ABSTRACT

ANDERSON, KEEGAN BROWN. Career Transfer Efficiency Study for North Carolina Public Sector Community College to University Pathways in Associate in Applied Science Programs. (Under the direction of Dr. James Bartlett).

Many students in North Carolina that finish an Associates in Applied Science (AAS) degree at a state community college will need to continue their education for various reasons and attempt to attain a bachelor's degree. Traditionally, students in North Carolina had to choose between degrees designed to transfer and degrees with a purpose of entering the workforce. In many cases, students who finish a degree in a Career and Technical Education (CTE) program at a North Carolina community college will look for transfer pathways but have a difficult time finding a public college that will accept and apply their credits toward a bachelor's degree. This can lead to more time at the university, more money to finish a bachelor's degree, and the industry waiting longer to have qualified citizens to meet the workforce needs.

Many North Carolina community colleges create transfer pathways that allow students the opportunity to continue their education after leaving the two-year school. Pathways to North Carolina public universities for graduates from AAS programs are not as prevalent at many North Carolina community colleges, compared to pathways to private institutions. The purpose of this study was to identify efficient pathways for students who graduated from an AAS degree program at a North Carolina community college and transferred to a North Carolina public university.

A quantitative, non-experimental correlation approach was used to examine data for students graduating from North Carolina community college with an AAS degree to North Carolina public universities to identify efficient pathways for students to utilize in transfer. The study looked at 1) the efficiency of applicable transfer credit across career clusters for students from various demographics, 2) the efficiency of applicable transfer credit across career clusters

to North Carolina public universities, and 3) the community colleges that have the highest frequency of students that transfer for identified efficient pathways. The conclusion of the study suggest changes to practice and policy for the way transfer can work in North Carolina for students wanting to transfer after receiving an AAS degree.

Career Transfer Efficiency Study for North Carolina Public Sector Community College to University Pathways in Associate in Applied Science Programs

By:
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DEDICATION

My work is dedicated to my wonderful wife and children, who have been so patient in my pursuit of a doctoral degree and supportive in my academic endeavors. This study is also committed to helping students at community colleges succeed in their aspirations.

BIBLIOGRAPHY

Keegan Anderson is a native of Mitchell County North Carolina. At the age of eight he moved with his family to Atlanta, Georgia. He spent time in different metropolitan areas of Atlanta until he moved back to Mitchell County at the age of seventeen and finished high school. After high school he moved back to Atlanta and completed a degree in Computer Information Systems at DeVry University, then located in Decatur, Georgia. After graduating college, he spent time working in private industry for a couple of years.

In 2002 an opportunity came open to teach at the local community college, Mayland Community College in Spruce Pine, NC. The position was teaching Information Technology classes in the prison programs, which he did until the Fall of 2005. A position teaching Information Technology came available on the main campus of Mayland Community College and Keegan transferred to this position. In 2007 Keegan was accepted in the MBA program at Milligan College in Elizabethton, Tennessee. He completed his degree at Milligan and started teaching classes in the Business Administration program, in addition to the Information technology program, at Mayland Community College. In the Fall of 2016 Keegan was offered and accepted the position of Program Coordinator for the Business Administration program, which he held until Fall of 2020. In September of 2020, Keegan left Mayland Community College and took the Dean of Career and Technical Education position at Caldwell Community College and Technical Institute in Hudson, NC.

Keegan enjoys spending time with his wife Samantha and two daughters, Carlee, and Maggie. His interests include snow skiing, fly-fishing, golfing, and being involved with his church.

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CHAPTER 1: Introduction

Many students in higher education looking to complete a bachelor's degree at a four-year institution start their educational journey at the community college (Jenkins & Fink, 2016). Horn & Skomsvold, (2011) estimated 80% of community college students intend to complete a bachelor's degree. Research indicates that community college has, and continues to, play an important role in helping students attain bachelor's degrees through transfer (Kasper, 2002; Laanan, 1996). Community colleges have an open-door policy, which provides educational opportunities and access to a diverse pool of potential students. Equal access, combined with the lower tuition cost of community colleges, offers hope to many potential degree-seeking individuals regardless of socioeconomic status. Access and affordability play a big part in why the enrollment of community colleges has grown over the years; however, the ability for community college students to transfer to four-year institutions continues to be an issue for many students (Berger & Malaney, 2003). The community college still provides its students the means to a middle-class lifestyle and its communities a chance at higher educational attainment for the population (Boswell, 2004).

Many states offer incentives to create efficiencies within higher education (Bailey, et al., 2015; Jenkins, 2006). Community college to four-year transfer is one aspect of efficiency in higher education that focuses to improve student outcomes. The rising cost of tuition at four-year institutions is a concern for many potential students, as well as a concern for state and national governments (Monaghan & Attewell, 2015). According to the American Association of Community Colleges [AACC] 2020 Fact Sheet, the average annual cost to attend a public community college in-district is $3,730 compared to $10,440 to attend an in-state four-year public institution. With a difference of $6,720 between the cost to attend a two-year vs. four-year

institution, many students start at the community college to help alleviate costs (Kasper, 2002). The National Student Clearinghouse Research Center [NSCRC] (2017) reports 49% of students who completed a bachelor's degree were enrolled at a two-year institution within the previous 10 years. While attaining a bachelor's degree is a goal for students that start at the community college, Jenkins and Fink (2016) report only 15 % will attain a four-year degree. The remaining 85% of students who do not complete their four-year degree still have the time and money invested and any student loan debt to pay back, but with no degree to show for it (Belfield, 2013). Since many community college students come from a lower socioeconomic status (SES), meaning they belong to a lower-income household, the risk of failure can create insurmountable debt to overcome if a student does not complete the degree intended. Providing a pathway with the highest probability of success for educational attainment is needed to mitigate risk to degree seekers and increase the skill level of the workforce in the United States.

For many middle-class professions, a degree from a four-year institution is required and this is a trend that continues to increase over time (Boswell, 2004; Carnevale, et al., 2013; Wyner et al., 2016). One aim of community college is to provide students a pathway to the American middle-class and, in some cases, this would require a student to transfer to a four-year institution. Research shows that for many students the only way to achieve a degree from a four-year institution is to start at a two-year institution (Laanan, 1996; Monaghan & Attewell, 2014; Rouse, 1995). With a shortage of skilled workers needed for the United States economy, increasing the efficiency in the transfer of community college students to a four-year institution will help meet labor market demands for highly trained workers (Carnevale, et al., 2013). The community college's ability to create better pathways to four-year degrees will provide upward

mobility to the lower-middle class through higher wages and will help meet the workforce demand of skilled workers necessary to help the country compete in the global marketplace.

Data shows 49% of graduates from a four-year institution are considered transfer students (NSCRC, 2017). Since transfer students account for approximately half of graduates from four-year institutions, this study sought to discover possible pathways that contribute to the success of transfer students. The successful completion of a degree and the time to completion are ways to assess the success of community college transfer students (Fink & Jenkins, 2017; Jenkins & Fink, 2016). One key factor that impacts both of these measures of success for students that transfer from community colleges is the number of credits being applied toward the program of choice at a university after transferring.

Traditionally, students at community colleges decide between a curriculum that will allow them to transfer to a four-year institution and a curriculum that will allow them to go to work after completing a degree or credential. The curriculum focused on transferring to a four-year institution is typically made up of general education credits and are primarily referred to as an Associate of Arts (AA) or an Associate of Science (AS) degrees (Boswell, 2004). For this reason, transfer degrees are often referred to as “academic” degrees. When students take a two-year curriculum focused on immediate entrance into the local labor market upon graduation, this curriculum is referred to as an Associate in Applied Science (AAS) (Bragg, 2002; Boswell, 2004). An AAS curriculum is sometimes referred to as a “vocational” or “career and technical education” (CTE) degree. Example programs that earn AAS degrees are nursing, business/management, data analytics, and information technology.

While AA/AS degrees are designed to help students transfer to a four-year institution, AAS degrees traditionally are not (Bragg, 2002). In many cases, community colleges must create

articulation agreements with individual schools to create pathways for students to transfer from CTE programs. These pathways are referred to as local articulation agreements or bilateral agreements in higher education (Kisker, 2007; Roksa & Keith, 2008). Agreements ensure certain credits will be accepted by the receiving four-year institution. Without the agreements in place, transfer efficiency decreases, and credits are lost when a student moves from one institution to another. For community college programs that do not have an agreement in place at a state level, setting up a local agreement with all university partners is nearly impossible. If a student transfers to a school where no agreement is in place, a student may need to earn more than half of the credits needed for a bachelor's degree at the four-year institution. Thus, in many cases, inefficient credit transfer creates the issue of more time and money needed to complete a bachelor's degree. Excessive credit loss toward a bachelor's degree in transfer can be enough of a barrier to discourage a student intending to transfer after attaining an AAS degree and ultimately give up the dream of attaining a bachelor's degree (Roksa & Keith, 2008).

With so many students looking to earn a bachelor's degree after earning their associate degree, forming efficient pathways would be of great value to these students. Research on the topic of inefficiency in transfer focus on the transfer of two-year academic degrees, AA/AS degrees, and do not include graduates from AAS degree programs (Berger & Malaney, 2003; Jenkins & Fink, 2016; Laanan,1996; Monaghan & Attewell, 2015). Previous studies indicate many students who intend to transfer from a community college to a four-year institution fail to complete the transfer process after leaving a two-year institution (Jenkins & Fink, 2016; Monk-Turner, 1995). Up to this point, one area that is not the focus in many transfer studies is the need for better transfer of two-year CTE AAS degrees to four-year institutions (Fink & Jenkins, 2017). Data shows one-third to almost half of graduates from CTE programs plan to earn a

bachelor's degree (Boswell, 2004; Levesque et al., 2008; Ignash & Kotun, 2005; Townsend, 2002).

One obvious question is why would a student pursue an AAS degree in a CTE field from a community college and look to transfer to a four-year school? In many cases, students are not initially seeking to transfer, but start with a credential that allows them to go to work after completing their associate degree (Levesque et al., 2000). These students tend to be older, have families to provide for and receive financial aid (Levesque et al., 2000). Many of these students are looking for an economical way to increase social mobility and see a vocational degree from a community college as having a good return on investment (Belfield, 2013). Having the option to transfer after attaining an AAS degree from a community college could be a helpful way to provide a pathway to advance their skills if the need arises in the future. The attainment of a credential from a community college before continuing to a four-year institution gives a form of a "safety net" if the student does not complete at a four-year institution (Belfield, 2013). Attainment of a vocational degree, however, should not create a roadblock to transferring and completing a four-year degree.

Some partnerships between community colleges and four-year colleges stand out as being more effective at helping students transfer and succeed, even after controlling for institutional characteristics and student demographics (Jenkins, 2016). Characteristics of strong partnerships for transfer include prioritization of transfer, clear pathways, and good advising (Wyner et al., 2016). Each credential attained from a community college has a level of "transferability" depending on the classes in the program of study. The most common CTE programs completed at a community college are business, healthcare, and mechanical and repair technologies (NSCRC, 2019). The most common degree completed at four-year institutions is business,

healthcare, and education (NSCRC, 2019). Due to the popularity in subject areas that are common at both community colleges and four-year institutions, the problem around inefficiency is hard to explain (Roksa, 2009).

Statement of Problem

Studies have shown 14% to 15% of students entering a transfer program at a community college complete their bachelor's degree within six years of starting at the four-year institution (Jenkins and Fink, 2016; NSCRC, 2017). The reason it takes transfer students so long to attain a bachelor's degree is due, in part, to many students finding their community college credits do not count toward their program of choice at the university (Monaghan & Attewell, 2015). While credit transfer remains an obstacle for AS/AA students, credit-transfer efficiency is unknown, and likely even worse, for AAS transfer students.

In the state of North Carolina, one plausible reason credit transfer may be worse for AAS students is the design of pathways from state community colleges to public universities. Pathways for students transferring from a North Carolina Community College System (NCCCS) AAS program to a University of North Carolina System (UNC System) university proved to be inefficient (Giani, 2019). After transferring, many credits are not applied toward the degree at the university of choice and end up as excess credits (Giani, 2019). The inefficiency in the pathways extends the time at the university for these transfer students, which leads to more student debt and a loss in lifetime earnings (Belfield, 2013; Chase, 2011).

When students graduate with an AAS degree from a community college within the NCCCS and transfer to a university within the UNC System, some degree programs at the university may be more efficient than others (Giani, 2019). Little research has been done to recognize specific programs within the UNC system that offer the most applicable transfer credit

when students graduate and transfer from an AAS program at a NCCCS institution. The little research that has been done indicates the transfer of AAS degrees in North Carolina is inefficient and credit loss for students transferring can be substantial (Giani, 2019; Jenkins & Fink, 2016). While some studies focus on the transfer of all AAS degrees from a community college to a four-year institution in North Carolina, little is known about the efficiency of transfer for specific programs of study. The identification of high-efficiency program pathways for transfer students graduating with AAS degrees from a NCCCS institution could increase awareness and therefore the probability of future students completing a bachelor's degree. Implementing best practices of current high-efficiency transfer programs to current low-efficiency programs has the potential to lead to a shortened timeframe to degree completion, decreased financial investment, and increased chances at upward mobility.

To reach equitable outcomes, it is critical to understand the relationship of credit loss to various demographic characteristics of students transferring from AAS degree programs to UNC System universities. Investigating student demographics can give more insight into who is affected the most by transfer inefficiency. Patterns from the analysis of the demographical relationships could show differences or similarities in transfer for the analyzed students. The recognition of the influence of various demographic characteristics on credit loss for the population in this study could lead to understanding the impact of transfer inefficiency from AAS degree in CTE programs in the NCCCS to the UNC System in North Carolina.

Purpose of Study

Studies show that partnerships between community colleges and four-year institutions can increase transfer by creating more efficient pathways (Wyner et al., 2016). Pathways are considered to be more efficient as more credits from the community college are applied toward a

bachelor's degree. The purpose of this quantitative study was to identify program transfer efficiencies between the NCCCS and the UNC System for students who graduated with an AAS degree between 2014 to 2019. The study also identified correlations to student demographics that impact the North Carolina community-college-to-university pathways, as well as how student demographics influence student transfer. This study used a quantitative approach and data on transfer between the sixteen career clusters identified by the 2010 National Career Cluster Framework and the sixteen UNC System universities (Creswell & Creswell, 2018).

Research Questions

1. For each career cluster, what amount of variance does gender, race, age, and Pell status explain in the number of credit hours applied toward a bachelor's degree for AAS degree earners?
2. For each career cluster, after controlling for gender, race, age, and Pell status what amount of variance does the college explain in the number of credit hours applied toward a bachelor's degree for AAS degree earners?
3. Which community colleges have the highest performing transfer pathways in the identified UNC System university and career cluster?

Theoretical Framework

This study used the complex systems theory, or sometimes called complexity theory, to help guide the study. Complex system theory is not considered to be an independent theory, but a collection of theories (Mason, 2008). Theories included in complex systems theory originate in the fields of mathematics and computer science, but have expanded into the fields of science, economics, and social sciences (Mason, 2008). Many scholars have concluded complex system theory is closely related and can be considered part of chaos theory (Bak, 1996; Kauffman, 1995;

Mason, 2008). The fact that when many interactions are prevalent in a system can support the argument of complex system theory being a part of chaos theory (Bak, 1996; Mason, 2008).

Since the interactions in this study were consistently reiterated over time but could not predict regular outcomes, the study resembled complex system theory and did not appear as interactions explained in chaos theory. Complex system theory also favors an ad hoc nature and is not well suited for top-down design in nature (Mason, 2008). When considering the repeated interactions students have during the transfer process, complex system theory was more suitable than chaos theory due to the stability in the overall idea of the way the process works. The part of the interaction that could not be controlled was how each school in the system approached the transfer process and how the credits were applied as the student entered one of the institutions.

