American Association of Community Colleges, 2010). *Community College Week* reports that TBR community colleges have nearly 100,000 students registered for classes during fall 2010 semester (Community College Week, page 10). Since the inception of community colleges in the early 1900s, the core function of community colleges has been to provide academic coursework and programs leading to associate degrees. These degrees prepare students for transfer for further study at a 4-year college or university or prepare students to entry into the workforce. However, the role of community colleges has changed and is continuing to change to be more responsive to the needs of business, industry, government, and the community. In addition to granting associate degrees (and some selected bachelor degrees), community colleges also have the responsibility for vocational preparation and education, workforce development, customized course offerings to meet the needs of employers, and providing other programs and services upon request (Kasper, 2003).

A review of literature to ascertain information about student persistence found numerous studies regarding retention and student persistence. Some research was more general in that the topics were focused on student retention and persistence regardless of the institution, while some topics addressed factors within selected institutions. In addition to studies conducted by states, educational systems, and institutions, it was also revealed numerous foundations and associations dedicated to improving persistence and graduation rates.

Bean and Metzner (1985), Braxton, Sullivan, and Johnson (1997), Grimm and Yarnold (2001), Horn (1998), McArthur (2005), Pascarella and Terenzini (1991), Peter and Rooney (2002), Phillips and Preston (1993), Skahill (2002), Spurling and Armstrong (2002), Spady (1971), and Tinto (1993) are among the many who have researched and provided frameworks in regard to retention and student persistence. Durkheim (1951) and Spady (1971) provided a framework for researchers such as Bean, Metzner, and Tinto in that they revealed social difficulties (such as suicidal individuals) may impact students' social systems. Although Durkheim's research was on suicide rather than student retention, Spady incorporated components of Durkheim's conclusions into his research as related to the role of social structure and the impact of the structure on the retention process. Tinto (1993) used demographic, psychosocial, and institutional factors as predictor variables to study in relationship with students' persistence in college. Preston (1993) further defined these "stopouts" as community college students who were over the age of 21, attended college on a part-time status, and enrolled as their schedules permitted. Preston used the word "non-traditional" in describing this group of students. Horn (1998) identified individuals who did not persist as a result of their work, family, or financial situations as "stopouts" or "stayouts". Peter and Rooney (2002) later reported that

the attrition rates within community colleges were higher than those of 4-year colleges and universities.

Braxton et al. (1997) validated Tinto's 1975 foundational theory to support 5 of the 13 primary factors that may have affected students' commitment to institutions. The five factors included socioeconomic status, parental educational level, students' academic ability, race, and gender. In 2001 Skahill suggested that in addition to the foregoing five factors commuter students were less likely to persist than were residential students. Bean and Metzner (1985) added to Tinto's model to reveal that factors associated with such classifications as *non-traditional students* and *minority students* may be considered to identify them as "at-risk" students in that these variables may have created an environment that did not allow them to persist. This environment may be strong enough to require the student to "stop-out".

Grimm and Yarnold (2001) reported that persistence must be explained through a multivariate approach so that the study distinguishes relationships between and within the numerous variables. They suggested that while studies have been conducted using ANOVA, Chi-square, and t-tests that a multivariate approach will better explain relationships. McArthur (2005) further noted the numerous barriers of a community college student and the relationship between these barriers and student success. The Community College Survey of Student Engagement (2008) revealed characteristics of community college students as students attending part-time; students working while attending college; students lacking financial support; students supporting a family while attending college. Although the national survey results may be skewed in that the information is self-reported by the student, it does provide information as to a profile of a community college student.

There is an overabundance of research that has been conducted at four-year colleges and universities; however, the results of this research may not be generalized to the community college student as the community college student varies in factors such as demographics when compared to the university student (Hoachlander et al., 2003). For example, Pascarella and Terenzini's (1986, 1991) studies involved student retention and persistence at 4-year colleges and universities. The work of Astin (1993), Tinto (1993), Bean and Eaton (2001-2002), and Stage (1988) were also conducted at 4-year colleges and universities. Studies have been conducted on demographic variables, social integration, and academic integration for more than 30 years. While numerous studies have been conducted on first-time freshmen at the community college, including community college students in the TBR, few studies have been conducted on specific programs of study within the community college. Apple (2002) studied student grade distribution data and grade-point averages of TBR associate-degree nursing programs as related to program completers and success on the national licensure exam (NCLEX-RN). Horner (2005) researched persistence in associate-degree nursing programs within one specific TBR community college to find a 66.57% persistence rate between 2000-2004. Within the study, Horner analyzed 28 variables such as demographic, preclinical, and clinical variables. Graybeal (2007) investigated 15 attributes of first-time full-time freshmen and their associations with retention within one TBR community college. Although some of the attributes investigated by Graybeal such as age, ethnicity, and first-generation status were included in this study, the population was different in that Graybeal's study focused on first-time full-time freshmen who may or may not have declared a major. This study focused on students who had declared health-related professions as their major and was focused on their completing their identified program of study.

McKenzie (2008) examined predictors of academic success in a nursing program at a 2-year public technical college. The variables examined included GPA in nursing courses and general education courses, age, gender, assessment test scores, and number of quarter hours between completion of general education courses and entry into the nursing program. This study consisted of a population size of 450 students who were accepted into a Licensed Practical Nursing (LPN) program. Of the 450 students, 304 students completed the nursing program to receive a diploma. The study revealed that variables such as GPA in natural science (e.g anatomy) and social science courses and age had a statistical significance on program completion. Other variables such as gender, GPA in nutrition and nursing theory courses, and time between completion of general education courses and entry into the nursing program had no statistical significance on program completion.

Although student persistence has been and continues to be of interest and concern to institutions of higher education, the increase in students attending community colleges within the past 5 years as well as the increased interest in retention and graduation rates has resulted in community colleges' researching and implementing a variety of retention initiatives. One initiative within the TBR has been the Developmental Studies Redesign Project, which began in 2006 and has resulted in redesigning developmental education in Tennessee. While the project had several goals, one goal was to improve student learning outcomes and completion rates in developmental education. Students successfully completing developmental education would provide more students entering college-level courses and programs of study, which would hopefully lead to an increase and improvement in student persistence and graduation rates. As a result of the various goals within this project including student persistence, the project was supported by the Fund for the Improvement of Postsecondary Education (FIPSE) and the

National Center for Academic Transformation (NCAT) (Tennessee Developmental Studies Redesign, 2010). While the Tennessee Developmental Studies Project has received national recognition, there are various programs of studies currently reviewing their programs with an emphasis on student persistence and program completion. One such program currently undergoing a redesign is the Tennessee Emergency Medical Services program – EMS education. Tennessee community colleges are reviewing and revising their EMS programs of study to comply with the national mandates. One component of the review is how to design the program so that more students graduate with a certificate or degree (personal conversation, Don Coleman, February 15, 2011). With the Tennessee legislative mandate to improve Tennessee’s graduation rates, it is essential students persist to graduation; therefore, the result is the exploration of student persistence initiatives among TBR institutions. Administrators, program directors, and faculty are analyzing their programs of study to determine potential areas whereby changes can be made or initiatives may be strengthened to improve program completion.

A 2006 National Center for Education Statistics study classified students attending community colleges in 2003-04 into three commitment levels: “more committed,” “less committed,” and “not committed” Based upon the analysis, community college students were classified as “more committed” (Horn & Nevill, 2006). In an address at Syracuse University titled “Student Retention: What Next”, Vincent Tinto explained how culture, social, and institutional factors may have affected student retention. He discussed the influences of communities, institutional settings, and the various complexities associated with retention. Tinto’s retention model, *The Student Integration Model*, was designed to help institutions understand why students did not persist. The institutions would apply the Model to their institution for the purpose of knowledge acquisition, research, and continual improvement

(Tinto, 1993). If an institution can understand why students leave the institution, the institution then can design and implement strategies to retain the students. For decades researchers such as Braxton, Johnson, McClendon, Pascarella, Terenzini, Strauss, Sullivan, and Volkwein have been expanding Tinto's model of student departure (Astin, 1993). Those researchers have provided groundwork for research in developing an understanding of students' decisions to persist or to not persist (Hossler, 2008). Therefore, with the increased enrollments in community colleges and increased mandates to increase graduation rates, factors relating to student persistence should be researched in an effort to identify connections and gaps so that institutions (e.g. community colleges) can affect student success.