When using the complex system theory to analyze interactions, detail of the components involved in the interaction is not needed to explain the result of the process (Kauffman, 1995). This omission of detail allows for the construction of a model that focuses on the overall process and allows the outcome of the study to be understood in different ways. In each outcome, a look at more localized elements of the process can be explored in hopes to make small changes that can lead to big impacts in other interactions in the overall system. In a previous study, Kisker (2007) uses system theory to explain the transfer processes between community colleges and universities. Through a systematic approach, community colleges and universities can work to strengthen partnerships that lead to viable pathways to bachelor's degrees (Kisker, 2007).

The use of complex system analysis enables an examination of how the NCCCS and the UNC System work together as one North Carolina public sector higher educational system. These two higher education systems in North Carolina work independently from one another, yet students use the systems in their academic journey and are not aware of the distinction between

the two systems. While there is policy to help students transfer credits between the systems, there can be some variation in how the credits are applied at institutions. By looking at the two higher education systems as sub-systems of a larger, comprehensive higher educational system, the study was able to analyze the phenomenon of how students transfer between the two state systems.

Conceptual Model

The concept of efficiency for this study focused on the amount of credit a student transfers and applies from a NCCCS community college to a UNC System university bachelor's program after finishing an AAS degree in a CTE field. The conceptual model (see Figure 1) started by looking at what credit's students earned at a NCCCS community college after completing an AAS degree. The use of the comprehensive articulation agreement (CAA) was considered in the conceptual model, which is an agreement between the NCCCS and the UNC System that specifies applicable credit when transferring to public universities for certain courses taken at NCCCS community colleges. In addition to the CAA, the use of local articulation agreements helped students transfer from AAS programs to UNC System universities. At all UNC System universities, except for the North Carolina University School of the Arts, a class equivalence table was provided by the university to help determine transfer efficiency for incoming students. After the classes attained by the students were evaluated, the total credits accepted by the university within the UNC system were determined. The last part of the process was looking at how many of the credits accepted from the transfer process applied toward the intended degree. The applicable credit determined how many credits were left to finish the bachelor's degree for the transfer student as they worked toward completion at the university.

The relationship to demographics during the transfer process was also considered within the conceptual method. Age, ethnicity, gender, and Pell grant award status were considered and evaluated for significance in the population transferring to a university within the UNC System. Any significance observed in the selected demographics during the transfer process helped identify who was experiencing the most efficiency of applicable hours as they transferred to a university.

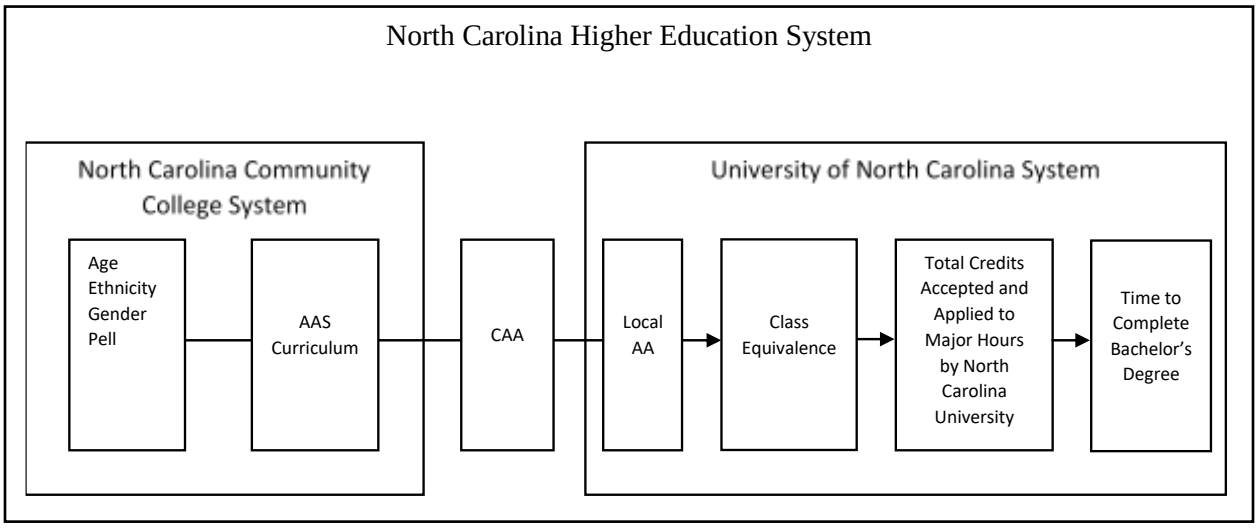

Figure 1

Note. This figure shows a visual representation of how a student would transfer through the two higher educational systems in North Carolina, when choosing to start with an AAS program at a NCCCS institution.

Significance of Study

This study aimed to draw attention to the importance of policy in increasing pathway efficiency between NCCCS community colleges and UNC System universities. The policies between institutions of the two higher education systems in North Carolina have a direct impact on decreasing the time and resources required of students to attain a bachelor's degree. By identifying the most efficient pathways for CTE career clusters at NCCCS community colleges to UNC System universities this study aimed to give evidence of promising practices that assist

students in successfully completing post-secondary credentials of value in the workforce. The results of this study identified which demographics, if any, were experiencing the most inefficiency. In turn, decision-makers can use the data to help shape policy and practice that focus resources on support for increased success of specific populations transferring from CTE programs within NCCCS.

Methodology Overview

This study was a quantitative study that used a non-experimental correlational approach focused on the efficiency of transfer pathways and the effect of student characteristics on transfer. For Research Question 1, a multiple regression model was used to explore the significance of student characteristics on transfer from community college to university. For Research Question 2, a multiple regression analysis was used to examine the transfer of students from CTE career clusters at NCCCS community colleges to each UNC System university. Research Question 3 attempted to identify the community colleges that provide the most students to a university partner in the identified efficient pathway based on the number of accepted applicable transfer credits.

A secondary data source was used to investigate the efficiency of transfer for the research questions. The secondary data was provided by the Belk Center at North Carolina State University for the study. IBM SPSS was used to perform the analysis on the given data for the research questions.

Definition of Terms

Articulation Agreement: agreements made between institutions, or types of institutions, identifying which credits transfer and how they apply in a program of study (Ignash & Townsend, 2000).

Bilateral Agreement: agreement between two peer institutions specifying which credits a student can apply toward a program of study upon transfer ("Bilateral Agreements", 2021).

Career and Technical Education: Academic programs designed to train students for a specific career in the workforce (Bragg, 2002). Sometimes referred to as "vocational" education.

Community College: A two-year public institution providing both lower-level classes provided at four-year institutions and credentials focused on the local workforce (Cohen et al., 2014).

Comprehensive Articulation Agreement: a statewide articulation agreement in North Carolina to mandate the transfer of credits in certain classes from state community colleges to state universities (Board of Governors of the University of North Carolina and Board of Governors of the North Carolina Community College System, 2014).

Efficiency: Merriam-Webster (Efficiency, 2020) defines efficiency as "an effective operation as measured by a comparison of production with cost (as in energy, time, and money)." In the context of student transfer, the time and money a transfer student takes to complete are the parameters for efficiency in this study.

Local Articulation Agreement: agreements made between two schools identifying which credits transfer to a program of study upon the student entering the senior institution ("What is an Articulation Agreement?",2021).

Reverse Transfer: the act of transferring credits from a four-year institution to a two-year institution (Townsend, 2002).

Transfer Student: A student who enrolls at a four-year institution after beginning or attending another higher education institution (Transfer Student, 2021). In the context of this

study, a transfer student is referred to as a student transferring from a two-year community college to a four-year institution.

Vertical Transfer: the process of a student transferring to a senior educational institution (McCormick & Carroll, 1997).

Chapter Summary

Chapter 1 provided an overview of concerns in inefficient credit transfer from CTE programs at NCCCS Community Colleges to UNC System universities. The chapter described the purpose of the study in attempting to identify efficient pathways between the programs of study found in the sixteen career clusters at NCCCS Community Colleges to the UNC System's sixteen universities. The study aimed to look at how student characteristics affect overall transfer efficiency as well. The chapter introduced the use of the theoretical framework from Mason (2008) and the conceptual framework that guided the study. The chapter ended with an explanation of significance, a brief overview of the methodology, and common definitions for terms used throughout the study.

CHAPTER 2 – Review of Literature

Introduction

The review of literature for the study focused on four main factors. The first component was the history of community college in the US and North Carolina. The second was the policy from legislators and institutional leaders that help facilitate the transfer process. Third, was the phenomenon of transfer for community college CTE students pursuing four-year degrees, specifically for students majoring in degrees from CTE programs. Last was the demographics of community college students.

The Community College

Originally, one of the most important outcomes for a community college was to provide an associate degree to help high school students continue their education and transfer to a four-year institution (Kasper, 2002; Kintzer, 1996; Townsend, 2002; Wellman, 2002). After attaining a two-year degree, students could be awarded a junior certificate that would be accepted at a four-year institution (Kintzer, 1996). The idea of transferring credits from a two-year to a four-year institution was developed in the 1950s and 1960s in the United States (Kintzer, 1996). By the 1970s, there was evidence of growth in the transfer programs from community colleges to universities (Kasper, 2002; Kintzer, 1996).

In the 21st century, one important role of the community college is preparing citizens for the workforce (Bragg, 2002; Carnevale & Desrochers, 2001; Grubb, et al., 1996). The current economy demands a higher-skilled worker, shifting away from lower-skilled jobs (Carnevale et al., 2013). Research indicates that America has underproduced highly skilled workers from postsecondary institutions since the mid-1980s (Carnevale et al., 2013; Chase, 2011). The economy shows a premium on skills, rather than knowledge, which the community college is

designed to do with the many services offered to citizens in their communities (Carnevale et al., 2013; Chase, 2011).

Community colleges are known for their accessibility and open-door policy (Adelman, 2005; Monk-Turner,1995; Wellman, 2002; Wyner et al., 2016). For many US citizens, the community college is the gateway to better SES through the attainment of a two-year degree or providing a way to transfer to a four-year institution (Fink & Jenkins, 2017; Giani, 2019; Handel, 2011; Laanan, 1996; Wyner et al., 2016). Due to the low tuition prices of community colleges, the majority of the citizens in the US have the opportunity to a postsecondary degree (Boswell, 2004; Laanan, 2001; McCormick & Carroll, 1997; Wellman, 2002; Wyner et al., 2016). Studies show that 40% to 50% of the undergraduate student population is enrolled in community colleges, which is a considerable portion of students across the US higher education system (Boswell, 2004; Laanan, 2001; Roksa & Keith, 2008; Wyner et al., 2016). Compared to four-year institutions, distinguishing characteristics of community colleges are that class sizes tend to be low, usually below 20 students in an average class, and that access to instructors for help tends to be more readily available (Boswell, 2004).

History of Community College in North Carolina

In North Carolina, the first known two-year institution appeared in Asheville in 1927 and was named Buncombe County Junior College (Broadhurst & Bartlett, 2014). Like in much of the US, North Carolina's economy expanded quickly after the return of veterans following World War II (Broadhurst & Bartlett, 2014; Cohen et al., 2014). The North Carolina General Assembly created community colleges in North Carolina in 1957 after passing the Community College Act (North Carolina Community College System [NCCCS], 2018). The objective of the community college at the time of inception was to train people in the state of North Carolina to enter the

industrial businesses across the state (NCCCS, 2018). From 1957 to 1962, there were two types of tax-funded two-year education systems in North Carolina; one consisting of community colleges, and the other being Industrial Education Centers (NCCCS, 2018). In 1962, the then-Governor Terry Sanford, appointed the Governor's Commission on Education Beyond the High School to combine the North Carolina community colleges and North Carolina Industrial Educational Centers (NCCCS, 2018). In the early 1960s, Dallas Herring was appointed to develop a network of educational institutes designed to train citizens in their local communities (Broadhurst & Bartlett, 2014). From 1962 to 1978 the NCCCS grew from 20 industrial educational centers and 6 community colleges to the 58-community college system of today (NCCCS, 2018).

The mission of the NCCCS has always been to create access to educational opportunities for the citizens living in the 100 counties of North Carolina (NCCCS, 2018). The NCCCS has placed a community college inside each county or in a neighboring county throughout the state in hopes to increase accessibility to post-secondary educational opportunities for state citizens. The accessibility in terms of physical distance distinguishes North Carolina from many other states in America and puts it among one of the top states for the state's population being located 25-miles of a public community college (Rephann, 2007).

Policy Around Transfer

Many states and institutions have policies in place to help facilitate transfer for students planning to continue at a four-year institution (Giani, 2019). These policies can be developed in collaboration between two institutions, or be mandated by state policymakers (Giani, 2019). Wellman (2002) refers to state policy as essential for addressing concerns specific to transfer from two-year institutions to four-year institutions in public higher education systems. In most

cases, articulation agreements are used to create pathways from two-year institutions to four-year institutions (Bender, 1997; Chase, 2011; Ignash & Townsend, 2000). The object of these agreements is to provide an alignment of curriculums from two-year to four-year institutions for students to use as a pathway to complete their bachelor's degree (Handel, 2011; Roksa, 2009). Policies concerning articulation can be developed through the state legislature, state oversight agencies in higher education, and/or between individual institutions (Giani, 2019).

Articulation Agreements

When community college students transfer to a four-year institution, the use of an articulation agreement is often in place to help them as they move from one institution to another (Ignash & Townsend, 2000; Roksa & Keith, 2008). The term "articulation" means to be "joined" or "interrelated" (Articulation, 2020). Articulation can exist around students transferring from any two institutions (Roksa, 2009). Many times, articulation is referred to as policies from an institution or state legislature that focuses on the transfer of community college students from one higher education institution to another (Roksa, 2009; Costa & Kopko, 2014). The scope of this study is/was around the transfer of students from two-year institutions to four-year institutions.

The objective of articulation agreements is to make the transfer process as efficient as possible and preserve the integrity of credits being transferred between institutions (Bender, 1997; Boswell, 2004; Giani, 2019; Jenkins & Fink, 2016; Rifkin, 1996; Roksa & Keith, 2008). Many studies note the importance of collaboration between faculty members of community colleges and universities, however, state policy for transfer helps keep a balance of power between community colleges and public universities (Handel, 2011; Jenkins & Fink, 2016; Kisker, 2007; Roksa, 2009). Most articulation agreements are at the state or institutional level

(Bender, 1997; Giani, 2019). Articulation policies address many notable factors including access to education, equity to minorities, affordability of post-secondary degrees, cost-effectiveness for degree completion, and quality of education (Handel, 2011; Jenkins & Fink, 2016; Kasper, 2002; Wellman, 2002).

A state articulation agreement is a policy created by legislation of the state to be applied between public community colleges and public universities (Roksa and Keith, 2008). A state articulation agreement customarily focuses on the transfer of general education classes from a community college to a four-year public university but can include credits typically found in CTE programs in some states (Bender, 1997; Ignash and Townsend, 2000). In most cases, state policy came about as a means to remedy the low transfer rates from community colleges to universities and as an attempt to preserve credits for students moving from a community college to a public university (Roksa and Keith, 2008). These policies focus on the governance of associate in arts (AA) degrees, associate in science (AS) degrees, and associate in fine arts (AFA) degrees in terms of transfer (Bender, 1997). Roksa (2009) shows 21 states had some form of statewide mandated articulation agreement as of 2000.

State policy around articulation from community colleges to four-year institutions varies greatly and studies show most states have some form of policy to facilitate transfer (Millard, 2014; Roksa, 2009). Some states have developed system-wide articulation agreements for transfer from community colleges to universities (Roksa, 2009). In some cases, a system-wide agreement for transfer is developed through the collaboration of community colleges and the university developing the agreement (Roksa, 2009). State lawmakers rationalize the importance of policy for articulation to protect students from losing credits and incurring the cost of having to take more classes at a four-year institution (Roksa & Keith, 2008). State policies often

mandate four-year state institutions as being required to take the credits specified in the agreement (Board of Governors of the University of North Carolina and Board of Governors of the North Carolina Community College System, 2014; Roksa, 2009). According to Rifkin (1996) "the question is not whether states will be more aggressive in promoting transfer and articulation in higher education, but how soon, how much, in what forms, and for whom" (p. 15). Nearly a decade later, studies show more states have policy focused on transfer from public community colleges to public universities (Hossler et al., 2012).

An institutional articulation agreement, or sometimes referred to as a local articulation agreement, is typically an agreement between one community college and one university/college to allow students a pathway to a four-year degree in a specific program (Kisker, 2007; Roksa, 2009). Institutional articulation agreements are vital for many students in the transfer process, and without some form of policy to protect students, students are vulnerable to excess credit loss as they transfer between institutions (Giani, 2019; Wellman, 2002).

Research has been conducted on the effectiveness of articulation policies. Bender (1997) concluded that policy development should focus on helping students continue their education. The insight from Bender's study is just as important today, as the focus is on the wellbeing of the student transferring, but there is still much work to be done to help students transfer the credits needed at a four-year institution from the community college (Chase, 2011; Roksa, 2009; Roksa, & Keith, 2008). Studies also show local articulation agreements are effective, but state articulation agreements show to be more effective (National Student Clearinghouse Research Center, 2017; Roksa, & Keith, 2008; Wellman, 2002).

Policy in North Carolina

Wellman (2002) refers to state policy as essential for addressing concerns specific to transfer from two-year institutions to four-year institutions in public higher education systems. Policies concerning articulation can be developed through the state legislature, state oversight agencies in higher education, and/or between individual institutions (Giani, 2019). In North Carolina, public higher education is overseen by two systems. Public community colleges in North Carolina are managed by the NCCCS and are governed by the State Board of Community Colleges (NCCCS, 2018). The UNC System supervises the state's sixteen public four-year institutions and is administered by the UNC Board of Governors (UNC SYSTEM, 2020a). North Carolina has 58 public community colleges and sixteen public universities (NCCCS, 2018; UNC SYSTEM, 2020a).

Students in the NCCCS can transfer to a public four-year institution in two ways; through the CAA; or, local articulations between the community colleges and the four-year institutions. The North Carolina state legislature passed legislation in 1997 (HB 739 and SB 1161), which is referred to as the North Carolina CAA, calling for North Carolina's two higher education systems to develop a transfer policy between public two-year and public four-year institutions (Board of Governors of the University of North Carolina and Board of Governors of the NCCCS, 2014; Wellman, 2002). The CAA intends to coordinate the transfer of general education classes between the two North Carolina higher education systems and focus on students enrolled in AA or AS degree programs (Board of Governors of the University of North Carolina and Board of Governors of the North Carolina Community College System, 2014; Wellman, 2002). The North Carolina CAA was revised in 2013 and applied in 2014 (Board of Governors of the University of

North Carolina and Board of Governors of the North Carolina Community College System, 2014).

Past research show NCCCS community colleges serve approximately 40% of the state's undergraduate population (NSCRC, 2017). NCCCS community colleges have 24% of students who transfer to a public four-year institution, and 46% of these students complete a bachelor's degree within six years of starting at a community college (Jenkins & Fink, 2016). Furthermore, 25% of students from the NCCCS complete a degree before transferring, which ranks 39th in the nation (Jenkins and Fink, 2016). The reason for the low rate of associate degree completion before transferring may be due to a lack of credits transferring toward the degree at a four-year institution (Crosta & Kopka, 2015). While North Carolina performs well compared to other states when students transfer to a public university within the state, North Carolina shows 76% of community college students do not continue at a four-year institution after completing a degree at a community college and is ranked near the bottom in comparison to other states (Jenkins & Fink, 2016).

Articulation Agreements in Transfer

Nationally, articulation of credit varies in effectiveness across various states in the US (Handel, 2011; Jenkins & Fink, 2016; Roksa, & Keith, 2008; Xu et al., 2018). The development and creation of good partnerships between institutions have been shown to be key in transfer efficiency (Bailey, Jaggars, & Jenkins, 2015). Important elements of these partnerships are priority of transfer, development of clear pathways, and quality advising for the student (Bailey et al., 2015; Fink & Jenkins, 2017; Kisker, 2007).

Articulation policies help ensure better efficiency for students going from two-year to four-year institutions (Handel, 2011; Roksa, 2009). The agreement assists in creating a balance

of power between two-year and four-year institutions (Roksa, 2009). The agreement also helps place a priority on the interests of students, instead of the interests of institutions (Bender, 1997; Handel, 2011). Research shows local articulations are effective, but the monitoring of student progress can take time and money (Handel, 2011; Roksa, 2009). Since students can lose a majority of credits during the transfer process, agreements around elective credit is not enough and needs to be expanded to include applicable transfer credit (Belfield, 2013; Monaghan & Attewell, 2015; Simone, 2014). Only half of the transfer students transfer all, or nearly all, credits to the receiving university, and more than one-third can lose all credits from the community college (Monaghan and Attewell 2015; Simone 2014; United States Government Accountability Office, 2017).

Effort from both a community college and a four-year institution can increase the effectiveness of an articulation agreement (Bailey et al., 2015; Fink et al., 2016; Jenkins & Fink, 2016; Kisker, 2007; Wyner et al., 2016). For example, communication between strategic representatives from each institution is key to efficient pathways of transfer for students (Bailey et al., 2015; Jenkins and Fink, 2016; Wyner et al., 2016). Having strategic members from institutions in the development of transfer agreements can elevate the priority of transfer for students (Jenkins and Fink, 2016; Wyner et al., 2016). While state policy can help to some extent, examples of successful cases of effective transfer come from good partnerships created between institutions from which students transfer (Bailey et.al., 2015; LaSota & Zumeta, 2016).

Transfer in Community College Career and Technical Programs

In higher education, CTE programs that intend to prepare students for a specific job or career are called “vocational programs,” “career programs,” or “occupational education” (Bragg, 2002; Levesque et al., 2008; Hudson et al., 2007; Alfonso et al., 2004). CTE programs are

developed to meet the needs of employment in specific careers and occupations and historically were not meant to help students transfer (Bragg, 2002; Chase, 2011; Ignash & Kotun, 2005; Levesque et al., 2008; Townsend, 2002). Generally, the majority of CTE programs focus on developing labor skills as opposed to theory as with academic curriculums (Levesque et al., 2008). CTE programs typically fall into career clusters, grouping programs with common skills. Common CTE career clusters are Agriculture, Construction, Business/Management, Health Science, Technology, Public Safety, and Manufacturing (Career Clusters, 2021).

All CTE programs focus on training workers for the local labor market (Kasper, 2002). Labor markets tend to need skill, more than knowledge, in which CTE programs are designed to provide (Carnevale et al., 2013). Studies also indicate the US workforce has a shortage in many areas in which community college CTE programs can help meet the need (Chase, 2011; Offenstein et al., 2009). With the evolution of labor markets, a need for highly skilled workers in the US workforce and the ability for workers to be able to continue their education will be of importance (Carnevale et al., 2013).

A pair of studies by Bragg (2002) and by Crosta and Kopka (2014) found that students who enroll in CTE programs tend to be minority, female, and from lower socioeconomic households when compared to students enrolled in two-year transfer programs. Similar studies also show consistency with these findings and can extend the list of characteristics to include married, have children, are older, cannot attend full-time, and have more financial responsibility than transfer students (Calcagno et. al., 2007; Chase, 2011; Handel, 2011; Roksa, 2006).

In many cases, students in CTE programs have a desire to transfer and complete a four-year degree (Chase, 2001; Levesque et al., 2008; Kienzl et al., 2012; Townsend, 2002). For many of these students, credit loss will decrease their chances of successfully transferring and

completing a bachelor's degree (Kinnick et al. 1998). A study by Levesque et al. (2008) shows 60% to 70% of students in higher education, and just over one-half million faculty members, are considered to make-up CTE programs.

In the 1980s, CTE became a critical part of community colleges in America (Townsend, 2002). While CTE was important for local labor markets, studies show trends where CTE was also important to students in creating more opportunities for transfer (Bragg, 2002; Townsend, 2002). In most cases, CTE programs offer a certificate, diploma, associate degree, or bachelor's degree to students who finish the requirements for completion (Levesque et al., 2008). Since many CTE programs at community colleges are also offered at four-year institutions, there are opportunities to create pathways for furthering education (Levesque et al., 2008; Townsend, 2002). Research in the early 2000s shows that CTE programs have increased offerings at four-year institutions (Grubb 2006; National Science Foundation 2008). The addition of programs at four-year institutions in CTE came after the Perkins Act in 2006, which included specific fields aimed at career preparation (2006 Carl D. Perkins Career and Technical Education Improvement Act, P.L. 109-270; Grubb 2006). CTE programs of study can be found in public, private for-profit, and private non-profit institutions (Levesque et al., 2008).

In their study, Shearon, Brownlee, and Johnson (1990) look at students in CTE programs and found that nearly half of the students in the study have an interest in transferring in North Carolina. Studies show, however, that only 31% of students at UNC System universities transferred from community college CTE programs (UNC SYSTEM, 2020b). While North Carolina is considered a more efficient state for students transferring from CTE programs to four-year institutions, transfer students still experience considerable loss of credits (Giani, 2019). This may be why the CTE students interested in transferring, but never do, decide not to transfer.

Applicable Transfer Credits for Transfer Students in CTE Programs

For many transfer students, the issue of inefficiency in transferring is determined not on how many credits will be transferred to the four-year institution, but how many credits will apply toward the degree they are pursuing at the four-year institution (Giani, 2019). Some argue that the focus of inefficient transfer must move past the concept of transferability and concentrate on how many credits will be applied, looking at the issue of applicability of transfer credit (Giani, 2019; Kisker et al., 2011). A recent study shows students who transferred to a four-year institution and completed a bachelor's degree averaged 153.8 credits upon graduating, compared to an averaged 129.1 for students who started and completed at a four-year institution (Belfield, Fink, & Jenkins, 2017). The difference in the averages is 24.7 hours, which would equate to two semesters' worth of classes, under normal circumstances, for a full-time student. The extra hours would result in the student having to spend more money (Monaghan & Attewell, 2014; Roksa & Keith, 2008).

For many transfer students, private institutions are more likely to accept credit toward a bachelor's degree than public institutions (Crosta & Kopka, 2015). Many students transferring from a community college CTE program to a four-year public university are not able to apply credit from the community college toward a bachelor's degree, which proves to be especially true in North Carolina (Grubb, 1991; Giani, 2019; Monaghan & Attewell, 2014). The use of institutional agreements between community colleges and private, for-profit institutions aid in clear transfer pathways, including applicable credits toward the degree at the four-year institution (Giani, 2019). Decision-makers could use the agreements between community colleges and the private, non-profit institutions as a model for developing more efficient agreements between NCCCS Community Colleges and UNC System schools.

Community College Student Characteristics

In the 2019-20 academic year, data shows that 1050 community colleges in America enrolled 11.8 million students (American Association of Community Colleges [AACC], 2020). Community colleges represent a variety of demographics in the populations they serve (AACC, 2020). By having an open-door policy, no one is denied access based on race or ethnic background. Community colleges also give access to people of different ages, with an average age of 28 in 2019 (AACC, 2020). Community colleges deliver educational services to the adult learner often seeking a "second chance" at education, while still being able to accommodate younger students (Grubb, 1991).

Transfer Definition

Transfer in higher education can be defined in many ways, but almost always consist of a student transferring, or "flowing" academic credits from one higher education institution to another (McCormick & Carroll, 1997; Roksa, 2009). Horizontal transfer is used to describe when a student transfers to a peer institution (McCormick & Carroll, 1997). Peer institution refers to two or more institutions similar in the type of education provided, size, and resources (Hurley, 2002). A senior institution refers to 4-year institutions in comparison to 2-year institutions. For this study, "transfer" will be in the context of vertical transfer in which students are transferring from two-year to four-year institutions.

Transferring from a community college to a university was designed to encourage people to start college by creating accessibility to a college degree that would be closer to home (Cohen et al., 2014). For many students, starting at the community college is the only way to a four-year degree (Berger & Malaney, 2003; Kasper, 2002; Wyner et al., 2016). Community college as a

gateway to a four-year degree is even more critical in terms of equity for diverse student demographics (Handel, 2011; Jenkins and Fink, 2016).

A student does not have to complete a degree at one institution before coming to a second institution to be considered a transfer student (McCormick & Carroll, 1997). One central mission at almost any community college is to offer an associate degree designed to transfer to a four-year institution (Kasper, 2002; Wellman, 2002). The transfer option is still considered an important function of two-year institutions, especially for students that could not continue their education after high school (Laanan, 2001; Wyner et al., 2016). To assure the transfer from two-year to four-year institutions continues, almost all states in the United States have state policy designed for transfer success (Boswell, 2004).

There is an array of literature around the traits of community college transfer students (Adelman, 2005; Berger & Malaney, 2003; Boswell, 2004; Jenkins, 2006; Laanan, 2001; Monk-Turner,1995). As noted in the research, community college students differ from undergraduate students in their first two years at four-year institutions in various ways (Monaghan & Attewell, 2014). In a historical study by Monk-Turner (1995), research shows most community college students are not as well prepared as they start their educational journey compared to students starting at four-year institutions. Academic preparedness can be used as an indicator for the success of transfer students and strategies can be formed in increasing preparation for the college environment (Calcagno et al., 2007). Once students transfer to a four-year institution, studies show transfer students complete a bachelor's degree at a similar rate as native students at the four-year institution (Adelman, 2005; Laanan, 1996; Monaghan & Attewell, 2014; Roksa, 2006; Wyner et al., 2016).

Part-time/Full-time

In looking at the total population of community college students, almost two-thirds are considered part-time status, and this figure is consistent with the findings from previous studies (AACC, 2020; Boswell, 2004; Calcagno et al., 2007; Kasper, 2002). Various reasons can be contributed to the reason that the majority of students are part-time, which includes work, marriage, and family obligations (AACC, 2020; Boswell, 2004; Calcagno et al., 2007). Studies also show community college students also tend to be older, which supports the reasoning for why more students enroll part-time, rather than full-time (Boswell, 2004; Calcagno et al., 2007).

Gender

Females make-up slightly more than half of the population of community college students, and this is consistent with previous studies (AACC, 2020; Calcagno et al., 2007; Kasper, 2002; Laanan, 1996). Studies show females graduate at higher rates but are less likely to transfer to a four-year institution (Calcagno et al., 2007; McCormick & Carroll, 1997). Research suggests that the low transfer rate for females is due to family and marriage obligations (Calcagno et al., 2007).

Race and Ethnicity

Most students enrolled at community colleges are White, followed by Hispanic, and then Black (AACC, 2020). These statistics regarding race and ethnicity are consistent with past research on ethnicity trends (American Association of Community Colleges [AACC], 2019; Calcagno et al., 2007). Research also shows the community college enrolls more minorities than any other sector of higher education (Handel, 2011; Wellman. 2002; Wyner et al., 2016).

Socioeconomics

The Pell Grant exists to help lower-income, undergraduate students have the means to an opportunity for a higher education credential (College Board, 2019). Data show Pell Grant awards grew 35% from 2008-09 to 2018-19, and one-third of community college students were recipients of a Pell Grant award (AACC, 2020; College Board, 2019). In 2019, it is estimated 6.8 million American college students were recipients of a Pell grants and full Pell Grant awards for students averaged $4,160.00, with a maximum of $6,095.00 (College Board, 2019).