As the United States experiences shortages of healthcare workers, higher education institutions are tasked with the challenge of producing more health graduates. According to the Southern Regional Education Board (SREB), the graduation rates of SREB states have been below the national averages at public 4-year and 2-year colleges and universities. Fifty-two percent of students in the SREB region enrolled in 2001 graduated by 2007. The national rate was 55% (Southern Regional Education Board, 2010). Consequently, national foundations and organizations, governments, and business and industry are supporting initiatives to increase access, student persistence, and graduation rates. A goal of these various initiatives is to produce more graduates who are prepared to enter the workforce. Bailey (2005) from the Lumina Foundation for Education is supporting various persistence efforts. As noted in a report titled *Paths to Persistence*, the Lumina Foundation outlined an analysis on increasing persistence and completion at community colleges. The analysis focused on four practices:

1. Advising, counseling, and mentoring,
2. Learning communities,

3. Developmental education, and
4. College-wide reform.

The findings indicated that institutions should conduct research initiatives as a college and within specific programs of study to address the four practices. By focusing on the four practices, administrators, program directors, and faculty could better understand strengths, weaknesses, and threats to the college-at-large as well as specific programs. Through review and revision of institutional policies and practices, implementation of corrective actions, and continued analysis, it was projected that retention and completion will improve.

#### *National Initiatives*

Kolowich (2010) reported the Bill and Melinda Gates Foundation has launched several initiatives related to college enrollment and completion rates. Initiatives include, but are not limited to, increasing technology as a tool to assist students in completing a program of study, funding online learning projects to improve retention and learning, improving current technologies on college campuses, developing new forms of interactive learning (e.g. gaming), and investing in research and best practices aimed at providing policy makers and educators information to make effective decisions. Pennington, who helps direct the Gates Foundation's postsecondary initiatives, stated "Getting students to college isn't enough – we must help them get through college. We are proud to join other foundations that are already working on this important effort" (Kolowich 2010, p. 1).

The National Academic Advising Association (NACADA) continues to research and support student retention, persistence, and graduation initiatives. Habley (1994), Nutt (2010), and Tinto (1987) noted the importance of academic advising and the relationship between advising and retention on college campuses. Nutt, NACADA Executive Director, incorporates retention and

persistence topics within the Center's projects, activities, and publications. Institute and workshop sessions include persistence topics related to all students enrolled in postsecondary institutions, discipline-specific programs of study, and strategies to connect academic planning, career goals, and program completion. For example, strategies such as group advising sessions and discipline-specific professional advisors are recommended for students majoring in Health-Related Programs of study. Students within Health-Related Programs have been found to want one-to-one connections with advisors, but they also have benefited from group sessions in that the group sessions provide them a connection with college personnel as well as with students majoring in similar majors.

The College Board, a nonprofit association, consists of 5,600 schools, college, universities, and other educational organizations whose mission is to increase college access and student success (College Board Advocacy, 2009). A project supported by the Board is the Project on Academic Success (PAS), which has developed policies and practices associated with persistence in higher education institutions. The project report was based upon findings from a survey of 4-year postsecondary institutions in five states. Variables researched included orientation and early warning programs, faculty and student interaction, academic advising, and the coordination of retention and persistence initiatives on college campuses. The findings revealed that while institutions engage in retention and persistence strategies, the resources to support those strategies are minimal. And, findings revealed that institutions need to gather empirical data regarding persistence, establish benchmarks, and make comparisons with peer institutions.

Administrators, faculty, staff, and citizens of the region should be concerned about students not persisting to graduation in higher education as the decision to leave college impacts not only

the student but the institution, workforce development, the region, and society. Murdock (2004) reported that in 2000 that an individual living in selected cities within the United States with a high school diploma had an annual income of \$44,068, an individual with a bachelor's degree had an annual income of \$80,327, and an individual with a graduate or professional degree had an annual income of \$104,294. It should be noted that these income amounts do not accurately reflect annual income levels in the state of Tennessee. In addition to differences in income levels, workforce development initiatives are also impacted by the inability to find qualified healthcare workers. Horner (2005) reported the U.S. Bureau of Labor Statistics estimated "that more than 1.0 million additional nurses will be needed by the year of 2010." While there is adequate research with academic performance with nursing programs, research in other areas of Health-Related Programs at the community college level may be limited. As noted by Simmons, Haupt, and Davis (2001) most of the research in nursing has focused on success rates on licensure examinations; however, there has been a shift to success rates in academic coursework.

As the United States experiences shortages of healthcare workers, higher education institutions are tasked with the challenge of producing more allied health graduates. Additionally, President Obama has asked that community colleges increase the number of graduates and program completers by 5 million students over a 10-year period (Obama, 2009). Therefore, community colleges are finding it necessary to develop plans to help guide efforts leading to student persistence not only as an institution but in discipline-specific majors of study. Various efforts are supported at national, state, regional, and local levels of education, government, and business and industry. The national nonprofit organization, Achieving the Dream: Community Colleges Count, is a national initiative to help community college students succeed. The nonprofit organization is sponsored and funded by the Lumina Foundation for

Education and several national organizations including, but not limited to, the American Association of Community Colleges and the Community College Leadership Program at the University of Texas-Austin (Achieving the Dream, 2011). Efforts to increase graduate rates have been supported by the legislative act, Complete College Tennessee Act of 2010. With only 12% of students enrolled as a full-time student in Tennessee public institutions of higher learning attaining an associate degree within 3 years, it was determined by various stakeholders and agencies that Tennessee needed to improve its higher education completion rates. Therefore, it is the intent of the Act to improve college completion rates (Tennessee Higher Education Commission, 2010). During the 2010-11 academic year, TBR community colleges and universities have been working on implementing the various mandates within the Act as well as within the *TBR 2010-15 Strategic Plan*.

#### *State and Institutional Initiatives*

The Northeast State Community College *2010-15 Strategic Plan* includes a student success goal to promote student success through enhanced retention, graduation, and career-development efforts. Three objectives within Goal 2 pertain to enhancing student persistence to the completion of programs that lead to certificates and/or associate degrees, increasing the number of students who complete postsecondary programs that lead to certificates and/or associate degrees, and developing programs and services to promote persistence to graduation (Northeast State Community College, 2011). Therefore, the faculty and staff within the Health-Related Professions Division are finding it necessary to develop plans to help guide efforts leading to student persistence. The academic dean, program directors, and faculty are required to identify student success initiatives specific to their discipline that will enhance retention and persistence

to graduation. Program directors and faculty continually strive to keep students in courses term after term and implement strategies to ensure student completion of a certificate or degree.

In addition to public higher education institutions in Tennessee, other state community colleges are developing plans and processes to improve graduation rates. California found that approximately 70% of degree-seeking students did not graduate within 6 years or earn a degree or certificate. The study tracked more than 250,000 students who enrolled in a community college during the 2003-04 academic year did not transfer or earn a certificate or degree by 2009. As a result of the study, the state's community college system is committed to increasing completion rates on 112 campuses by developing a system to track student progress and rewarding campuses that help students complete their program of study (Chea, 2010). Between 2006 and 2008, Tulsa Community College conducted more than 100 focus groups with students, faculty, and staff to find that balancing home, work, and school was a major challenge. It was also determined that 3 out of 10 first-time freshmen were placed in developmental reading and writing and 7 out of 10 were placed in developmental mathematics. Therefore, Tulsa Community College has identified student persistence as a priority and has modified the college's freshman orientation class (Strategies for Academic Success) to assist students with specific barriers such as balancing work and home responsibilities, adjusting to college life, and developing student success strategies (McKeon, 2010). And, Ivy Tech Community College (one of the nation's fastest-growing colleges) is focusing on open access and college completion. President Thomas J. Snyder of Ivy Technical Community College says "we need more people through the door, and we need more completers" (as cited in Bradley, 2010, p.7). Community colleges in Indiana experienced an enrollment increase from 94,023 to 113,877 between 2008 and 2009. Snyder and other administrators attribute the increase to the changes in the economy.

Ivy Tech Community College has developed initiatives focused on the nontraditional student population and its academic leaders are reviewing data to reduce waiting lists in the college's high demand programs such as nursing and culinary arts (Bradley, 2010).