Career and Technical Students

Students enrolled in CTE programs are typically different than students enrolled in academic programs. Research shows CTE students are much more likely to be females, independent financially, considered to be a minority, and older than 24 years of age than those enrolled in transfer programs (Hirschy et al., 2011). CTE students are also more likely to receive financial aid (Hirschy et al., 2011). Many students enrolled in CTE programs are seeking an education strongly linked to career opportunities (Hirschy et al., 2011). Research also shows that students from CTE programs are just as likely to transfer as students in academic programs (Giani, 2019; Townsend, 2002).

Barriers to Transfer

Many students intend to transfer from a community college to a four-year institution after accumulating a substantial amount of credit or graduating but simply do not (Boswell, 2004; Levesque et al., 2008; Xu & Jaggars, 2016). In many cases, students will accumulate credits that will not apply toward a degree at a four-year institution, which leads to spending more time at the four-year institution to complete a bachelor's degree (Findlen, 1998; Xu et al., 2018). When a student takes longer, issues arise in the cost attributed to attaining an education from a 4-year

institution (NSCRC, 2019; Roksa, 2009; Wellman, 2002). This effect, in many cases, is known as “swirling” in higher education and describes how students can flow within an institution or between separate institutions (Giani, 2019; Townsend 2002). Also, when a student belonging to a lower SES make mistakes, research shows the impact on these students is the lack of overcoming the mistake and can lead individuals to give up on their pursuit of a four-year degree (Bailey et al., 2005).

Research also indicates the lack of pathways developed between community colleges and four-year institutions is a major factor in the issue of inefficient transfer (Batts & Pagliari, 2013; Calcagno et al., 2007; Chase, 2011; Fink & Jenkins, 2017; Giani, 2019; Handel, 2011). Studies show that mapping pathways for students to start at a community college, transfer to a four-year institution, and then graduate has promising results (Handel, 2011; Fink & Jenkins, 2017; Wyner et al., 2016).

Wyner et al. (2016) concludes that students with unclear pathways tend to make poor decisions in the transfer process due to the lack of information available to them about efficient options. Other studies back these findings and conclude effective advising can help students make informed decisions in transferring to a four-year institution (Fink & Jenkins, 2017; Jenkins and Fink, 2016; Wyner et al.,2016). By advising transfer students specific to their four-year institution of choice, students would be guided to an efficient pathway from the beginning of their postsecondary enrollment to graduation with a bachelor’s degree (Bailey et al., 2015; Jenkins and Fink, 2016; Wyner et al.,2016).

Advantages of Starting at Community College

Many studies highlight the advantage of starting at a community college and transferring to a four-year institution. One of the obvious reasons for students to start at the community

college is the cost (AACC, 2020; Belfield, 2013; Handel, 2011; Kasper, 2002). The average tuition and fees at a community college are approximately 36% of the cost of that at a four-year institution (Handel, 2011; AACC, 2020). For many community college students being able to stay at home while they attend college is also a cost-saver in most cases (Belfield, 2013; Crosta & Kopka, 2015; Kasper, 2002). Costs saved by being able to stay at home while attending community college include rent and eating expenses, or room and board costs, typically accrued by students attending four-year institutions (Crosta & Kopka, 2015).

Stakeholders from various areas of society are working together to improve economic outcomes for students going to community colleges (Wyner et al., 2016). Research shows that interest in supporting transfer students from community colleges to four-year institutions stems from the desire to create a better workforce for industry (Fink & Jenkins, 2017). By starting at the community college and then transferring to a four-year institution, students can minimize their financial investment in their education (Belfield, 2013; Crosta & Kopka, 2015). A lower financial investment can lead to lower debt in attaining a bachelor's degree and a higher chance that the student enters the labor market with higher skills in demand.

One main goal of transfer is to successfully connect students to jobs in labor markets after they graduate with their bachelor's degree (Wyner et. al, 2016). With demand increasing in the United States for workers with high skills, efficient transfer opportunities will help increase the supply of possible workers for these jobs (Belfield, 2013; Carnevale et al., 2013).

Chapter Summary

Chapter 2 gives a background on the purpose of community college and a review of the work that has been done in terms of transfer from community colleges to four-year institutions, both in the United States and North Carolina. Policy has been a driving factor in the development

of creating transfer pathways, as well as the continual need to increase the skills of the workforce. Concerns around barriers for students aspiring to attain a bachelor's degree continue to exist, in some cases, these barriers can be part of issues of accessibility and equity. Chapter 3 will expand on the design and how the study was conducted, as it looked for existing efficient pathways from community colleges to public universities in North Carolina.

Chapter 3 – Research Methodology

Introduction

The purpose of the study was to determine the efficiency of transfer for students coming from a North Carolina Community College with an AAS degree to a university in the UNC System. The study used a quantitative approach to measure the applicable credits transferred from community college to public university in North Carolina. Chapter 3 explains how the provided models attempted to answer the research questions from Chapter 1, which focused on transfer pathways for AAS students from the NCCCS to the UNC System. The study also looked at the relationship of student characteristics on successful credit transfer from a community college of NCCCS to a university of the UNC System. The details of the research methods used in the study are outlined in the remainder of this chapter.

Research Design

Because the researcher had little or no control over the independent variables attributed to the participants in this study, this study used a non-experimental correlational research design to answer the given research questions (Creswell & Creswell, 2018). The research design was exploratory by nature, as the study aimed to discover and highlight existing pathways for students graduating from a community college with an AAS degree classified by a career cluster and transferring to one of the sixteen universities within the UNC System. To determine the outcome of the research questions, the community college hours accepted and applied toward the university degree were used to evaluate transfer efficiency between the two North Carolina institutions. Student characteristics, which consisted of gender, age, race and ethnicity, and socioeconomic status, are also investigated and analyzed on how these factors affect applicable credits after transfer for AAS students. IBM SPSS was used to analyze the collected data for

relationships of applicable credits for students transferring from AAS programs through North Carolina public community-college-to-university pathways.

Population/Sample

The population for the study was a large longitudinal dataset. The data given for the study was a panel dataset consisting of transfer students who were enrolled at one of the sixteen UNC System universities from the Fall semester of 2003 through the Spring semester of 2019. The dataset was constructed from data provided by the UNC System to the Belk Center at North Carolina State University.

A sample was created from the dataset provided by the Belk Center at North Carolina State University. The sample consisted of transfer students that transferred from North Carolina community college AAS programs to one of the sixteen UNC System universities. The sample covered the Fall 2014 semester through the Fall 2019 semester. Student identifying information was not used in the study, therefore omitting the need for student consent. Due to the numerous programs a student can major in at a university, career clusters were used to group majors into broader categories for analysis. The 2010 Career Cluster Framework designed by the U.S. Department of Education was used to organize the intended areas of studies each student transferred into at the UNC System university. The study used a UNC System transferred too, record identifier, year of enrollment at UNC System institution, applicable transfer hours, NCCCS institution transferred from, degree earned at NCCCS institution, major at university, gender, Pell status, race and ethnicity, and age.

Data Source

The study used data provided by the Belk Center at North Carolina State University. Data requested included a snapshot of a student's progress and demographic information as they

transferred from the community college to the university. The data requested was for the population of students transferring from NCCCS community colleges to UNC System universities.

Ethics

An Institutional Review Board (IRB) is utilized to protect the identity of human subjects in research studies. Prior to beginning a study, IRB approval was required for any study involving human subjects (https://research.ncsu.edu/administration/compliance/research-compliance/irb/). Approval was required for all institutions involved in the study.

Before the study was conducted, an IRB was filed and approved to conduct a study of transfer efficiency involving NCCCS community colleges and UNC System universities for examining pathways for students in AAS programs. Even though the dataset for the study came from the Belk Center at North Carolina State University, the IRB was filed and approved by the researcher through North Carolina State University protocol. The approved IRB was then shared with the Belk Center at North Carolina State University and a non-disclosure statement was signed by the researcher to receive data. The data received by the researcher pertained to information about transfer students and the student demographics for these records.

The data was shared by the Belk Center at North Carolina State University through a shared Google Drive folder. The Google Drive folder was password protected, in which the researcher was provided the password to access the data. Once the data was accessed, the researcher copied the data to a personal Google Drive folder. Using the functionality built into the Google File Stream service for Google Drive, a local copy was made offline through the Google service. The described process only allowed access to the data if the researcher was logged into the laptop used for the study. The Google technology also kept the data encrypted to

help ensure data cannot be breached if unauthorized access was attempted. Once the study was complete, the data was deleted by the researcher to prevent the potential of unauthorized access to the data provided by the Belk Center at North Carolina State University.

Preliminary Data Analysis

The dataset provided by the Belk Center at North Carolina State University for the study was in the format of an Excel spreadsheet and various SPSS files. A data dictionary for the file was given and showed 81 variables for each record in the dataset.

One extra field was added to the dataset to identify which of the 16-career clusters the student's major fell into according to the 2010 National Career Cluster Framework. The dataset provided contained a variable for the *Classification of Instructional Programs*, known in education as a CIP code (National Career for Education Statistics [NCES], 2020). The CIP coding scheme is developed and maintained by NCES and used to analyze data from colleges for reporting purposes (NCES, 2020). CIP codes are structured to indicate three levels of classification; for example, 15.0201 is used for the Civil Engineering Technology/Technician major. The first two digits indicate the major program of study, followed by a four-digit number representing the subcategory of the program, with a period separating the first level from the second level (NCES, 2020). An additional number can be used to identify more specific subprograms within the indicated program but is not needed for this study. For the study, the CIP code with the first and second groups was used to indicate the major of the student. The CIP code in each record was used to cross-reference the 2010 National Career Cluster Framework to match up the career cluster and major. Table 3.1 provides a list of the career clusters provided by the 2010 National Career Cluster Framework.

Table 3.1

2010 Career Cluster classifications

Career Cluster Number	Career Cluster Name
1	Agriculture, Food & Natural Resources
2	Architecture & Construction
3	Arts, Audio/Video Technology & Communications
4	Business Management & Administration
5	Education & Training
6	Finance
7	Government & Public Administration
8	Health Science
9	Hospitality & Tourism
10	Human Services
11	Information Technology
12	Law, Public Safety, Corrections & Security
13	Manufacturing
14	Marketing
15	Science, Technology, Engineering & Mathematics
16	Transportation, Distribution & Logistics

Note. Credentials at college and universities in North Carolina have a unique identifier, known as a CIP code. Each CIP code is grouped and categorized into a career cluster.

Participants in the study were provided a unique identifier for the student record that was assigned before the dataset was received by the researcher. Because the data was a panel dataset

and had multiple entries for a student's unique identifier, the record consisting of the earliest date of transfer was the only record analyzed for each student. If records were missing for the value for the Transfer Hours variable, these records were filtered out and not included in the sample. The data were then filtered by the entry field to only include records of students that were enrolled in a UNC System university in Fall 2014 through Spring 2019. The dataset was then filtered again to only include students transferring from one of the NCCCS community colleges. Next, the dataset was filtered to include only students that received an AAS degree before transfer. Lastly, the CIPmajor code was cross-referenced to identify the appropriate career cluster the degree belongs to.

After analyzing the variables for the data provided by the Belk Center at North Carolina State University, the following variables defined in Table 3.2 were used to answer the research questions in this study.

Table 3.2

Variables used from the dataset provided by the Belk Center for the study

Variables	Definition	Variable Type
reportingInstutition	UNC System student is transferring too	Categorical
newID	Unique identification of student observation	Categorical
entry	Term that a student entered a UNC System institution	Categorical
race	The identified ethnicity of the student	Continuous
sex	The sexual orientation of the student	Categorical
fice_name	The community college a student graduated from before transferring	Categorical
transferHours	Applicable credits toward degree at North Carolina public university	Continuous

Table 3.2 (continued).

Variables	Definition	Variable Type
CIPmajor	Program of study entered at the university	Categorical
pell	Whether the student received a Pell grand award	Dichotomous
ccDegYr1 through ccDegYr4	Academic year student received community college credential	Categorical
careerCluster	NATIONAL CAREER CLUSTER FRAMEWORK code for the program of study indicated by MajorCIP	Categorical
AYage	Approximate age of student	Continuous

Note. All variables indicate the student preference at the time of transfer from the North Carolina community college to a North Carolina public university.

Data Analysis

The dataset given for the study contained 1,038,671 student records. The researcher initially filtered the dataset through a preliminary data analysis. Some student records indicated whether the student was a graduate student at a university, where the researcher omitted the records marked as "Y" (n=114,444). Records were then analyzed to whether the student graduated from a North Carolina community college, where records marked as "N" were omitted (n=109,650). The researcher then omitted all records where applicable transfer credits were less than or equal to zero (n=31,582) and records with more than 90 credits (n=1,709). Next, the researcher deleted records having an entry date earlier than Fall 2014 to a North Carolina public university (n=512,819). The dataset contained four fields to indicate if the student attained an AAS degree. The researcher created a new variable to test the four fields in each record for the attainment of an AAS degree and, if so, the new variable would show a value of "true" for the

field. Once this was complete, the records not having a value of true were omitted (n=222,658). Some students had multiple records in the dataset. The researcher sorted and filtered the dataset to show the most current record for each student, omitting the earlier record (n=35,910). Lastly, a test was conducted to verify each student had a valid CIP in their record. CIP fields are six characters in length. Some records did not meet this specification, showing a CIP value with no length or less than six. These records were omitted from the dataset (n=69). The records were then tested for a valid CIP code that was identified in each of the career clusters. Records that did not have a valid CIP code were deleted from the dataset. This process left 9,830 records in the dataset after the preliminary data analysis.

After filtering and truncating the given dataset to leave the variables described in Table 3.2, the researcher analyzed the remaining data for missing values. Records missing 15% or more of data were considered for omission from the study, and this did not apply to any records in the dataset. Any missing values for the student's major at the university were identified as UNDECIDED, as indicated in the data dictionary documentation provided by the Belk Center at North Carolina State University.

The researcher began by analyzing the variable indicating how many applicable credits have transferred to the UNC System university of choice. While the data could be considered individual-level data or school-level data, all data in the study was considered to be at the same level. The first objective of the analysis was to examine the data values of the variable for normal distribution. Descriptive statistics were calculated to determine measurements of central tendencies. By comparing the mean, median, and mode, an assumption was verified for the degree of skewedness in the distribution of values. A histogram was then used to validate the

data in terms of kurtosis and confirmed normality (Urdan, 2017). The initial data analysis confirmed normally distributed and identified outliers.

The second and third assumptions were to test and verify that the data had linearity and were heteroscedastic, meaning the variance of error terms in the data were not constant over the range, which led to verifying the fourth and final assumption (Hair et al., 2010). A Levene's test was conducted in SPSS to assess the residuals of the dependent variables. The data was confirmed to be heteroscedastic, and an Ordinal Least Square (OLS) regression did not have to be used to increase the linear relationship of the variables.

The first research question attempted to explain the impact of gender, age, race and ethnicity, and SES by examining the amount of variance when students transfer to a UNC System university after graduating with AAS degrees from NCCCS. The dependent variable for the first research question was applicable transfer credit hours. The independent variables for the first research question were gender, age, race and ethnicity, and Pell grant status. A multiple regression analysis was used for each career cluster according to the following model:

$$(1)\ Y_i = \beta_0 + \beta_1 Race + \beta_2 Gender + \beta_3 Age + \beta_4 Pell + \varepsilon_i.$$

where,

Y_i= value for the dependent variable (DV = *Applicable Transfer Credits*)

β_0= is the intercept of the y-axis

$\beta_1 Race$ = coefficient for the third independent variable (*Race and Ethnicity*)

$\beta_2 Gender$ = coefficient for the first independent variable (*Gender*)

$\beta_3 Age$ = coefficient for the second independent variable (*Age*)

$\beta_4 Pell$ = coefficient for the fourth independent variable (*Socioeconomic Status*)

ε_i = residuals, also known as errors of prediction

A Forward selection entry method was used in building the block for the first regression model. This method allowed for more control in how the variables for the regression were analyzed. The regression did not include groups with less than ten students in an iteration for each career cluster, which impacted the $\beta_1 Race$ variable in the analysis.