### *Demographic Data*

According to the National Center for Education Statistics, community college students have differed from their counterparts who were enrolled in public and private 4-year institutions in terms of age, gender, ethnic origin, and financial dependency or independency from their parents. In 2003-04 the median age of community college students was 24-years and about 59% were female. Although community colleges enrolled predominantly White students in 2003-04, 15% of their students were Black, and 14% were Hispanic (Special Analysis 2008). Data derived in December of 2009 indicated that community colleges enrolled 45% of all Black undergraduate students, 53% of all Hispanic students, and 45% of all Asian-Pacific Islander students. Data also revealed that the average age of all community college students was approximately 28 years and that about 56% were female (American Association of Community Colleges, 2010). The proportion of White students has declined since 2003-04, whereas the proportions of members of other ethnic groups have increased. Because of the community college open-door policy, lower tuition, and ease-of-access, minority (ethnic) numbers have increased within the community colleges (Cohen & Brawer, 2008).

A frequently tested predictor variable for persistence has been age. DeVecchio (1972) reported that there was no significant relationship between students' age and persistence to graduation. Research conducted by Windham (1995) found that persisters tended to be younger and nonpersisters tended to be older. However, some studies show that older students had more responsibilities and yet were more goal-oriented. Lanni (1997) found that age combined with

other variables was associated with attrition and degree completion. A study of health-related students at a community college in Morristown, Tennessee revealed that the mean age of students (females and males combined) who persisted was 25.27 and that the mean age of students who did not persist was 24.58 (Horner, 2005).

Ishitani (2003) found that first-generation students were less likely to persist than students whose parents had attended or graduated from some type of higher education institution such as a community college, college, university, or institute. Thayer (2000) noted that first-generation students have a tendency to attend 2-year colleges rather than 4-year colleges. Ishitani reported that students classified as first-generation students were 71.0% less likely to persist than were students classified as non-first-generation students. Elkins, Braxton, and James (2000) reported that a student with a strong support system was more likely to persist in higher education.

Guilford Technical Community College (GTCC) in North Carolina conducted a study during the fall semester of 2001 to examine the prevalence of demographic risk factors of students as well as factors associated with student success. The purpose of the study was to identify factors associated with student success so college personnel would better understand student persistence and success. Questions were included in three different surveys that were administered to 2,464 students and were designed to gain information related to persistence at GTCC. Students surveyed included a representative sample of then currently enrolled students, students who had attended GTCC for one semester but did not return, and students who had graduated during the 2001-02 academic year. It was the intent of the college to use the study to promote better planning for academic and student services. The survey results revealed factors that often had prevented at-risk students from completing their degrees. Those factors included full-time employment, delayed entry between high school and college, nonattendance in community

college classes, parenthood, and financial barriers; therefore, GTCC developed strategies to assist students as they balanced work, home, and other aspects of life. One strategy was to participate in the Achieving the Dream initiative with an emphasis on improving student success rates of minority and low-income students (Schmid, 2003).

New York City Mayor Michael R. Bloomberg announced in 2007 the investment of \$20 million over a 3-year period in six community colleges to increase graduation rates. The goal was to admit 1,000 low-income, first-generation recent high school graduates or adults who have never attended college. The funding provided services to the six community colleges to ensure the students persist to graduation (Fisher, 2007). According to Hernandez (2009), Mr. Bloomberg's plan has been revised to graduate 120,000 students by 2020 from the six New York City community colleges.

#### *Academic Data*

Community colleges have become more interested in student persistence and graduation as a result of various factors including academic performance in selected courses. Some institutions have identified “gatekeeper” courses within the college curriculum to monitor as these “gatekeeper” courses often have low success rates. While enrollment in community colleges have increased over the past 30 years, the percentage of students completing some form of postsecondary degree or credential has not increased (Hull & Hinckley, 2007). It is often understood by faculty and staff that students may not persist due to their academic performance in both preclinical and clinical coursework, thus retaining students in Health-Related Programs of study has become a challenge for the community college. For example, a 10-year research study at Ivy Tech State College in Indianapolis, Indiana revealed in baccalaureate programs that students who persist in their preclinical coursework may not persist in their clinical coursework

(Lamm, 2000). The study was a 5-year study researching factors that would predict success in practical nursing programs. Data gathered included demographic, academic, and aptitude data. Lamm and McDaniel found college GPA was the most accurate academic predictor of success on the NCLEX – PN exam.

McCabe (2000) reported that 95% of community colleges offered some type of remedial and/or developmental coursework for underprepared students. He found that 41% of students entering community colleges were deficient in one of three areas (reading, writing, mathematics). During the 2005 academic year, 99.6% of all public 2-year colleges offered developmental studies courses (McIntosh & Rouse, 2009). The Strong American Schools (2008) project outlined the lack of academic preparation is a national problem. The report provided information related to both 2-year and 4-year institutions and that the number of students needing remediation varied from state to state. Two-year institutions found that at least 43% of all students had enrolled in at least one remedial or developmental course and 4-year institutions found that at least 29% of all students had enrolled in at least one remedial or developmental course. This lack of academic preparation is present in the state of Tennessee. Former Governor Bredesen addressed Tennessee's lack of academic preparation by stating the state must address the low levels of achievement in Tennessee public high schools (Doniach, 2007). As discussed by TBR Chancellor John Morgan, a recent study indicated that for every 100 students who enter ninth grade in Tennessee, 67 will finish high school, 43 will attend college, and 19 will complete either 2 or 4 years of colleges within 6 years (personal conversation, John Morgan, February 18, 2011).

In a study conducted within the TBR (2005), it was reported that 60% of students enrolled in a TBR community college or university were deficient in at least one developmental studies

course. Yates (2010) conducted a study to determine whether students who entered a community college academically underprepared and were required to take developmental education courses had persisted to graduation at the same rate as students who entered academically prepared for college-level coursework. Her study also examined the number of developmental courses into which a student was placed as related to persistence to graduation. Yates found that there was a significant difference in the 3-year graduation rate for students required to take developmental education courses as compared to students who were prepared for college-level coursework. The study also found the number of developmental courses a student had to complete was related to the 3-year graduation rate. Because students do enter community colleges underprepared for college-level work and test into remedial and developmental coursework, the success rate within a health-related program of study may be lower than students who enter prepared for college-level coursework. Therefore, this study examines the cumulative grade point average for remedial and developmental coursework of students admitted to Health-Related Programs of study to determine if this variable could affect student persistence within the program of study.

Griffiths, Bevil, O'Connor, and Wieland (1995) examined the relationship between grades in anatomy and physiology courses and academic performance in clinical nursing courses. Fowles (1992) reported that successful completion of the NCLEX-RN exam could be predicted by anatomy and physiology grades. Horner (2005) reported that in a 2000-2004 study of associate degree nursing students at Walters State Community College that students with a letter grade of "A" or "B" science courses (anatomy and physiology and microbiology) were more likely to persist than students earning a letter grade of "C". "The persistence rate had a direct relationship with increasing grade averages, with those students who maintained a letter grade of "A" having the highest persistence rate at 86.21%" (Horner, p. 73). In a study group of

baccalaureate nursing students research revealed that GPA in preclinical (or prenursing) and clinical coursework affected program completion. The study found that students who were successful in the preclinical coursework had a higher persistence rate than students who struggled in the preclinical courses (Byrd, Garza, & Nieswiadomy, 1999).

The North Carolina Community College System conducted a comprehensive study of 49 Health-Related Programs consisting of 1,800 students in 1985. Petty and Todd (1985) reported that age, specific admissions tests, and student personal characteristics were positively associated with students' success within the North Carolina Community College System. Programs participating in the study included associate degree nursing, dental hygiene, medical laboratory technology, physical therapy, and respiratory therapy. Each program of study showed each characteristic (age, specific admissions tests, and student personal characteristics) could be used as a predictor to student success. For example, study results revealed a higher rate of student completion among the nontraditional adult learners and second career students. Additionally, Bishop, Blash, Schiorring, and Servan (2003) reviewed practices in California Community College Health-Related Programs and the overall success of students in health programs.

Through their review, they found four themes:

1. Recruitment and retention,
2. Predictors of student success,
3. Teaching and learning strategies, and
4. Collaboration and partnerships.

While complex, they found GPA (high school and college), ACT composite score, ACT natural science subscore, age, gender, number of credits earned at a previous institution, and student personality characteristics all influenced student success in health programs.

CHAPTER 3  
METHODOLOGY  
*Research Design*

This quantitative study analyzed empirically derived relationships within Northeast State's Health-Related Programs of study from the periods of fall 1999 through summer 2010 academic years. The population consisted of students who were admitted into a health-related program of study between 1999 and 2008 inclusive. Because the study examined persistence to graduation factors, the study consisted of data from the period of fall 1999 through summer 2010. The students were identified from institutional census data, which were taken from official class rosters on the 14<sup>th</sup> day of classes during each fall semester. The study design was an *ex-post-facto* nonexperimental design in that possible relationships among researchers cannot be altered by the researcher and the causes have occurred, thus an after-the-fact design (McMillan & Shumacher, 2006).

*Population*

Northeast State Community College is an open-access, public, comprehensive community college and is governed by the Tennessee Board of Regents. The College was founded in 1966 as an area vocational school and in 1970 became a regional center for vocational and technical training. Effective in 1983, Tri-Cities State Area Vocational-Technical School was placed under the Tennessee State Board of Regents and it became a comprehensive community college on July 1, 1990 (Northeast State Community College, 2010). There are seven academic divisions including the division of Health-Related Professions. Within this division are seven programs of study: Cardiovascular Technology, Dental Assisting, Emergency Medical Technology-Paramedic, Medical Laboratory Technology, Nursing, and Surgical Technology. The subjects of

this study were students who began Health-Related Programs of study between 1999 and 2008 inclusive. A specified number of students is accepted into each health-related program each fall semester per academic year to form a cohort. Cardiovascular Technology accepts 20 students each fall semester; Dental Assisting accepts 15; Emergency Medical Technology-Paramedic accepts 15, Medical Laboratory Technology accepts 15; Nursing accepts 70; Surgical Technology accepts 15. Because the Nursing Program is the newest program beginning in 2007-08, the program accepted 34 students during the 2007-08 academic year followed by 70 students per year in 2008-09 and 2009-2010. The population size for this study was 761 students.

#### *Criterion Variable*

The criterion variable in this study was persistence, which was categorized into two groups – persister group and nonpersister group. The persister group was comprised of students who received an Associate of Applied Science degree in a health-related program of study. The nonpersister group was the group that included individuals who did not receive an Associate of Applied Science degree in a health-related program of study within the proposed number of semesters after admittance into a health-related program. Students who were readmitted to any program of study were excluded from this study.

#### *Predictor Variables*

The predictor variables included demographic and academic data. The demographic data were:

1. Gender,
2. Ethnic origin,
3. First-generation student status versus non-first-generation status,
4. Age,

5. Major program of study.

The academic data included for each student were the following preclinical and clinical variables:

1. Students completing one or more remedial or developmental courses,
2. Anatomy and Physiology I and II course grades,
3. Microbiology course grade,
4. Probability and Statistics course grade,
5. Composition I course grade,
6. Number of mathematics and science credit hours earned prior to program admission,
7. First clinical semester and second clinical semester course grades.

#### *Data Collection*

The data for this retrospective study were housed in Northeast State's student information database system, Banner Software System. Because of a change in the system-wide database system for TBR, data were also retrieved from the former student information system (SIS) in addition to the current database system. This system is a state-wide database for the collection and storage of student information within the Tennessee Board of Regents' (TBR) higher education system. Therefore, information for all TBR institutions (e.g. universities, community colleges, technology centers) is housed within the database. The College employs the ABCDF letter grading system based on a 4.0 quality-point scale. Grade- point averages were coded using the 4.0 grading scale.

Following approval by the East Tennessee State University Educational Leadership Policy Analysis Dissertation Committee (October 26, 2010) and the East Tennessee State University

Institutional Review Board (December 2010), the President of Northeast State Community College as well as the Northeast State Institutional Review Board approved this study on December 8, 2010. Subsequently, data for this study were requested on December 9, 2010 to the office of Institutional Effectiveness and were received on December 21, 2010.

### *Data Analysis*

The data were analyzed through selected statistical techniques for the following research questions:

1. Is there a difference between male and female students in regard to their persistence to graduation?
2. Are there differences among students of different ethnic origins regarding persistence to graduation?
3. Is there a difference between first-generation students and non-first-generation students in regard to their persistence to graduation?
4. Are there differences in students' ages at the point of program admission associated with their persistence to graduation?
5. Are there differences among students in varying Health-Related Professions programs (cardiovascular technology, dental assisting, EMT-Paramedic, medical laboratory technology, nursing, surgical technology) regarding their persistence to graduation?
6. Is there a difference between students who took one or more remedial and developmental courses and students who did not take a remedial and developmental course regarding their persistence to graduation?

7. Is there a relationship between students' course grades in human anatomy and physiology I and II courses and their persistence to graduation?
8. Is there a relationship between students' course grades in microbiology and their persistence to graduation?
9. Is there a relationship between students' course grades in the required mathematics course (Probability and Statistics) and their persistence to graduation?
10. Is there a relationship between students' course grades in composition I course and their persistence to graduation?
11. Is there a relationship between the number of mathematics and science courses that students completed prior to their program admission and their persistence to graduation?
12. Is there a relationship between students' course grades for clinical I and clinical II and their persistence to graduation?

A combination of descriptive and inferential statistics was used in the analysis of the data.

Data were analyzed using Chi-square tests of independence and independent samples *t*-tests. A Chi-square test of independence was used with selected research questions that consisted of categorical variables. Independent samples *t*-test were used to determine if the mean of a variable on one group of subjects is different from the mean on the same variable with a different group of subjects. For all statistical tests, a .05 level of significance was the defined alpha level.

Table 1 provides a list of variables as well as a description of each variable as related to the coding within the SPSS software.

Table 1

*Variable Names and Values*

Variable Name	Variable Description
Gender	1=Female; 0=Male
Ethnic origin	00 = Not Specified 10 = Alaskan Native 20 = American Indian 30 = Asian or Pacific Islander 40 = Hispanic origin 50 = White – not of Hispanic origin 60 = Black – not of Hispanic origin
First-generation student	1 = First-generation student; 0=Other
Age	Years
Student’s major program of study	Cardiovascular Technology = CVTE Dental Assisting = DAST EMT-Paramedic = EMTP Medical Laboratory Technology = MLAB Nursing = NURS Surgical Technology = SURG
Remedial and developmental coursework	0 = No coursework; 1 = coursework
GPA in identified coursework	0.0 – 4.0
No. of math-science courses prior to program admission	0.0 – 14.0

*Research Methods*

After I had received all necessary approvals from the dissertation committee and institutional review boards, the first step was to request the data from Northeast State’s office of Institutional

Effectiveness (IE Office). The following information was collected on individuals admitted into the Health-Related Programs of study from 1999 through 2008: gender, ethnic origin, first-generation student status, age, specific program of study, number of remedial and developmental courses, and course grades in preclinical and clinical coursework.

As a component of the data request, specific course listings were identified according to the course numbers and names published in the college's *2010-11 Catalog and Student Handbook*. If a course name and/or number had been modified since 1999, that course was noted in the data retrieval process. I verified the course names and numbers with the college registrar to determine accuracy because some course names and numbers had been modified due to the conversion of the SIS system to the Banner system. The following is a list of courses and course numbers for the study:

1. Number of remedial and developmental courses

DSPM 0700, 0800, and/or 0850,

DSPR 0700, 0800, or 0870,

DSPS 0800,

DSPW 0800.

2. Human anatomy and physiology I and II

Biol 1210 or 2010,

Biol 1220 or 2020.

3. Microbiology

Biol 1230.

4. Probability and Statistics

Math 1530.

5. Composition I

Engl 1010.

6. Clinical I

Cardiovascular Technology                      CVTE 1260 – Clinical Practicum I

Dental Assisting                                      DAST 1410 – Clinical Practicum I

EMT-Paramedic                                      EMTP 2215 – Clinical Practicum I

Medical Laboratory Technology                      MLAB 2100 – Clinical Practicum I

Nursing    NURS 2000 – Nursing Process I

Surgical Technology                                      SURG 2900 – Clinical Practicum I

7. Clinical II

Cardiovascular Technology                      CVTE 2060 – Clinical Practicum II

Dental Assisting                                      DAST 1420 – Clinical Practicum II

EMT-Paramedic                                      EMTP 2225 – Clinical Practicum II

Medical Laboratory Technology                      MLAB 2110 – Clinical Practicum II

Nursing    NURS 2200 – Nursing Process II

Surgical Technology                                      SURG 2901 – Clinical Practicum II

Upon receipt of data, statistical tests were performed using Statistical Package for Social Sciences (SPSS), Version 17. To ensure student confidentiality, the identity of each student was coded so that social security numbers or student identification numbers were not revealed. The dataset file was stored on a jump drive, which was locked in a filing cabinet. I retained the two keys to the locked cabinet at all times.