The second research question added the North Carolina public university to the model used for examining the first research question. A multiple regression analysis was used to examine the amount of variance when a student transferred to a UNC System university after graduating from an AAS program at a NCCCS institution. The following multiple regression model was used to determine if there was any significance in the first research question of this study:

$$(2)\ Y_i = \beta_0 + \beta_1 UNC_{University} + \gamma X_i + \varepsilon_i$$

where,

Y_i = value for the dependent variable (DV = *Applicable Transfer Credits*)

β_0 = the intercept of the y-axis

$\beta_1 UNC_{University}$ = the North Carolina University chosen by the student at transfer

γX_i = collection of variables used in research question one

ε_i = residuals, also known as errors of prediction

The results produced by SPSS showed the efficiency of transfer pathways for students transferring to a UNC System university grouped by career cluster after graduating with a two-year AAS degree. A Forward selection entry method was used in building the block for the second regression model in SPSS. This method allowed for more control in how the variables for the regression were analyzed. The regression did not include UNC System schools that did not have a pathway for a career cluster.

The third research question used a frequency analysis to determine which NCCCS community colleges provided the most students in the highest performing partnerships identified in research question two.

Limitations

One limitation of this study was not knowing about any existing agreements or partnerships created between NCCCS institutions and UNC System universities for AAS programs. By identifying and understanding how specific agreements and partnerships were developed and implemented could help other partnerships be more efficient for AAS students. A second limitation was not knowing the degree that students graduated with at the NCCCS institution. Knowing the program of study the student graduated from at the NCCCS institution could show how closely the two-year degree aligned to the four-year degree. The third limitation was not knowing the individual classes a student transferred into the UNC System. Having the transcript of classes would allow the study to examine classes applying toward a bachelor's degree at the UNC System institution. For many transfer students, the program at the community college correlates with the amount of credit accepted at the transfer institution (Giani, 2019).

Chapter Summary

The methodology section showed how the study used a quantitative approach in examining the relationship of student data on applicable transfer credit hours for students transferring from NCCCS to the UNC System after receiving a two-year AAS degree. Data was provided from the Belk Center at North Carolina State University for the study, in which a sample subset of data using student records from 2014 through 2019 was constructed and used for analysis. The constructed dataset was an Excel spreadsheet that was loaded into IBM SPSS. To explore the relationship of variables in the dataset on applicable transfer hours, the researcher

used descriptive statistics and multiple regression analysis to test the significance, if any, of the correlations in the previous regression models provided in the chapter. The results of the analysis are discussed in Chapter 4.

Chapter 4 - Results

Introduction

This dissertation implemented a non-experimental quantitative approach to examine for each career cluster, the relationship between student characteristics and the amount of applicable credit hours students received after transferring and the relationship of the 4-year receiving institution on the amount of applicable credit hours students received after transferring. Multivariable linear regression was used to determine the significance of the relationship between individual variables and their effects on applicable transfer hours within each transfer pathway. The coefficient of each variable was used to measure the effect of that variable within the given pathway for each of the sixteen regression models.

Data Analysis

After the initial analysis, the sample used for the study consisted of 9,830 records, each representing a single AAS transfer student. SPSS was used to explore these data through frequency analysis. Based on the frequency analysis, several groups were determined unsuitable for this study including certain schools, demographic groups, and one career cluster. Specifically, the initial frequency analysis for North Carolina public universities revealed that the University of North Carolina's School of the Arts had only three (.03%) students in the dataset. Thus, the data for this institution was omitted from the sample due to too few students that would allow individuals to be identified. In the initial frequency analysis of the career clusters, the students in the sample belonging to career cluster 16 (Transportation, Distribution, & Logistics) had only nine (.09%) students in the sample. Due to the small number of students in career cluster 16, the records were not included in the analysis. The ethnicities of Native Hawaiian or Other Pacific Islander had very small representations in the sample (n=15), collectively accounting for only

0.15% of the sample, and were therefore omitted from the study. Additionally, students that were undecided or had an unknown CIP to align with one of the career clusters (n=400), which was 4.07% of the sample, were omitted from the sample as this study focused on the efficiency in career cluster pathways, and students with undecided majors were outside the scope of the study. The total number of records omitted from the dataset were 427 (4.34%) of the original population, leaving 9,403 student records.

Using this refined dataset within SPSS, the sample was analyzed again to determine measurements of central tendencies and various frequencies to provide a thorough description of the students that completed AAS degrees prior to transferring to UNC System schools. There were 9,403 students in the dataset that transferred from a NCCCS institution to one of the sixteen UNC System public universities in the dataset.

In the appendix, Table A1 lists all the institutions and includes the numbers of students and the percentages they comprise of the total transfers from a North Carolina community college to a North Carolina public university. In this sample, ECU had the largest number of AAS transfer students (n=1,488, 15.82%), UNC-G had the second largest number of transfers (n=1,326, 14.10%), and UNC-C had the third largest number of transfer students (n=1,160, 12.34%). ECU and UNC-G combined accounted for approximately one-third (n=2,814, 29.93%) of the AAS transfer students. The four largest schools by frequency of AAS transfer students (ECU, UNC-G, UNC-C, & UNC-W) accounted for over half of the sample, at 54.57% (n=5,131, 54.50) of the cases in the dataset. The three universities (UNC-A, ECSU, & UNC-CH) with the lowest frequency of students accounted for less than 1% of the population, individually.

In the appendix, Table A2 lists the years each student transferred into a UNC System institution. In this sample, the 2018 year had the highest frequency (n=2,394, 25.46%), the 2017

year had the second highest frequency (n=2,085, 22.17%), and the 2016 year had the third highest frequency (n=1,876, 19.95%). The 2014 and 2019 years had the lowest frequency, due to only including students from one semester in the year. When considering years where students were counted for all semesters, transfer numbers increased year-over-year.

In the appendix, Table A3 shows the frequency of AAS transfer students based on ethnicity. In this sample, White students represented the largest racial/ethnic group in the study (n=6,022, 64.04%), accounted for approximately two-thirds of the total sample. Black or African American, had the second most students (n=1,848) and accounts for 19.65%. These two groups contain 86.70% (n=7,870) of the sample. The racial demographic information for this study closely aligned to that of the state of North Carolina at the time of this study (North Carolina Community College System, 2019).

In the appendix, Table A4 shows the frequency of students that transferred from each North Carolina community college to a North Carolina public university with an AAS degree. In this sample, Wake Technical Community College had the most students (n=813, 8.65%), Guilford Technical Community College had the second largest number of students (n=531, 5.65%) of the sample, Fayetteville Technical Community College had the third largest number of students (n=522, 5.55%) of the sample, and Central Piedmont Community College had the fourth largest number of students (n=512, 5.45%) of the sample. The four largest contributing North Carolina community colleges to the sample contained just over one quarter of the records at 25.29% (n=2,378). The next eight largest North Carolina community colleges encompassed another quarter (n=2,443) of the sample; and, when added to the first four schools, they demonstrate that half of the total sample is contained in these twelve schools (n=4,821). In this sample, 25 North Carolina community colleges provided 75% (n=7,055) of the AAS students

that transferred, leaving one quarter (n=2,348) of the sample represented in the other 33 North Carolina community colleges. There were 23 North Carolina community colleges that represent less than 1 percent of the population each.

In the appendix, Table A5 shows the frequency of students that transferred into each career cluster at the North Carolina public university they attended. In this sample, the Health Science career cluster had the largest number of students in the dataset (n=3052, 32.46%), followed by the Education and Training cluster (n=1680, 17.87%), and the Manufacturing cluster (n=854, 9.08%). The Health Science career cluster accounted for approximately one-third of all students in the dataset. The Health Science and Education & Training career clusters combined accounted for just over half of the dataset (n=4,732, 50.32%) of all students in the sample. The Manufacturing, Science, Technology, Engineering & Mathematics, and Business Management & Administration career clusters were practically the same size and accounted for 27.18% (n=2,556) of the sample. The remaining eleven career clusters accounted for 22.49% (n=2,115) of the students in the sample.

In the appendix, Table A6 shows the frequency of students that were awarded or not awarded a federal Pell Grant upon transfer. Of the 9,403 in the sample, 60.04% (n=5,646) of students did not receive federal financial aid upon entry and 39.96% (n=3,757) did. Also, Table A7 shows the gender of students in the sample as 63.89% (n=6,008) being female and 36.11% (n=3,395) were male for the sample.

In the appendix, Table A8 shows the frequency for the age of students in the sample. Twenty-three years of age had the largest representation in the sample (n=587, 6.24%) of the records. Twenty-one years of age had the second largest number of students in the sample (n=569, 6.05%) of the records. Twenty-two years of age had the third largest number of students

in the sample (n=561, 5.97%) of the records. Students whose ages range from 20 to 29 incorporate just over half of the sample, at 53.71% (n=5,000). Just over half of the sample was 28 years of age or younger (n=4,778, 50.81%). 76.46% of the sample is 36 years of age or younger (n=7,190). Only 5.54% of the sample is 48 years of age or older (n=521).

In the appendix, Table A9 shows the descriptive statistics for the continuous variables in the sample, transfer hours and age. All students in the sample transferred in 3 to 90 applicable transfer credits ($\bar{x}$=58.09, SD=16.69). Ages for the students in the sample range from 15 to 73 years ($\bar{x}$=30.56, SD=0.09).

In the appendix, Table A10 shows the mean number of applicable transfer hours for each North Carolina public university. The overall mean for the sample was 58.09 credits (SD=16.69), which is just short of half of what is needed to graduate in most bachelor's degree programs. The overall standard deviation showed that approximately 68% of the students in the sample transfer in between 41.40 and 74.78 credits into their program of choice at a North Carolina public university.

When comparing the mean number of applicable transfer hours for each North Carolina public university to the overall mean of all studied students, only four of the fifteen universities in the study are above the overall average. The institution with the highest overall mean is FSU, with an average of 68.49 credits (SD=16.32). NCSU had the second highest average with a mean of 64.73 credits (SD=17.18). WCU had the third highest average with a mean of 64.43 credits (SD=15.23). ASU had the fourth highest mean with an average of 61.85 credits (SD=15.59).

Comparing Applicable Credit Hours Transferred by North Carolina Public University

To describe and compare the receiving institutions (UNC System institutions) a comparison of the number of applicable credit hours was conducted. An ANOVA (F=54.44,

df=1, p<=.01) indicated there was a significant difference in the number of applicable credit hours by receiving institution. Table A11 shows the post hoc results of a one-way analysis-of-variance (ANOVA) test to determine if the means of applicable transfer hours is significant when comparing North Carolina public universities to each other. Each North Carolina public university is listed and the mean for that particular institution is compared to the mean of the other 14 North Carolina public universities. A difference in mean is given for each comparison of universities.

NCA&T awarded less credits on average than other North Carolina public universities ($\bar{x}$=-4.33). Noticeable differences in means were observed when comparing the mean number of applicable transfer hours at NCA&T to those awarded at FSU ($\bar{x}$=16.13), at NCSU ($\bar{x}$=12.28), and at WCU ($\bar{x}$=12.08).

ASU awarded more credits on average than other North Carolina public universities ($\bar{x}$=5.85). Noticeable difference for applicable transfer credits when compared to ASU were UNC-A ($\bar{x}$=19.43), ECSU ($\bar{x}$=-11.35), and NCCU ($\bar{x}$=-12.81).

UNC-A awarded less credits on average than other North Carolina public universities ($\bar{x}$=-14.96). On average, there were ten North Carolina public universities that gave more than ten or more credits than UNC-A. Noticeable difference for applicable transfer credits when compared to UNC-A were ASU ($\bar{x}$=19.43), FSU ($\bar{x}$=26.06), NCSU ($\bar{x}$=22.31), and WCU ($\bar{x}$=22.00). UNC-A gave the least applicable credit than any other North Carolina public university on average.

ECU awarded more credits on average than most other North Carolina public universities ($\bar{x}$=1.03). Noticeable difference for applicable transfer credits when compared to ECU were UNC-A ($\bar{x}$=-14.93), and FSU ($\bar{x}$=-11.12).

ECSU awarded less credits on average than other North Carolina public universities ($\bar{x}$=-6.30). Noticeable difference for applicable transfer credits when compared to ECSU were ASU ($\bar{x}$=11.35), FSU ($\bar{x}$=17.98), NCSU ($\bar{x}$=14.23), and WCU ($\bar{x}$=13.92).

FSU awarded more credits on average than other North Carolina public universities ($\bar{x}$=12.96). On average, there are eleven North Carolina public universities that gave less than ten or more credits. Noticeable difference for applicable transfer credits when compared to FSU were NCA&T ($\bar{x}$=-16.13), UNC-A gave ($\bar{x}$=-26.06), ECSU ($\bar{x}$=-17.98), NCCU ($\bar{x}$=-19.44), and UNC-P ($\bar{x}$=-16.24). FSU gave more credits than any other North Carolina public university on average.

NCCU awarded less credits on average than other North Carolina public universities ($\bar{x}$=-7.87). Noticeable difference for applicable transfer credits when compared to NCCU were ASU ($\bar{x}$=12.81), FSU ($\bar{x}$=19.44), NCSU ($\bar{x}$=15.69), and WCU ($\bar{x}$=15.39).

UNC-P awarded less credits on average than other North Carolina public universities ($\bar{x}$=-4.44). Noticeable difference for applicable transfer credits when compared to UNC-P were FSU ($\bar{x}$=16.24), NCSU ($\bar{x}$=12.49), and WCU ($\bar{x}$=12.18).

NCSU awarded more credits on average than other North Carolina public universities ($\bar{x}$=8.94). Noticeable difference for applicable transfer credits when compared to NCSU were NCA&T ($\bar{x}$=-12.38), UNC-A ($\bar{x}$=-22.31), ECSU ($\bar{x}$=-14.23), NCCU ($\bar{x}$=-15.69), and UNC-P ($\bar{x}$=-12.49).

UNC-CH awarded less credits on average than other North Carolina public universities ($\bar{x}$=-0.55). Noticeable difference for applicable transfer credits when compared to UNC-CH were UNC-A ($\bar{x}$=-13.46) and FSU ($\bar{x}$=12.60).

UNC-C awarded less credits on average than other North Carolina public universities ($\bar{x}$=-1.19). Noticeable difference for applicable transfer credits when compared to UNC-C were UNC-A ($\bar{x}$=-12.86) and FSU ($\bar{x}$=13.20).

UNC-G awarded more credits on average than other North Carolina public universities ($\bar{x}$=1.45). Noticeable difference for applicable transfer credits when compared to UNC-G were UNC-A ($\bar{x}$=-15.32) and ECSU ($\bar{x}$=10.74).

WCU awarded more credits on average than other North Carolina public universities ($\bar{x}$=8.61). Noticeable difference for applicable transfer credits when compared to WCU were NCA&T ($\bar{x}$=-12.08), UNC-A ($\bar{x}$=-22.00), ECSU ($\bar{x}$=-13.92), NCCU ($\bar{x}$=-15.39), and UNC-P ($\bar{x}$=-12.18).