## CHAPTER 4

### RESULTS AND ANALYSIS OF DATA

#### *Introduction*

Lacey and Wright (2009) predicted that 70.0% (i.e. 21 out of 30) of the fastest-growing jobs in America would require some type of postsecondary education. The National Commission on Community Colleges (2008) projected that community colleges would prepare more than half of the country's health-care providers and, in some fields, such as first responders and paramedics, more than 80.0%. If Northeast State Community College is to remain an institution whose mission is to increase and advance the educational development of individuals within the region, the college must continue to monitor enrollment, conduct research on student retention rates, and implement institutional and programmatic processes and improvements to ensure student persistence to graduation.

Twelve research questions were developed to direct the study. Chi-Square tests (two-way contingency table) and independent samples *t*-tests were used to determine significance differences or relationships between the criterion and predictor variables. The research questions, null hypotheses, and data analyses are presented below.

#### *Research Question 1: Gender*

Is there a difference between male and female students in regard to their persistence to graduation?

H<sub>0</sub>1: There is no difference between male and female students regarding their persistence to graduation.

Gender was defined as either male or female. The composition of the population in relation to gender was distributed with 83.0% classified as females and 17.0% classified as males. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and gender were not significantly related  $X^2(1, N=761) = .06, p = .801$ . Therefore, the null hypothesis was retained. The analysis revealed that male and female students persist to graduation at about the same rate. Table 2 indicates the frequencies and associated percentages of persisters and nonpersisters by gender and the total population.

Table 2

*Gender Analysis of Persisters and Nonpersisters*

Group	Females		Males		Total
	N	%	N	%	
Persisters	398	63.3	82	62.1	480
Nonpersisters	231	36.7	50	37.9	281
Total	629		132		761

*Research Question 2: Ethnic Origin*

Are there differences among students of different ethnic origins regarding persistence to graduation?

H<sub>0</sub>2: There is no difference between students of different ethnic origins and persistence to graduation.

Ethnic origin groupings were consistent with definitions as defined by the National Center for Education Statistics. Ethnic origin was self-reported by the student at the time of application and is not required for admission. If the student does not self-report as to his or her ethnic origin, the institution recorded the ethnicity as not specified. For this study, if a student failed to report ethnic origin or not specified, the failure to report was treated as a missing case. This study had one missing case. Alaskan Native and American Indian were defined as a person having origins of North American and who maintained a cultural identification through tribal affiliation. The ethnic origin of Asian/Pacific Island was a person with origins of the Far East, Southeast Asia, India, or Pacific Islands. The Black ethnic origin was an individual who has origins in any of the black racial groups of Africa, while the Hispanic ethnic origin is an individual of Mexican, Puerto Rican, Cuban, Central or South America or other Spanish origin. The White ethnic origin was an individual who has origins of Europe, North Africa, or the Middle East (National Center for Education Statistics, 2011).

The ethnic origin composition of the population was the White (European American) ethnic origin with 455 (64.4%) persisting to graduation. The second largest population was the Black (African American) ethnic origin with 11 (50.0%) persisting to graduation. Other minorities include Alaskan Native, Asian/Pacific Islander, and Hispanic ethnic origin groups were represented within the population study, the compositions were less than 1% (Table 3). The analysis indicated that persistence and ethnic origin were not significantly related  $\chi^2(3, N=758) = .99, p = .063$ . Therefore, the null hypothesis was retained.

Table 3

*Ethnic Origin Analysis of Persisters and Nonpersisters*

Ethnic origin	Persister		Nonpersister	
	N	%	N	%
Black	11	50.0	11	50.0
White	455	64.3	252	35.6
Other	14	46.4	15	53.6
Total	480		278	

*Research Question 3: First versus Non-First Generation Status*

Is there a difference between first-generation students and non-first-generation students regarding their persistence to graduation?

H<sub>03</sub>: There is no difference between classification as a first-generation student and non-first-generation student regarding their persistence to graduation.

The composition of the population in relation to generational status was distributed with 65.0% classified as first-generation status persisters and 35.0% of the first-generation status were nonpersisters. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and first-generation status were not significantly related  $X^2(1, N=761) = .98, p = .320$ . Therefore, the null hypothesis was retained. The analysis revealed that first-generation status students and students not classified as first-generation status persisted to graduation at about the same rate. Table 4 indicates the frequencies

and associated percentages of persisters and nonpersisters by first-generation status and by non-first-generation status.

Table 4

*First-generation Student Analysis of Persisters and Nonpersisters*

Group	First-generation Students		Non-First-generation Students		Total
	N	%	N	%	
Persisters	221	65.0	259	61.5	480
Nonpersisters	119	35.0	162	38.5	281
Total	340		421		761

*Research Question 4: Age*

Are there differences in students' age regarding their persistence to graduation?

H<sub>0</sub>4: There is no difference between students' age at the point of program admission regarding persistence to graduation.

As indicated in Table 5, the age range for persisters was 18 to 60. The age range for nonpersisters was 18 to 59. I did identify one error when an individual reported a 1900 birthdate; therefore, the individual was not included in the age calculations. The 1900 birthdate was noted as a missing case. Standard deviations, means, medians, and ranges are also reported in Table 5. An independent-samples *t* test was conducted to evaluate the null hypothesis. The analysis indicated that persistence and age at the time of program admission were not significantly related

$t(611.77) = .21, p = .836$ . The effect size as measured by Eta square ( $\eta^2$ ) was .01. Therefore, the null hypothesis was retained.

Table 5

*Age Analysis of Persisters and Nonpersisters*

Group	N	Mean	Median	Standard Deviation	Range
Persisters	480	29.44	27.00	8.64	18-62
Nonpersisters	280	29.32	27.00	8.23	18-59
Total	760				

*Research Question 5: Health-related Professions Programs of Study*

Are there differences among students in varying health-related profession programs of study (cardiovascular technology, dental assisting, EMT-Paramedic, medical laboratory technology, nursing, surgical technology) regarding their persistence to graduation?

H<sub>05</sub>: There is no difference between student’s major programs of study regarding their persistence to graduation.

The proportion of enrollments in each of the Health-Related Programs of study was as follows: CVTE (21.9%); DAST (15.9%); EMT-P (3.7%); MLAB (15.1%); NURS (23.6%); and SURG (19.7%). A two-way contingency table analysis (Table 6) was conducted to evaluate the null hypothesis that there is no difference among students in various Health-Related Programs of study regarding their persistence to graduation. The analysis indicated that persistence rates of

students in different Health-Related Programs of study were significantly different  $X^2(5, N=761) = 143.28, p = .001$ . The  $p$  value was less than the alpha value of .05; therefore, the null hypothesis was rejected. The health-related program of study with the highest persistence rate was cardiovascular technology and the program of study with the lowest persistence rate was the emergency medical technology – paramedic program.

Because the interaction between persistence and the specific health-related program of study was significant, follow-up tests were conducted to explain the interaction. The Tukey post hoc test was conducted and showed there was a significant difference between students majoring in a specific health-related program of study and persistence ( $p < .001$ ). The results of this test indicated three of the six pairwise differences were significant: the difference between cardiovascular and EMTP, the difference between dental assisting and surgical technology, and the difference between cardiovascular and nursing. Table 6 indicates the frequencies and associated percentages of persisters and nonpersisters by specific health-related program of study and the total population.

Table 6

*Program of Study Analysis of Persisters and Nonpersisters*

Program of Study	Persister		Nonpersister		Total
	N	%	N	%	
CVTE	154	92.2	13	7.8	167
DAST	92	76.0	29	24.0	121
EMTP	04	14.3	24	85.7	28
MLAB	79	68.7	36	31.3	115
NURS	78	43.3	102	56.7	180
SURG	73	48.7	77	51.3	150
Total	480	63.1	281	36.9	761

*Research Question 6: Remedial and Developmental Education*

Is there a difference between students who took one or more remedial or developmental courses and students who did not take a remedial or developmental course regarding their persistence to graduation?

H<sub>0</sub>6: There is no difference between students' taking one or more remedial or developmental courses and students not taking a remedial or developmental course regarding their persistence to graduation.