UNC-W awarded less credits on average than other North Carolina public universities ($\bar{x}$=-0.86). Noticeable difference for applicable transfer credits when compared to UNC-W were UNC-A ($\bar{x}$=-13.16) and FSU ($\bar{x}$=12.86).

WSSU awarded more credits on average than other North Carolina public universities ($\bar{x}$=1.65). Noticeable difference for applicable transfer credits when compared to WSSU were UNC-A ($\bar{x}$=-15.51) and FSU ($\bar{x}$=10.55).

Table A5 shows the mean and standard deviation of applicable transfer hours for each career cluster used in the study. The overall mean for the sample is 58.09 (SD=16.69), showing consistency with the results from the ANOVA in comparison to the descriptive statistics for North Carolina public universities.

When comparing the mean in applicable transfer hours for each career cluster to the overall mean, only four of the fifteen career clusters are above the overall mean. Marketing shows the highest mean at 61.56 credits (SD=16.96), the Manufacturing career cluster had the

second highest mean (SD=16.97), Law, Public Safety, Corrections & Security had the third highest mean with 60.13 credits (SD=15.91), Health Science showed the fourth highest with a mean of 59.86 credits (SD=14.88), and Arts, Audio/Video Technology & Communications had the lowest mean at 48.07 credits (SD=18.84).

Table A12 shows the post hoc results of a one-way analysis-of-variance (ANOVA) to determine if the means of applicable transfer hours was significant when comparing career clusters students transfer into at North Carolina public universities. Each career cluster is listed and the mean for that particular career cluster is compared to the mean of the other 14 career clusters. A difference in mean is given for each comparison of career clusters.

The overall mean for Agriculture, Food & Natural Resources is 57.98 and the average difference of mean when comparing to all career clusters in the study is 2.18, which shows 2.18 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to Arts, Audio/Video Technology & Communications ($p<=.001$), Government & Public Administration ($p=.005$), Hospitality & Tourism ($p=.011$), and Information Technology ($p<=.001$). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 9.91, meaning students get 9.91 less credit hours in majors of this cluster than that of the Agriculture, Food & Natural Resources career cluster. The lowest mean in the comparison is with Marketing at -3.85 credit hours, which means students get an average of 3.85 more credit hours in majors for this cluster in comparison to the Agriculture, Food & Natural Resources career cluster.

For majors in Architecture & Construction the overall mean is 53.98 and the average difference of mean when comparing to all career clusters in the study is -2.28, which shows 2.28 less credits on average when students transfer into a major in this career cluster. Results show

significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications (p=.018), Health Science (p=.003), Law, Public Safety, Corrections & Security (p=.003), Manufacturing (p<=.001), and Marketing (p=.007). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 5.74, meaning students get 5.74 less credit hours in majors of this cluster than that of Architecture & Construction. The lowest mean in the comparison is with Marketing at -7.74 credit hours, which means students get an average of 7.75 more credit hours in majors for this cluster in comparison to Architecture & Construction.

For majors in Arts, Audio/Video Technology & Communications the overall mean is 48.07 and the average difference of mean when comparing to all career clusters in the study is -8.43, which shows 8.43 less credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Agriculture, Food & Natural Resources (p<=.001), Architecture & Construction (p=.018), Business Management & Administration (p<=.001), Education & Training (p<=.001), Finance (p<=.001), Health Science (p<=.001), Human Services (p<=.001), Law, Public Safety, Corrections & Security (p<=.001), Manufacturing (p<=.001), Marketing (p<=.001), and Science, Technology, Engineering & Mathematics (p<=.001). Results show noticeable difference in Health Science, where students receive 11.79 more credits in these majors, Law, Public Safety, Corrections & Security, where students receive 12.06 more credits, Manufacturing, where students receive 12.80 more credits, and Marketing, where students receive 13.49 more credits when choosing majors in Arts, Audio/Video Technology & Communications. The highest mean in the comparison is Information Technology at -2.79, meaning students get 2.79 more credit hours in majors of this cluster than that of Arts, Audio/Video Technology & Communications.

The lowest mean in the comparison is with Marketing at -13.49 credit hours, which means students get an average of 13.49 more credit hours in majors for this cluster in comparison to Arts, Audio/Video Technology & Communications.

For majors in Business Management & Administration the overall mean is 57.44 and the average difference of mean when comparing to all career clusters in the study is 1.61, which shows 1.61 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications ($p<=.001$), Government & Public Administration ($p<=.001$), Health Science ($p<=.001$), Hospitality & Tourism ($p<=.003$), Human Services ($p=.045$), Information Technology ($p<=.001$), Law, Public Safety, Corrections & Security ($p<=.001$), and Manufacturing ($p<=.001$). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 9.37, meaning students get 9.37 less credit hours in majors of this cluster than that of Business Management & Administration. The lowest mean in the comparison is with Marketing at -4.11 credit hours, which means students get an average of 4.11 more credit hours in majors for this cluster in comparison to Business Management & Administration.

For majors in Education & Training the overall mean is 57.87 and the average difference of mean when comparing to all career clusters in the study is 2.06, which shows 2.06 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications ($p<=.001$), Government & Public Administration ($p<=.001$), Health Science ($p<=.001$), Hospitality & Tourism ($p<=.001$), Human Services ($p=.013$), Information Technology ($p<=.001$) Law, Public Safety, Corrections & Security ($p=.002$),

Manufacturing (p<=.001), and Science, Technology, Engineering & Mathematics (p=.041). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 9.79, meaning students get 9.79 less credit hours in majors of this cluster than that of Education & Training. The lowest mean in the comparison is with Marketing at -3.70 credit hours, which means students get an average of 3.70 more credit hours in majors for this cluster in comparison to Education & Training.

For majors in Finance the overall mean is 56.64 and the average difference of mean when comparing to all career clusters in the study is 0.75, which shows 0.75 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications (p<=.001), Government & Public Administration (p=.009), Health Science (p=.015), Hospitality & Tourism (p=.022), Information Technology, (p<=.001) Law, Public Safety, Corrections & Security (p=.015), Manufacturing (p=.003), and Marketing (p=.041). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 8.57, meaning students get 8.57 less credit hours in majors of this cluster than that of Finance. The lowest mean in the comparison is with Marketing at -4.92 credit hours, which means students get an average of 4.92 more credit hours in majors for this cluster in comparison to Finance.

For majors in Government & Public Administration the overall mean is 51.52 and the average difference of mean when comparing to all career clusters in the study is -4.74, which shows 4.74 less credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Agriculture, Food & Natural Resources (p=.005), Business Management & Administration (p<=.001), Education & Training (p<=.001), Finance (p=.009), Health Science (p<=.001), Law,

Public Safety, Corrections & Security (p<=.001), Manufacturing (p<=.001), Marketing (p<=.001), and Science, Technology, Engineering & Mathematics (p=.002). Results show noticeable difference in Marketing, where students receive 10.04 more credits when choosing majors Government & Public Administration. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 3.45, meaning students get 3.45 less credit hours in majors of this cluster than that of Government & Public Administration. The lowest mean in the comparison is with Marketing at -10.04 credit hours, which means students get an average of 10.04 more credit hours in majors for this cluster in comparison to Government & Public Administration.

For majors in Health Science the overall mean is 59.86 and the average difference of mean when comparing to all career clusters in the study is 4.20, which shows 4.74 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Architecture & Construction (p=.003), Arts, Audio/Video Technology & Communications (p<=.001), Business Management & Administration (p<=.001), Education & Training (p<=.001), Finance (p=.015), Government & Public Administration (p<=.001), Hospitality & Tourism (p<=.001), Human Services (p<=.001), Information Technology (p<=.001), and Science, Technology, Engineering & Mathematics (p<=.001). Results show noticeable difference in Arts, Audio/Video Technology & Communications, where students receive 11.80 more credits when choosing majors in Health Science. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 11.80, meaning students get 11.80 less credit hours in majors of this cluster than that of Health Science. The lowest mean in the comparison is with Marketing at -1.70 credit

hours, which means students get an average of 1.70 more credit hours in majors for this cluster in comparison to Health Science.

For majors in Hospitality & Tourism the overall mean is 51.08 and the average difference of mean when comparing to all career clusters in the study is -5.21, which shows 5.21 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Agriculture, Food & Natural Resources (p=.011), Business Management & Administration (p=.003), Education & Training (p<=.001), Finance (p=.022), Health Science (p<=.001), Law, Public Safety, Corrections & Security (p<=.001), Manufacturing (p<=.001), Marketing (p<=.001), and Science, Technology, Engineering & Mathematics (p=.012). Results show noticeable difference in Marketing, where students receive 10.48 less credits when choosing majors in Hospitality & Tourism. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 3.00, meaning students get 3.00 less credit hours in majors of this cluster than that of Hospitality & Tourism. The lowest mean in the comparison is with Marketing at -10.48 credit hours, which means students get an average of 10.48 more credit hours in majors for this cluster in comparison to Hospitality & Tourism.

For majors in Human Services the overall mean is 55.03 and the average difference of mean when comparing to all career clusters in the study is -0.99, which shows 0.99 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications (p<=.001), Business Management & Administration (p=.045), Education & Training (p=.013), Health Science (p<=.001), Information Technology (p=.002), Law, Public Safety, Corrections & Security (p<=.001), Manufacturing (p<=.001), and Marketing (p=.004).

The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 6.95, meaning students get 6.95 less credit hours in majors of this cluster than that of Human Services. The lowest mean in the comparison is with Marketing at -6.54 credit hours, which means students get an average of 6.54 more credit hours in majors for this cluster in comparison to Human Services.

For majors in Information Technology the overall mean is 50.86 and the average difference of mean when comparing to all career clusters in the study is -5.45, which shows 5.45 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Agriculture, Food & Natural Resources ($p<=.001$), Business Management & Administration ($p<=.001$), Education & Training ($p<=.001$), Finance ($p<=.001$), Health Science ($p<=.001$), Human Services ($p=.002$), Law, Public Safety, Corrections & Security ($p<=.001$), Manufacturing ($p<=.001$), Marketing ($p<=.001$), and Science, Technology, Engineering & Mathematics ($p<=.001$). Results show noticeable difference in Manufacturing, where students receive 10.01 more credits when choosing majors in Information Technology and in Marketing, were students receive 10.70 less credits when choosing majors in Information Technology. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 2.78, meaning students get 2.78 less credit hours in majors of this cluster than that of Information Technology. The lowest mean in the comparison is with Marketing at -10.70 credit hours, which means students get an average of 10.70 more credit hours in majors for this cluster in comparison to Information Technology.

For majors in Law, Public Safety, Corrections & Security the overall mean is 60.13 and the average difference of mean when comparing to all career clusters in the study is -4.48, which shows 4.48 more credits on average when students transfer into a major in this career cluster.

Results show significance when the mean is compared to the following career clusters: Architecture & Construction (p=.003), Arts, Audio/Video Technology & Communications (p<=.001), Business Management & Administration (p<=.001), Education & Training (p=.002), Finance (p=.015), Government & Public Administration (p<=.001), Hospitality & Tourism (p<=.001), Human Services (p<=.001), Information Technology (p<=.001), and Science, Technology, Engineering & Mathematics (p<=.001). Results show noticeable difference in Arts, Audio/Video Technology & Communications, where students receive 12.06 more credits when choosing majors in Law, Public Safety, Corrections & Security. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 12.06, meaning students get 12.06 less credit hours in majors of this cluster than that of Law, Public Safety, Corrections & Security. The lowest mean in the comparison is with Marketing at -1.43 credit hours, which means students get an average of 1.43 more credit hours in majors for this cluster in comparison to Law, Public Safety, Corrections & Security.

For majors in Manufacturing the overall mean is 60.87 and the average difference of mean when comparing to all career clusters in the study is 5.28, which shows 5.28 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Architecture & Construction (p<=.001), Arts, Audio/Video Technology & Communications (p<=.001), Business Management & Administration (p<=.001), Education & Training (p<=.001), Finance (p=.003), Government & Public Administration (p<=.001), Hospitality & Tourism (p<=.001), Human Services (p<=.001), Information Technology (p<=.001), and Science, Technology, Engineering & Mathematics (p<=.001). Results show noticeable difference in Arts, Audio/Video Technology & Communications, where students receive 12.80 more credits when choosing majors in

Manufacturing and in Information Technology, where students receive 10.01 more credits when choosing majors in Manufacturing. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 12.80, meaning students get 12.80 less credit hours in majors of this cluster than that of Manufacturing. The lowest mean in the comparison is with Marketing at -0.69 credit hours, which means students get an average of 0.69 less credit hours in majors for this cluster in comparison to Manufacturing.

For majors in Marketing the overall mean is 61.56 and the average difference of mean when comparing to all career clusters in the study is 6.02, which shows 6.02 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Architecture & Construction ($p=.007$), Arts, Audio/Video Technology & Communications ($p<=.001$), Finance ($p=.041$), Government & Public Administration ($p<=.001$), Hospitality & Tourism ($p<=.001$), Human Services ($p=.004$), Information Technology ($p<=.001$), and Science, Technology, Engineering & Mathematics ($p=.015$). Results show noticeable difference in Arts, Audio/Video Technology & Communications, where students receive 13.49 more credits when choosing majors in Marketing, Government & Public Administration, where students receive 10.04 more credits when choosing majors in Marketing, Hospitality & Tourism, were students receive 10.48 more credits when choosing majors in Marketing, and in Information Technology, were students receive 10.70 more credits when choosing majors in Marketing. The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 13.49, meaning students get 13.49 less credit hours in majors of this cluster than that of Marketing. The lowest mean in the comparison is with Marketing at 0.69 credit hours, which means students get an average of 0.69 less credit hours in majors for this cluster in comparison to Marketing.

For majors in Science, Technology, Engineering & Mathematics the overall mean is 56.45 and the average difference of mean when comparing to all career clusters in the study is 0.54, which shows 0.54 more credits on average when students transfer into a major in this career cluster. Results show significance when the mean is compared to the following career clusters: Arts, Audio/Video Technology & Communications ($p<=.001$), Education & Training ($p=.041$), Government & Public Administration ($p=.002$), Health Science ($p<=.001$), Hospitality & Tourism ($p=.012$), Information Technology ($p<=.001$), Law, Public Safety, Corrections & Security ($p<=.001$), Manufacturing ($p<=.001$), and Marketing ($p=.015$). The highest mean in the comparison is Arts, Audio/Video Technology & Communications at 8.38, meaning students get 8.38 less credit hours in majors of this cluster than that of Science, Technology, Engineering & Mathematics. The lowest mean in the comparison is with Marketing at 5.11 credit hours, which means students get an average of 5.11 more credit hours in majors for this cluster in comparison to Science, Technology, Engineering & Mathematics.

Comparing Applicable Credit Hours Transferred by Career Cluster

A univariate analysis was used to analyze and describe how career clusters compared to one another in the sample. The mean of applicable transfer credit for each career cluster to each North Carolina public universities can be found in Table A13. Career-cluster-to-university pathways that had less than ten students were removed from consideration in the regression analysis detailed later in the study. Racial/Ethnic groups with less than ten students were grouped together as “Other” in the regression results, except when combining these students resulted in groups that were less than ten AAS students in size.

Majors in the Agriculture, Food & Natural Resources career cluster had a pathway to six North Carolina public universities. The Agriculture, Food & Natural Resources career cluster

had a relatively small number of students that transferred from the community college (n=88, 0.94%) compared to other career clusters and ranged from 1 to 41 students. ASU had 15 (17.05%) students and the highest mean of credits ($\bar{x}$=63.07, SD=14.73) that transferred toward their degree. More students transferred to NCSU than any other North Carolina public university (n=41, 46.59%). The Agriculture, Food & Natural Resources career cluster had a relatively small sample size compared to other career clusters (n=88), with just under half going to NCSU. All schools, but one, transferred more than 50 credits for students. Three schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Architecture & Construction career cluster had a pathway to seven North Carolina public universities. The Architecture & Construction career cluster had a relatively small number of students that transferred from the community college (n=65, 0.69%) compared to other career clusters and ranged from 1 to 32 students. UNC-C had 32 (49.23%) students and the highest mean of credits ($\bar{x}$=59.09, SD=11.99) that transferred toward their degree. Only two schools had ten or more students that transferred from a major in this career cluster and five had less than ten students.

Majors in the Arts, Audio/Video Technology & Communications career cluster had a pathway to all fifteen North Carolina public universities in the study. The Arts, Audio/Video Technology & Communications career cluster had a relatively small number of students that transferred from the community college (n=153,1.63%) compared to other career clusters and ranged from 1 to 39 students. FSU had seven students (4.58%) and the highest mean of credits ($\bar{x}$=67.14, SD=8.92) that transferred toward their degree. More students transferred to ECU than any other North Carolina public university (n=39, 25.49%). Only six schools had ten or more students that transferred from a major in this career cluster and nine had less than ten students.

Majors in the Business Management & Administration career cluster had a pathway to all fifteen North Carolina public universities in the study. The Business Management & Administration career cluster had an above average number of students ($\bar{x}$=626.87) that transferred from the community college (n=851, 9.05%) compared to other career clusters and ranged from 1 to 217 students. UNC-A had two students (0.24%) in the sample and the highest mean of credits ($\bar{x}$=77.50, SD=17.68) that transferred toward their degree. More students transferred to UNC-G than any other North Carolina public university (n=217, 25.50%). Thirteen schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Education & Training career cluster had a pathway to all fifteen North Carolina public universities in the study. The Education & Training career cluster had the second largest number of students that transferred from the community college (n=1,680, 17.67%) compared to other career clusters and ranged from 4 to 537 students. WCU had 133 (7.92%) students and the highest mean of credits ($\bar{x}$=72.26, SD=11.14). More students transferred to UNC-G than any other North Carolina public university (n=537, 31.96%). Fourteen schools had ten or more students that transferred from a major in this career cluster and only one had less than ten students.

Majors in the Finance career cluster had a pathway to twelve North Carolina public universities in the study. The Finance career cluster had a relatively small number of students that transferred from the community college (n=162, 1.72%) compared to other career clusters and ranged from 1 to 46 students. UNC-A had 1 (0.62%) student and the highest mean of credits ($\bar{x}$=76.00, SD=N/A) that transferred toward their degree. More students transferred to UNC-G

than any other North Carolina public university (n=46, 28.40%). Six schools had ten or more students that transferred from a major in this career cluster and six had less than ten students.

Majors in the Government & Public Administration career cluster had a pathway to twelve North Carolina public universities in the study. The Government & Public Administration career cluster had a relatively small number of students that transferred from the community college (n=125, 1.33%) compared to other career clusters and ranged from 1 to 91 students. UNC-P had 1 (0.80%) student and the highest mean of credits ($\bar{x}$=75.00, SD=N/A) that transferred toward their degree. More students transferred to WCU than any other North Carolina public university (n=91, 72.80%). Only one school had ten or more students that transferred from a major in this career cluster and eleven had less than ten students.

Majors in the Health Science career cluster had a pathway to twelve North Carolina public universities in the study. The Health Science career cluster had the largest number of students that transferred from the community college (n=3,052, 32.46%) compared to other career clusters and ranged from 3 to 1021 students. FSU had 121 (3.96%) students and the highest mean of credits ($\bar{x}$=73.72, SD=20.03) that transferred toward their degree. More students transferred to UNC-W than any other North Carolina public university (n=1,021, 33.45%). Ten schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Hospitality & Tourism career cluster had a pathway to eight North Carolina public universities in the study. The Hospitality & Tourism career cluster had a relatively small number of students that transferred from the community college (n=64, 0.68%) compared to other career clusters and ranged from 1 to 21 students. WCU had 14 (21.88%) students and the highest mean of credits ($\bar{x}$=67.29, SD=13.91) that transferred toward their degree. More students

transferred to ECU than any other North Carolina public university (n=21, 32.81%). Four schools had ten or more students that transferred from a major in this career cluster and four had less than ten students.

Majors in the Human Services career cluster had a pathway to fourteen North Carolina public universities in the study. The Human Services career cluster had a relatively small number of students that transferred from the community college (n=238, 2.53%) compared to other career clusters and ranged from 4 to 41 students. FSU had 24 (10.08%) students and the highest mean of credit ($\bar{x}$=68.96 SD=13.82) that transferred toward their degree. More students transferred to UNC-G than any other North Carolina public university (n=41, 17.23%). Twelve schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Information Technology career cluster had a pathway to fourteen North Carolina public universities in the study. The Information Technology career cluster had a large number of students that transferred from the community college (n=432, 4.59%) compared to other career clusters and ranged from 3 to 153 students. NCSU had 31 (7.18%) students and the highest mean of credits ($\bar{x}$=69.58 SD=16.82) that transferred toward their degree. More students transferred to UNC-G than any other North Carolina public university (n=153, 35.42%). Ten schools had ten or more students that transferred from a major in this career cluster and four had less than ten students.

Majors in the Law, Public Safety, Corrections & Security career cluster had a pathway to ten North Carolina public universities in the study. The Law, Public Safety, Corrections & Security career cluster had a large number of students that transferred from the community college (n=722, 7.68%) compared to other career clusters and ranged from 5 to 201 students.

FSU had 201 (27.84%) students, the most of any school in the cluster, and the highest mean of credit ($\bar{x}$=68.13, SD=14.03) that transferred toward their degree. Eight schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Manufacturing career cluster had a pathway to six North Carolina public universities in the study. The Manufacturing career cluster had a large number of students that transferred from the community college (n=854, 9.08%) compared to other career clusters and ranged from 1 to 679 students. WCU had 15 (1.76%) students and the highest mean of credit ($\bar{x}$=61.467, SD=12.09) that transferred toward their degree. More students transferred to ECU than any other North Carolina public university (n=679, 79.51%). Four schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in Marketing career cluster had a pathway to five North Carolina public universities in the study. The Marketing career cluster had a relatively small number of students that transferred from the community college (n=66, 0.77%) compared to other career clusters and ranged from 1 to 27 students. WCU had 27 (40.91%) students, which was the most students from aby school, and the highest mean of credit ($\bar{x}$=66.19 SD=16.22) that transferred toward their degree. Three schools had ten or more students that transferred from a major in this career cluster and two had less than ten students.

Majors in the Science, Technology, Engineering & Mathematics career cluster had a pathway to all fifteen North Carolina public universities in the study. The Science, Technology, Engineering & Mathematics career cluster had a large number of students that transferred from the community college (n=851, 9.05%) compared to other career clusters and ranged from 3 to 155 students. NCSU had 105 (12.34%) students and the highest mean of credits ($\bar{x}$=70.25, SD=14.20) that transferred toward their degree. More students transferred to institution UNC-P

than any other North Carolina public university (n=155, 49.52%). Twelve schools had ten or more students that transferred from a major in this career cluster and three had less than ten students.

Exploring the Relationship between Student Characteristics and Applicable Credit Hours by Career Cluster

Multivariable linear regression models were used to analyze the relationship of student characteristics to applicable credit hours for AAS transfer students by career cluster at a North Carolina public university. Career-cluster-to-university pathways with less than ten AAS students transferring were omitted from the regression analysis for the dissertation which eliminated cluster 16, Transportation, Distribution, and Logistic. Racial/Ethnic groups with less than ten students were grouped together as "Other" in the regression analysis, except when combining students from various ethnicities results in group sizes smaller than ten.

The basic regression model used was as follows:

$$(1) Y_i = \beta_0 + \beta_1 Race + \beta_2 Gender + \beta_3 Age + \beta_4 Pell + \varepsilon_i.$$

In (1), Y_i represented the applicable transfer credits awarded for student i. Here, the coefficient β_0 was the constant term, the coefficient β_1 estimated the effect of a given race and ethnicity on applicable credit, the coefficient β_2 estimated the effect of a given gender on applicable credit, the coefficient β_3 estimated the effect of age on applicable credit, and the coefficient β_4 estimated the effect of SES on applicable credit. A multiple regression analysis was conducted for each career cluster in the study, resulting in fifteen separate models.

Each model was broken into four blocks in SPSS to control each part of the regression model. Model 1 consisted of race/ethnicity, where White was used as a comparison variable. Model 2 consisted of gender and used male as the comparison variable. Model 3 was the age of the students and did not have a comparison variable, since the Age Entering variable is

continuous. Model 4 consists of socioeconomic status, where non-Pell recipients was used as the comparison.

The Agriculture, Food & Natural Resources. The Agriculture, Food & Natural Resources career cluster was comprised of 84 students from the sample used in the study. Table 4.1 shows a large majority of the students were White (n=70, 83.33%), while Hispanics of any race comprised the second largest population (n=6, 7.14%). The average age of these students was 23.80 (SD=5.64). Males made up 71% (n=60) of the cluster. Non-Pell recipients made up 54% (n=45) of the students in the career cluster. For the regression analysis, all racial/ethnic categories other than White were combined due to small individual numbers.

Table 4.1

Agriculture, Food & Natural Resources- Cluster 1, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	2	2.4
Hispanics of any race	6	7.1
American Indian or Alaska Native	1	1.2
Asian	1	1.2
Black or African American	1	1.2
White	70	83.3
Two or more races	3	3.6
Gender		
Female	24	28.6
Male	60	71.4
Socioeconomic Status		
Non-Pell	45	53.6
Pell	39	46.4
Total	84	

In Table 4.2, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.37, df=4, p=.253). Table 4.3 shows that none of the variables were significant. The regression model indicates that the demographic variables explained about 7% of the variation in applicable transfer credit (R^2=.065).

Table 4.2

Student Demographic ANOVA results for the Agriculture, Food & Natural Resources career cluster (Career Cluster 1)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1290.70	4	322.67	1.37	.253
Residual	18657.34	79	236.17		
Total	19948.04	83			

Table 4.3

Regression Model for Student Characteristics to predict transfer hours for the Agriculture, Food & Natural Resources career cluster (Career Cluster 1)

Variable	b	Beta	SE Beta	t	p
Other (Non-White)	4.56	0.11	4.52	1.01	0.32
Female	1.25	0.04	3.77	0.33	0.74
Age Entering	0.57	0.19	0.34	1.68	0.10
Pell	2.15	0.07	3.54	0.61	0.55
(Constant)	43.03		7.84	5.49	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.065)

Architecture & Construction. The Architecture & Construction career cluster contains 43 students. Table 4.4 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=28, 65.12%) students make-up the majority of the Architecture and Construction career cluster. Hispanic of any race (n=5, 11.63%) and Black or African American (n=4, 9.30%) where the next biggest largest ethnic groups. The average age of the career cluster is 22.47 (SD=4.64) and males are a large majority at 86% (n=37). Non-Pell recipient's make-up 56% (n=24) of the career cluster. For the regression analysis Race and Ethnicity Unknown, Hispanic of any race, American Indian or Alaska Native, Asian, Black or African American, and Two or more races were combined due to small numbers in these groups.

Table 4.4

Architecture & Construction- Cluster 2, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	2	4.7
Hispanics of any race	5	11.6
American Indian or Alaska Native	2	4.7
Asian	1	2.3
Black or African American	4	9.3
White	28	65.1
Two or more races	1	2.3
Gender		
Female	6	14.0
Male	37	86.0
Socioeconomic Status		
Non-Pell	24	55.8
Pell	19	44.2
Total	43	

The ANOVA (F=1.09, df=4, p=.374) assessed the overall fit of this model and indicates this model is not a good fit. Table 4.6 shows that none of the variables were significant. The regression model indicates that the demographic variables explained about 10% of the variance in applicable credit hours transferred (R^2=.103).

Table 4.5

Student Demographic ANOVA results for the Architecture & Construction career cluster (Career Cluster 2)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1099.80	4	274.95	1.09	.374
Residual	9568.25	38	251.80		
Total	10668.05	42			

Table 4.6

Regression Model for Student Characteristics to predict transfer hours for the Architecture & Construction career cluster (Career Cluster 2)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-0.91	-0.03	5.34	-0.17	0.87
Female	-2.23	-0.05	7.27	-0.31	0.76
Age Entering	-0.62	-0.12	0.78	-0.79	0.44
Pell	10.52	0.33	5.23	2.01	0.05
(Constant)	66.19		17.59	3.76	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.103)

Arts, Audio/Video Technology & Communications. The Arts, Audio/Video Technology & Communications career cluster is comprised of 120 students. Table 4.7 provides the race/ethnicity, gender, age, and Pell status. White (n=83, 69.17%), with Black or African American (n=20,16.67%) students being the second largest race/ethnicity represented for the career cluster. The average age for the career cluster is 25.71 (SD=7.21). Females make-up 55% (n=66) of the career cluster and 52% (n=62) of the students are non-Pell recipients. For the regression analysis Race and Ethnicity Unknown, Hispanic of any race, American Indian or Alaska Native, Asian, and Two or more races were combined due to small numbers in these groups.

Table 4.7

Arts, Audio/Video Technology & Communications - Cluster 3, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	1	0.8
Hispanics of any race	8	6.7
American Indian or Alaska Native	3	2.5
Asian	2	1.7
Black or African American	20	16.7
White	83	69.2
Two or more races	3	2.5
Gender		
Female	66	55.0
Male	54	45.0
Socioeconomic Status		
Non-Pell	62	51.7
Pell	58	48.3
Total	120	

The ANOVA (F=3.12, df=5, p=.011) indicates the model is statistically significant and overall the is a good fit. Table 4.9 shows in the Arts, Audio/Video Technology & Communications career cluster two coefficients were significantly related to applicable credit hours. Gender shows female students earn 7.52 (p=.02) more credits than male students and for

every year older a student enters a North Carolina public university they earn 0.53 (p=.02) more credits in a major of the career cluster. The regression shows the independent variables predict approximately 12% of the dependent variable (R^2=.120).

Table 4.8

Student Demographic ANOVA results for the Arts, Audio/Video Technology & Communications career cluster (Career Cluster 3)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4500.08	5	900.02	3.12	.011
Residual	32901.79	114	288.61		
Total	37401.87	119			

Table 4.9

Regression Model for Student Characteristics to predict transfer hours for the Arts, Audio/Video Technology & Communications career cluster (Career Cluster 3)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-2.62	-0.05	4.54	-0.58	0.57
Black or African American	-2.94	-0.06	4.34	-0.68	0.50
Female	7.52	0.21	3.19	2.36	0.02*
Age Entering	0.53	0.21	0.23	2.33	0.02*
Pell	-6.09	-0.17	3.14	-1.94	0.06
(Constant)	33.24		6.52	5.10	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.120)

Business Management & Administration. The Business Management & Administration career cluster contains 848 students. Table 4.10 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=491,57.90%) makes up the majority of the career cluster, with Black or African American (n=216, 25.47%) being the next biggest largest ethnic group. The average age of the career cluster is 31.60 (SD=9.00). Females make-up 68% (n=574) of the career cluster and Non-Pell recipient's make-up 58% (n=490) of the career cluster.

Table 4.10

Business Management & Administration - Cluster 4, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	5	0.6
Race and Ethnicity Unknown	21	2.5
Hispanics of any race	57	6.7
American Indian or Alaska Native	20	2.4
Asian	18	2.1
Black or African American	216	25.5
White	491	57.9
Two or more races	20	2.4
Gender		
Female	574	67.7
Male	274	32.3
Socioeconomic Status		
Non-Pell	490	57.8
Pell	358	42.2
Total	848	

In Table 4.11, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.54, df=10, p=.122). Table 4.12 shows in the Business

Management & Administration career cluster two coefficients were significantly related to applicable credit hours. Ethnicity of two or more races show to earn 7.67 (p=.05) more credits on average than White students and for every year older a student enters a North Carolina public university they earn 0.17 (p<=.01) more credits in a major of the career cluster. The regression shows the independent variables predict approximately 2% of the dependent variable (R^2=.018).