Over half (56.2%) of the students took one or more remedial and developmental courses and 43.8% of the students did not. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that there was no significant difference in persistence

between students taking one or more remedial or developmental and students who did not,  $X^2(1, N=761) = .02, p = .880$ . Therefore, the null hypothesis was retained. It should also be noted that students majoring in Health-Related Programs of study are often from a different population from first-time full-time freshman with undecided majors. Table 7 indicates the frequencies and associated percentages of persisters and nonpersisters by remedial and developmental course placement. This finding is in alignment with Boylan and Saxon (2006) who reported that students who completed remedial or developmental coursework also successfully completed college-level courses.

Table 7

*Remedial and Developmental Education Analysis of Persisters and Nonpersisters*

Group	Students Placed in R-D		Students With No R-D		Total
	N	%	N	%	
Persisters	269	62.9	211	63.4	480
Nonpersisters	159	37.1	122	36.6	281
Total	428		333		761

*Research Question 7: Human Anatomy and Physiology I and II Course Grades*

Is there a relationship between students' course grades in human anatomy and physiology I and II courses and their persistence to graduation?

H<sub>0</sub>7: There is no relationship between students' course grades in human anatomy and physiology I and II courses and persistence to graduation.

Course grades in preclinical courses were considered to determine possible relationships between course grades and persistence through the clinical components of the program. Course grades were considered in human anatomy and physiology I and II, microbiology, probability and statistics, and composition I. The science courses consisted of a graded lecture and laboratory component that were combined for one course grade. In collecting data for the various courses, it was determined that some programs provided substitutions for some preclinical coursework requirements and some programs made curricula changes between 1999 and 2008. Therefore, the population size for the academic data (preclinical and clinical coursework) analyses may vary depending upon the course.

Five hundred seventy-six students completed the human anatomy and physiology I course, Of the 576 students, 450 (78.1%) persisted to complete their program of study and 126 (21.9%) were nonpersisters. It was revealed that some students may have completed courses that could be substituted for human anatomy and physiology I such as human anatomy, human physiology, or equivalent types of biology courses. Or, some students transferred in their science course requirements and notations were made from transcript reviews the course(s) had been completed as well as the course name(s). Therefore, the population size for this research question consisted of 576 students. The 576 represents students that completed human anatomy and physiology I at Northeast State Community College from 1999 through 2008. The most frequent letter grade of persisters was a "B" and the "C-D" grade was the most frequent grade of nonpersisters (Table 8). Students with a grade of "A" or "B" maintained a persistence rate higher than a 60.0%, which suggests there may be a relationship between human anatomy and physiology I course grades

and persistence. A Chi-Square analysis indicated that persistence and human anatomy and physiology I course grades were significantly related  $X^2(2, N=576) = 6.00, p = .050$ . Therefore, the null hypothesis was rejected. The analysis revealed there is a relationship between the students' course grade in human anatomy and physiology I and persistence to graduation.

Table 8

*Grades in Human Anatomy and Physiology I*

	A	B	C-D	Total
Persisters	149	183	118	450
Nonpersisters	37	42	47	126
Total	186	225	165	576

Note: No students were admitted with a grade of F.

Five hundred ninety-one students completed the human anatomy and physiology II course. It also appeared that some students may have completed courses that were substituted for human anatomy and physiology II such as human anatomy, human physiology, or other equivalent types of biology courses. Some students also had transferred in their science course requirements and notations were made from transcript reviews that the course(s) had been completed. Therefore, the population size for this research question consisted of 591 students. The 591 represents students that completed human anatomy and physiology II at Northeast State Community College from 1999 through 2008. Of the 591 students, 461 (78.0%) persisted to complete their program of study and 130 (22.0%) were nonpersisters. The most frequent letter grade of

persisters was the “B” grade (Table 9). A Chi-Square analysis indicated that persistence and human anatomy and physiology II course grades were not significantly related  $X^2(2, N=591) = 2.55, p = .281$ . Therefore, the null hypothesis was retained. The analysis revealed there is no relationship between the students’ course grade in human anatomy and physiology II and persistence to graduation.

Table 9

*Grades in Human Anatomy and Physiology II*

	A	B	C-D	Total
Persisters	152	209	100	461
Nonpersisters	52	50	28	130
Total	204	259	128	591

Note: No students were admitted with a grade of F.

*Research Question 8: Microbiology Course Grades*

Is there a relationship between students’ course grades in microbiology and their persistence to graduation?

H<sub>0</sub>8: There is no relationship between students’ course grades in microbiology and persistence to graduation.

Five hundred twenty-four students completed the microbiology course. With this research question, it was revealed that substitutions or transfer credits were awarded. Additionally, it was determined that the microbiology course requirement varied between specific Health-Related

Programs of study from 1999-2008. For example, the cardiovascular technology curriculum did not require microbiology as a program requirement for a period of time. However, following a program review, the microbiology course requirement was added to the curriculum. Thus, there is a difference in curriculum requirements between 1999 and 2008 regarding “gaps” in data retrieved for this study. The 524 population size represents the number of students who completed microbiology at Northeast State Community College from 1999 through 2008, Of the 524 students, 452 (86.3%) persisted to complete their programs of study and 72 (13.7%) were nonpersisters. The most frequent letter grade of persisters was a “B” and the “B” grade was also the most frequent grade of nonpersisters (Table 10). Students with a grade of “A” or “B” maintained a persistence rate higher than 80.53%. A Chi-Square analysis indicated that persistence and microbiology course grades were not significantly related  $X^2(2, N=524) = 1.57, p = .462$ . Therefore, the null hypothesis was retained. The analysis revealed there is no difference between the students’ course grade in microbiology and persistence to graduation

Table 10

*Grades in Microbiology*

	A	B	C-D	Total
Persisters	171	193	88	452
Nonpersisters	22	33	17	72
Total	193	226	105	524

Note: No students were admitted with a grade of F.

*Research Question 9: Mathematics (Probability and Statistics) Course Grades*

Is there a relationship between students' course grades in the required mathematics course (Probability and Statistics) and their persistence to graduation?

H<sub>0</sub>9: There is no relationship between students' course grades in the required mathematics course (Probability and Statistics) and persistence to graduation.

Five hundred four students completed the probability and statistics math course. Of the 504 students, 400 (79.4%) persisted to complete their programs of study and 104 (20.6%) were nonpersisters. The most frequent letter grade received by persisters was a "B" and the "B" grade also was the most frequent grade received by nonpersisters (Table 11). A Chi-Square analysis indicated that persistence and probability and statistics course grades were significantly related  $X^2(3, N=504) = 18.06, p = .001$ . Therefore, the null hypothesis was rejected.

Table 11

*Grades in Probability and Statistics*

	A	B	C	D-F	Total
Persisters	136	154	80	30	400
Nonpersisters	23	44	16	21	104
Total	159	198	96	51	504

Note: Students were admitted with a grade of F.

*Research Question 10: Composition I Course Grade*

Is there a relationship between students' course grades in the composition I course and their persistence to graduation?

H<sub>0</sub>10. There is no relationship between students' course grades in composition I and their persistence to graduation.

Three hundred fifty-nine students completed the composition I course. Of the 359 students, 288 (80.2%) persisted to complete their program of study and 71 (19.8%) were nonpersisters. Similar to the questions regarding the science and math courses, some programs of study provided course substitutions or transfer credits to students admitted into programs of study. Through conversations with program directors and academic deans, it was also revealed that many students transfer in composition I coursework; therefore, the number of students required to complete composition I at the college is less than courses such as mathematics and science courses. The most frequent letter grade of persisters was an "A" and the "B" grade was the most frequent grade of nonpersisters (Table 12). A Chi-Square analysis indicated that persistence and composition I course grades were significantly related  $X^2(3, N=359) = 38.72, p = .001$ . Therefore, the null hypothesis was rejected. The analysis revealed there is a positive relationship of students' course grade in the composition I and persistence to graduation

Table 12

*Grades in Composition I*

	A	B	C	D-F	Total
Persisters	139	117	29	4	288
Nonpersisters	13	40	9	9	71
Total	152	157	38	12	359

Note: Students were admitted with a grade of F.

*Research Question 11: Number of Mathematics and Science Courses*

Is there a relationship between the number of mathematics and science courses that students completed prior to their program admission and their persistence to graduation?

H<sub>011</sub>. There is no relationship between number of mathematics and science courses that students completed prior to program admission and persistence to graduation.

For research question 11, it was possible to obtain data regarding the number of mathematics (H<sub>0111</sub>) and science courses (H<sub>0112</sub>) completed by all individuals within the population. Data were obtained from each student record as to the number of mathematics and science courses completed prior to admission into a health-related program of study. Courses with math or science prefixes were counted. Science courses that were counted included courses in biology, chemistry, physics, physical science, and engineering.

A two-way contingency table analysis was conducted to evaluate the null hypothesis in regard to number of mathematics courses (H<sub>0111</sub>). The analysis indicated that persistence and the number of math courses completed prior to program admission were significantly related  $X^2(1, N=761) = 31.87, p = .001$ . Therefore, the null hypothesis was rejected. Six hundred ninety-two of the students enrolled in three or fewer mathematic courses prior to entering a health-related program of study. The persistence rate for these students was 64.4%. Students (69) who enrolled in four or more mathematic courses prior to entering a health-related program of study had a higher persistence rate at 73.9%.

A two-way contingency table analysis was conducted to evaluate the null hypothesis in regard to the number of science courses (H<sub>0112</sub>). The analysis indicated that persistence and the number of science courses completed prior to program admission were significantly related  $X^2(1, N=761) = 30.15, p = .007$ . Therefore, the null hypothesis was rejected. Four hundred seventy-two of the

students enrolled in three or fewer science courses prior to entering a health-related program of study. The persistence rate for these students was 64.2%. Students (289) who enrolled in four or more science courses prior to entering a health-related program of study had a higher persistence rate at 71.6%.

*Research Question 12: Clinical I and Clinical II Grade Point Average*

Is there a relationship between students’ GPAs for clinical I and clinical II and their persistence to graduation?

H<sub>0</sub>12. There is no relationship between students’ course grades in clinical I and clinical II and persistence to graduation.

A two-way contingency table analysis was conducted to evaluate the null hypothesis. A Chi-Square analysis indicated that persistence and clinical I course grades were significantly related  $X^2(5, N=747) = 34.85, p < .001$ . Therefore, the null hypothesis was rejected. The analysis revealed that students who complete clinical I persist to graduation. The “A” grade (Table 13) in clinical I was the most common grade among persisters.

Table 13

*Grades in Clinical I*

	A	B	C	D-F	Total
Persisters	382	150	23	0	555
Nonpersisters	148	7	5	32	192
Total	530	157	28	32	747

A two-way contingency table analysis was conducted to evaluate the null hypothesis. A Chi-Square analysis indicated that persistence and clinical II course grades were significantly related  $X^2(5, N=747) = 45.20, p < .001$ . Therefore, the null hypothesis was rejected. The analysis (Table 14) revealed that students who complete clinical II persist to graduation.

Table 14

*Grades in Clinical II*

	A	B	C	D-F	Total
Persisters	406	119	29	0	554
Nonpersisters	162	4	6	21	193
Total	568	123	35	21	747

## CHAPTER 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### *Summary of Findings*

The purpose of this study is to identify factors that have been positively or negatively associated with persistence to graduation by students who were admitted to health-related associate of applied science programs at Northeast State Community College. The population for the study was students admitted into a health-related program of study at the College between 1999 and 2008 as listed in the College's database system. Twelve characteristics of students who were admitted to a health-related program of study between 1999 and 2008 were studied. The characteristics were placed into three categories:

1. Demographic characteristics
  - a. Gender
  - b. Ethnic origin
  - c. First-generation Status
  - d. Age
  - e. Program of study
2. Preclinical Characteristics
  - a. Remedial and developmental Placement
  - b. Human Anatomy and Physiology I/II Course Grade
  - c. Microbiology Course Grade
  - d. Probability and Statistic Course Grade

- e. Composition I Course Grade
  - f. Number of Math and Science Courses
3. Clinical Characteristics
- a. Clinical I and Clinical II Course Grades.

The purpose was to seek factors (predictors of academic success) that are positively associated with persistence to graduation by students who are admitted to health-related associate of applied science degree programs at Northeast State Community College. The results may be used as a tool to improve institutional processes such as academic advising and in various support services in the division of Health-Related Professions. Information may be used to develop intervention strategies that would increase retention in the program of study, which may result in persistence to graduation. The following are the findings of the data analysis for the 12 research questions.

#### *Demographic Summary and Conclusion*

##### *Research Question 1: Gender*

Is there a difference between male and female students in regard to their persistence to graduation?

The composition of the population in relation to gender was distributed with 83.0% classified as females and 17.0% classified as males. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and gender were not significantly related  $X^2(1, N=761) = .06, p = .80$ . Therefore, the null hypothesis was retained in that there is no difference between male and female students in regard to their persistence to graduation.

### *Research Question 2: Ethnic origin*

Are there differences among students of different ethnic origins regarding persistence to graduation?

The ethnic origin composition of the population was the white ethnic origin with 455 (64.3%) persisting to graduation. The second largest group in the population was that of black ethnic origin, with 11 (50.0%) persisting to graduation. Other minorities included Alaska Native, Asian/Pacific Islander, and Hispanic ethnic origin groups that were represented within the population in this study. The other minority category consisted of 14 (46.4%) persisting to graduation.

### *Research Question 3: First or Nonfirst generation Status*

Is there a difference between first-generation students and non-first-generation students regarding to their persistence to graduation?

The composition of the population in relation to first-generation status was distributed with a 65.0% classified as first-generation status and 35.0% classified as other. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and first-generation status were not significantly related  $X^2(1, N=761) = .98, p = .32$ . Therefore, the null hypothesis was retained.

### *Research Question 4: Age*

Are there differences in students' age regarding their persistence to graduation?

The age variable was defined as the age of the student at the time the student was admitted into a health-related program of study. The age range for persisters was 18 to 60. The age range for nonpersisters was 18 to 59. Standard deviations, means, medians, and ranges are also reported in Table 5. An independent-samples *t* test was conducted to evaluate the null

hypothesis. A Levene's Test for Equality of Variances was conducted to determine if equal variances were assumed or not assumed. Based upon the analysis, the test for equal variances was not assumed ( $p = .045$ ). The analysis indicated the relationship between age and persistence to graduation was not significant,  $t(611.77) = .207, p = .836$ . Therefore, the null hypothesis was retained. The effect size as measured by Eta square was .01. The analysis revealed there is no relationship between age and persistence to graduation. The 95% confidence interval for the differences in means was -.125 to .154. The difference between means was .015.

*Research Question 5: Program of Study*

Are there differences among students in varying health-related professions programs of study (cardiovascular technology, dental assisting, EMT-Paramedic, medical laboratory technology, nursing, surgical technology) regarding their persistence to graduation?

The major programs of study were as follows: Cardiovascular Technology (21.9%); Dental Assisting (15.9%); Emergency Medical Technology (3.7%); Medical Laboratory Technology (15.1%); Nursing (23.7%); and Surgical Technology (19.7%). A two-way contingency table analysis was conducted to evaluate the null hypothesis that there is no difference between the students' major programs of study and persistence to graduation. The analysis indicated that persistence and specific health-related program of study were significantly related  $X^2(5, N=761) = 14$ .

Upon further investigation, information was obtained regarding the low persistence rates in emergency medical technology, nursing, and surgical technology. Students majoring in emergency medical technology and surgical technology are required to obtain the credential to practice a specific occupation but are not required to obtain the degree. Therefore, many students have completed the parts of each of each of those programs required to obtain the

credential without fulfilling all graduation requirements. Two requirements they may not fulfill are simply paying the graduation fee and submitting the graduation application. It should also be noted that faculty turnover rates and the number of years of teaching experience of faculty members were not considered within this study. However, it should be noted that in the discipline of Cardiovascular Technology there has been no faculty turnover since the inception of the program. With the emphasis on outcomes-based funding in the TBR system, mechanisms are currently in place to encourage students in Health-Related Programs to complete their degree programs (personal conversation with Don Coleman, December 17, 2010). Quantitative and qualitative data (e.g. from exit interviews) were available on the nonpersisters in the nursing program of study. The two main reasons students did not persist in the nursing program of study were problems with home or other life matters and poor academic performance in such nursing-specific courses as pharmacology. The nursing faculty and academic dean at Northeast State Community College are currently reviewing all policies and procedures, curricula, teaching and learning strategies, and evidenced-based nursing best practices to improve persistence rates in the nursing program of study (personal conversation, Melessia Webb, January 4, 2011). The analysis indicated that persistence and specific health-related program of study were significantly related  $X^2(5, N=761) = 143.28, p = .001$ . The  $p$  value was less than the alpha value of .05; therefore, the null hypothesis was rejected.

### *Preclinical Summary and Conclusion*

*Research Question 6: Students completing one or more remedial or developmental courses*

Is there a difference between students who took one or more remedial or developmental courses and students who did not take a remedial or developmental course regarding their persistence to graduation?

The composition of the population in relationship to remedial and developmental education included 56.2% who were classified as students who had taken one or more remedial or developmental course and 43.8% who did not take remedial or developmental coursework. A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and students taking one or more remedial or developmental courses were not significantly related  $X^2(1, N=761) = .02, p = .88$ . Therefore, the null hypothesis was retained.

*Research Question 7: Human anatomy and physiology I and II course grades*

Is there a relationship between students' course grades in human anatomy and physiology I and II courses and their persistence to graduation?

Five hundred seventy-six students completed the human anatomy and physiology I course. Of the 576 students, 450 (78.1%) persisted to complete their program of study and 126 (21.9%) were nonpersisters. It was revealed that some students may have completed courses that could be substituted for human anatomy and physiology I such as human anatomy, human physiology, or equivalent types of biology courses. Or, some students transferred in their science course requirements and notations were made from transcript reviews the course(s) had been completed as well as the course name(s). Therefore, the population size for this research question consisted of 576 students. The 576 represents students that completed human anatomy and physiology I at Northeast State Community College from 1999 through 2008. The most frequent letter grade of persisters was a "B" and the "C-D" grade was the most frequent grade of nonpersisters.

Students with a grade of “A” or “B” maintained a persistence rate higher than a 60.0%, which suggests there may be a relationship between human anatomy and physiology I course grades and persistence. A Chi-Square analysis indicated that persistence and human anatomy and physiology I course grades were significantly related  $X^2(2, N=576) = 6.00, p = .05$ . Therefore, the null hypothesis was rejected. The analysis suggested that students who make a grade of “A” or “B” in human anatomy and physiology I have a higher persistence rate than students with a C-D grade.

Five hundred ninety-one students completed the human anatomy and physiology II course. It was also revealed that some students may have completed courses that could be substituted for human anatomy and physiology II such as human anatomy, human physiology, or equivalent types of biology courses. Or, some students transferred in their science course requirements and notations were made from transcript reviews the course(s) had been completed as well as the course name(s). Therefore, the population size for this research question consisted of 591 students. The 591 represents students who completed human anatomy and physiology II at Northeast State Community College from 1999 through 2008. Of the 591 students, 461 (78.0%) persisted to complete their programs of study and 130 (22.0%) were nonpersisters. The most frequent letter grade of persisters was a “B”. A Chi-Square analysis indicated that persistence and human anatomy and physiology II course grades were not significantly related  $X^2(2, N=591) = 2.55, p = .28$ . Therefore, the null hypothesis was retained. The analysis revealed there was no relationship between the students’ course grade in human anatomy and physiology II and their persistence to graduation.

*Research Question 8: Microbiology course grades*

Is there a relationship between students' course grades in microbiology and their persistence to graduation?

Five hundred twenty-four students completed the microbiology course. With this research question, it was revealed that substitutions or transfer credits were awarded. Additionally, it was determined that the microbiology course requirement varied between specific Health-Related Programs of study from 1999-2008. For example, the cardiovascular technology curriculum did not require microbiology as a program requirement for a period of time. However, following a program review the microbiology course requirement was added to the curriculum. Therein, a difference in curriculum requirements between the time periods of 1999-2008 and “gaps” in data retrieved for this study. The 524 population size represents students that completed microbiology at Northeast State Community College from 1999 through 2008, Of the 524 students, 452 (86.3%) persisted to complete their program of study and 72 (13.7%) were nonpersisters. The most frequent letter grade of persisters was a “B” and the “B” grade was also the most frequent grade of nonpersisters. A Chi-Square analysis indicated that persistence and microbiology course grades were not significantly related  $X^2(2, N=524) = 1.57, p = .46$ . Therefore, the null hypothesis was retained. The analysis revealed there is no relationship between the students' course grade in microbiology and persistence to graduation.

*Research Question 9: Probability and Statistics course grades*

Is there a relationship between students' course grade in the required mathematics course (Probability and Statistics) and their persistence to graduation?

Five hundred four students completed the probability and statistics math course. Of the 504 students, 400 (79.4%) persisted to complete their program of study and 104 (20.6%) were

nonpersisters. The most frequent letter grade of persisters was a “B” and the “B” grade was the most frequent grade of nonpersisters. A Chi-Square analysis indicated that persistence and probability and statistics course grades were significantly related  $X^2(3, N=504) = 18.06, p = .001$ . Therefore, the null hypothesis was rejected. The analysis revealed there is a relationship between the students’ course grades in the probability and statistics course and their persistence to graduation. It is suggested that students who make a grade of “B” in the probability and statistic course have a higher persistence rate than students with a C-D grade.

*Research Question 10: Composition I course grades*

Is there a relationship between students’ course grade in the composition I course and their persistence to graduation?

Three hundred fifty-nine students completed the composition I course. Of the 359 students, 288 (80.2%) persisted to complete their program of study and 71 (19.8%) were nonpersisters. Similar to the findings regarding the science and math courses, leaders of some programs of study had allowed course substitutions or transfer credits to students admitted into programs of study. Through conversations with program directors and academic deans, it was also revealed that many students had transferred in composition I coursework; therefore, the number of students required to complete composition I at the college was 359. The most frequent letter grade of persisters was an “A” and the “B” grade was the most frequent grade of nonpersisters. A Chi-Square analysis indicated that persistence and composition I course grades were significantly related  $X^2(3, N=359) = 38.72, p = .001$ . Therefore, the null hypothesis was rejected. The analysis revealed there is a relationship between the students’ course grades in the composition I and their persistence to graduation. It is suggested that students with a grade of “A” and “B” have a higher persistence rate than students with C-D grade.

*Research Question 11: Number of math and science courses completed*

Is there a relationship between the number of mathematics and science courses that students completed prior to their program admission and their persistence to graduation?

A two-way contingency table analysis was conducted to evaluate the null hypothesis. The analysis indicated that persistence and the number of math courses completed prior to program admission was significantly related  $X^2(1, N=761) = 31.87, p = .001$ . Therefore, the null hypothesis was rejected. It was suggested that students completing more math courses than required were more likely to persist than students completing the required number. The analysis indicated that persistence and the number of science courses completed prior to program admission were significantly related  $X^2(1, N=761) = 30.15, p = .007$ . Therefore, the null hypothesis was rejected. The higher the number of science courses completed the higher the persistence rate.

*Research Question 12: Clinical I and Clinical II course grades*

Is there a relationship between students' course grades for clinical I and clinical II and their persistence to graduation?

Seven hundred forty-seven students completed the clinical I and II courses. Of the 747 students who completed clinical I, 555 (74.3%) persisted to complete their program of study and 192 (25.7%) were nonpersisters. A Chi-Square analysis indicated that clinical I course grades and persistence to graduation were significantly related  $X^2(5, N=747) = 34.85, p < .001$ . Therefore, the null hypothesis was rejected. Of the 747 students who completed clinical II, 554 (74.2%) persisted to complete their program of study and 193 (25.8%) were nonpersisters. A Chi-Square analysis indicated that students' course grades in clinical II and persistence to

graduation were significantly related  $X^2(5, N=747) = 45.20, p < .001$ . Therefore, the null hypothesis was rejected.

### *Recommendations for Further Research*

To strengthen the validity of this research project, one recommendation is to design exit interviews, surveys, or focus groups to obtain information that is not available in the NeSCC database system. For example, each student who does not persist should be encouraged to complete an exit interview with the academic advisor or program director to discuss reasons for non-persisting in program of study. Data such as number of work hours per week, number of children at home, marital status, and socioeconomic status may be associated with students' persistence in Health-Related Programs of study. Focus groups and/or surveys may be conducted to determine additional student support services that may be necessary to increase student persistence to graduation.

A second recommendation is to expand the research variables to include other programs of study at Northeast State Community College. It should be noted that this study was specific to one institution and may not be generalized to other populations. However, similar studies could be conducted to identify predictors of success (persistence) in other programs of study at the college.

A third recommendation is to apply a mixed-methods research methodology as a follow-up to this study.

### *Recommendations to Improve Practice*

A recommendation to improve internal processes is to develop certificates (embedded) within degree programs.

A second recommendation is to improve internal processes in regard to the development and implementation system of a common course numbering system.

A third recommendation is to improve internal processes through the identification of program cohorts in the Banner Student Information System.

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