Table 4.11

Student Demographic ANOVA results for the Business Management & Administration career cluster (Career Cluster 4)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4284.08	10	428.41	1.54	.122
Residual	233458.16	837	278.92		
Total	237742.24	847			

Table 4.12

Regression Model for Student Characteristics to predict transfer hours for the Business Management & Administration career cluster (Career Cluster 4)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	2.54	0.02	3.77	0.68	0.50
Hispanics of any race	-2.13	-0.03	2.35	-0.91	0.37
American Indian or Alaska Native	1.17	0.01	3.81	0.31	0.76
Asian	2.33	0.02	4.02	0.58	0.56
Black or African American	-2.06	-0.05	1.40	-1.47	0.14
Two or more races	7.67	0.07	3.82	2.01	0.05*
Female	-0.46	-0.01	1.25	-0.36	0.72
Age Entering	0.17	0.09	0.07	2.59	0.01*
Pell	0.95	0.03	1.18	0.81	0.42
(Constant)	52.19		2.28	22.94	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.018)

Education & Training. The Education & Training career cluster contains 1676 students. Table 4.13 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=877, 52.33%) makes up the majority of the career cluster, with Black or African American

(n=569, 33.95%) being the next largest ethnicity. The average age of the career cluster is 31.47 (SD=9.43). Females make-up a large majority of the students, at 83% (n=1,385) of the career cluster and Pell recipient's make-up 54% (n=906) of the sample.

Table 4.13

Education & Training - Cluster 5, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	4	0.2
Race and Ethnicity Unknown	34	2.0
Hispanics of any race	88	5.3
American Indian or Alaska Native	42	2.5
Asian	23	1.4
Black or African American	569	33.9
White	877	52.3
Two or more races	39	2.3
Gender		
Female	1,385	82.6
Male	291	17.4
Socioeconomic Status		
Non-Pell	770	45.9
Pell	906	54.1
Total	1,676	

In Table 4.14, the ANOVA (F=13.75, df=10, p<=.001) indicates the model is statistically significant and overall the is a good fit. Table 4.15 shows in the Education & Training career cluster three coefficients were significantly related to applicable credit hours. Gender shows female students earn 10.83 (p<=.01) more credits than male students. For every year older a student enters a North Carolina public university they earn 0.13 (p<=.01) more credits in a major of the career cluster and Pell recipients show to earn 3.09 (p<=.01) less credits than students that do not receive Pell. The regression shows the independent variables predict approximately 8% of the dependent variable (R^2=.076).

Table 4.14

Student Demographic ANOVA results for the Education & Training career cluster (Career Cluster 5)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	37285.31	10	3728.53	13.75	.000
Residual	451539.28	1665	271.20		
Total	488824.60	1,675			

Table 4.15

Regression Model for Student Characteristics to predict transfer hours for the Education & Training career cluster (Career Cluster 5)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	0.85	0.01	2.88	0.30	0.77
Hispanics of any race	-2.16	-0.03	1.84	-1.17	0.24
American Indian or Alaska Native	-3.66	-0.03	2.60	-1.41	0.16
Asian	-2.06	-0.01	3.48	-0.59	0.55
Black or African American	-0.63	-0.02	0.91	-0.69	0.49
Two or more races	-4.97	-0.04	2.70	-1.84	0.07
Female	10.83	0.24	1.08	10.06	0.00***
Age Entering	0.13	0.07	0.04	3.03	0.00**
Pell	-3.09	-0.09	0.82	-3.78	0.00***
(Constant)	46.93		1.69	27.86	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.076)

Finance. The Finance career cluster contains 133 students. Table 4.16 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=65, 48.87%) is the ethnic group. Black or African American (n=24, 18.05%) and Hispanic of any race (n=17, 12.78%) are the next largest ethnic groups. The average age of the students is 30.23 (SD=9.08). Females make-up 65% (n=86) of the career cluster and Pell recipients made up 55% (n=73) of the sample. For the regression analysis Race and Ethnicity Unknown, American Indian or Alaska Native, and Two or more races were combined due to small numbers in these groups.

Table 4.16

Finance- Cluster 6, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	7	5.3
Hispanics of any race	17	12.8
American Indian or Alaska Native	2	1.5
Asian	13	9.8
Black or African American	24	18.0
White	65	48.9
Two or more races	5	3.8
Gender		
Female	86	64.7
Male	47	35.3
Socioeconomic Status		
Non-Pell	60	45.1
Pell	73	54.9
Total	133	

In Table 4.17, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=.88, df=7, p=.527). Table 4.18 shows regression coefficients and illustrates that the demographic characteristics of these students only account for 5% of the variation in applicable transfer credit (R^2=.047).

Table 4.17

Student Demographic ANOVA results for the Finance career cluster (Career Cluster 6)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1458.52	7	208.36	.876	.527
Residual	29722.42	125	237.78		
Total	31180.93	132			

Table 4.18

Regression Model for Student Characteristics to predict transfer hours for the Finance career cluster (Career Cluster 6)

Variables	b	Beta	SE Beta	t	p
Hispanics of any race	-4.22	-0.09	4.26	-0.99	0.32
Asian	-3.60	-0.07	4.79	-0.75	0.45
Black or African American	-1.43	-0.04	3.70	-0.39	0.70
Other (Non-White)	-2.15	-0.04	4.56	-0.47	0.64
Female	-0.91	-0.03	2.86	-0.32	0.75
Age Entering	0.18	0.11	0.15	1.22	0.22
Pell	-3.50	-0.11	2.77	-1.27	0.21
(Constant)	57.35		5.42	10.59	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.047)

Government & Public Administration. The Government & Public Administration career cluster contains 91 students. Table 4.19 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=82, 90.11%) is the largest ethnic group. The average age of the students is 31.16 (SD=7.76). Males make-up 79% (n=72) of the career cluster. Non-Pell recipients made up 82% (n=75) of the students in the career cluster. For the regression analysis Hispanic of any race, Black or African American, and Two or more races were combined due to small numbers in these groups.

Table 4.19

Government & Public Administration – Cluster 7, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Hispanics of any race	4	4.4
Black or African American	4	4.4
White	82	90.1
Two or more races	1	1.1
Gender		
Female	19	20.9
Male	72	79.1
Socioeconomic Status		
Non-Pell	75	82.4
Pell	16	17.6
Total	91	

The model for the Government & Public Administration career cluster was included for completeness but did not have ten or more students from non-White ethnicity. In table 4.20, the ANOVA ($F=3.21$, $df=4$, $p=.017$) indicates the model is statistically significant and overall the is a good fit. Table 4.21 shows in the Government & Public Administration career cluster one coefficients was significantly related to applicable credit hours. Pell recipients show to earn 13.06 ($p<.01$) less credits than students that do not receive Pell. The regression shows the independent variables predict approximately 13% of the dependent variable ($R^2=.130$).

Table 4.20

Student Demographic ANOVA results for the Government & Public Administration career cluster (Career Cluster 7)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3518.50	4	879.62	3.21	.017
Residual	23544.49	86	273.77		
Total	27062.99	90			

Table 4.21

Regression Model for Student Characteristics to predict transfer hours for the Government & Public Administration career cluster (Career Cluster 7)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	8.98	0.16	5.85	1.54	0.13
Female	-3.21	-0.08	4.31	-0.75	0.46
Age Entering	-0.39	-0.16	0.25	-1.56	0.12
Pell	13.06	0.29	4.60	2.84	0.01**
(Constant)	62.61		8.10	7.74	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.130)

Health Science. The Health Science career cluster contains 3,043 students. Table 4.22 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=2,315, 76.08%) is the largest ethnic group in the career cluster. Black or African American (n=334, 10.98%) is the second largest ethnic group represented. The average age of the students is 32.27 (SD=8.36) and females make-up a large majority in the career cluster at 88% (n=2,679). Non-Pell recipients made up 74% (n=2,250) of the students in the career cluster.

Table 4.22

Health Science - Cluster 8, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	28	0.9
Race and Ethnicity Unknown	84	2.8
Hispanics of any race	138	4.5
American Indian or Alaska Native	42	1.4
Asian	56	1.8
Black or African American	334	11.0
White	2,315	76.1
Two or more races	46	1.5
Gender		
Female	2,679	88.0
Male	364	12.0
Socioeconomic Status		
Non-Pell	2,250	73.9
Pell	793	26.1
Total	3,043	

In Table 4.23, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.40, df=10, p=.172). Table 4.24 shows students with a race/ethnicity of Black or African American earn 1.76 (p=.05) less credits than White students.

Table 4.24 shows regression coefficients and illustrates that the demographic characteristics of these students only account for 1% of the variation in applicable transfer credit (R^2=.005).

Table 4.23

Student Demographic ANOVA results for the Health Science career cluster (Career Cluster 8)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3089.67	10	308.97	1.40	.172
Residual	667090.65	3032	220.02		
Total	670180.31	3,042			

Table 4.24

Regression Model for Student Characteristics to predict transfer hours for the Health Science career cluster (Career Cluster 8)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	-2.05	-0.02	1.65	-1.24	0.22
Hispanics of any race	0.09	0.00	1.30	0.07	0.95
American Indian or Alaska Native	3.87	0.03	2.31	1.68	0.09
Asian	0.66	0.01	2.01	0.33	0.74
Black or African American	-1.76	-0.04	0.88	-2.00	0.05*
Two or more races	-0.19	0.00	2.21	-0.09	0.93
Non-Resident Alien	-3.81	-0.02	2.82	-1.35	0.18
Female	-1.04	-0.02	0.83	-1.25	0.21
Age Entering	0.04	0.02	0.03	1.13	0.26
Pell	-0.63	-0.02	0.62	-1.02	0.31
(Constant)	60.03		1.34	44.92	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.005)

Hospitality & Tourism. The Hospitality & Tourism career cluster contains 53 students. Table 4.25 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=34, 64.15%) is the largest ethnic group in the career cluster. Black or African American (n=11, 20.75%) is the second largest ethnic group represented. The average age of the students is 27.36 (SD=8.10) and males make-up 55% (n=29) of the career cluster. Non-Pell recipient's make-up 53% (n=28) of the students in the career cluster. For the regression analysis Race and

Ethnicity Unknown, Hispanic of any race, American Indian or Alaska Native, Asian, and Black or African American ethnicities were combined due to small numbers in these groups.

Table 4.25

Hospitality & Tourism - Cluster 9, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	1	2.9
Hispanics of any race	3	8.6
American Indian or Alaska Native	1	2.9
Asian	1	2.9
Black or African American	5	14.3
White	24	68.6
Gender		
Female	14	40.0
Male	21	60.0
Socioeconomic Status		
Non-Pell	19	54.3
Pell	16	45.7
Total	35	

In Table 4.26, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.65, df=4, p=.189). Table 4.27 shows regression coefficients and illustrates that the demographic characteristics of these students only account for 18% of the variation in applicable transfer credit (R^2=.180).

Table 4.26

Student Demographic ANOVA results for the Hospitality & Tourism career cluster (Career Cluster 9)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2429.03	4	607.26	1.646	.189
Residual	11064.97	30	368.83		
Total	13494.00	34			

Table 4.27

Regression Model for Student Characteristics to predict transfer hours for the Hospitality & Tourism career cluster (Career Cluster 9)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-13.10	-0.31	7.78	-1.68	0.10
Female	-13.28	-0.33	6.76	-1.97	0.06
Age Entering	0.07	0.03	0.44	0.15	0.88
Pell	-3.04	-0.08	7.04	-0.43	0.67
(Constant)	67.91		11.89	5.71	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.180)

Human Services. The Human Services career cluster contains 229 students. Table 4.28 provides the race/ethnicity, gender, age, and Pell status of the participants. Black or African American (n=113, 49.34%) is the largest ethnic group. White (n=87, 37.99) is the second largest ethnic group represented. The average age of the students is 33.53 (SD=10.48) and Females make-up the large majority of the students at 87% (n=200) of the career cluster. Pell recipient's make-up 64% (n=146) of the students in the career cluster. For the regression analysis Race and Ethnicity Unknown, American Indian or Alaska Native, Asian, and Two or more races were combined due to small numbers in these groups.

Table 4.28

Human Services - Cluster 10, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	5	2.2
Hispanics of any race	12	5.2
American Indian or Alaska Native	5	2.2
Asian	4	1.7
Black or African American	113	49.3
White	87	38.0
Two or more races	3	1.3
Gender		
Female	200	87.3
Male	29	12.7
Socioeconomic Status		
Non-Pell	83	36.2
Pell	146	63.8
Total	229	

In Table 4.29, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=.81, df=6, p=.566). Table 4.30 shows regression coefficients and illustrates that the demographic characteristics of these students only account for 2% of the variation in applicable transfer credit (R^2=.021).

Table 4.29

Student Demographic ANOVA results for the Human Services career cluster (Career Cluster 10)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1336.66	6	222.78	.806	.566
Residual	61322.71	222	276.23		
Total	62659.37	228			

Table 4.30

Regression Model for Student Characteristics to predict transfer hours for the Human Services career cluster (Career Cluster 10)

Variables	b	Beta	SE Beta	t	p
Black or African American	-3.26	-0.10	2.48	-1.32	0.19
Hispanics of any race	-1.80	-0.02	5.13	-0.35	0.73
Other (Non-White)	-0.63	-0.01	4.43	-0.14	0.89
Female	-5.30	-0.11	3.32	-1.59	0.11
Age Entering	0.04	0.03	0.11	0.36	0.72
Pell	-0.93	-0.03	2.29	-0.41	0.69
(Constant)	60.59		4.95	12.23	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.021)

Information Technology. The Information Technology career cluster contains 411 students. Table 4.31 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=247, 60.10%) is the largest ethnic group and Black or African American (n=70, 17.03%) is the second largest ethnic group represented for the career cluster. The average age of the students is 26.90 (SD=7.58) and males make-up the majority of the students at 76% (n=312) of the career cluster. Non-Pell recipient's make-up 51% (n=210) of the students in the career cluster. For the regression analysis Non-Resident Alien, Race and Ethnicity Unknown, and American Indian or Alaska Native were combined due to small numbers in these groups.

Table 4.31

Information Technology - Cluster 11, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	4	1.0
Race and Ethnicity Unknown	8	2.0
Hispanics of any race	40	9.7
American Indian or Alaska Native	5	1.2
Asian	26	6.3
Black or African American	70	17.0
White	247	60.1
Two or more races	11	2.7
Gender		
Female	99	24.1
Male	312	76.0
Socioeconomic Status		
Non-Pell	210	51.1
Pell	201	48.9
Total	411	

In Table 4.32, the ANOVA (F=3.57, df=8, p<=.001) indicates the model is statistically significant and overall the is a good fit. Table 4.33 shows in the Information Technology career cluster three coefficients were significantly related to applicable credit hours. Students with ethnicity of Asian show to earn 7.98 (p=.03) more credits on average. Gender shows female

students earn 8.13 (p<.01) more credits than male students and Pell recipients show to earn 5.38 (p<.01) less credits than students that do not receive Pell. The regression shows the independent variables predict approximately 8% of the dependent variable (R^2=.076).

Table 4.32

Student Demographic ANOVA results for the Information Technology career cluster (Career Cluster 11)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	8406.50	8	1050.81	3.57	.001
Residual	118315.68	402	294.32		
Total	126722.18	410			

Table 4.33

Regression Model for Student Characteristics to predict transfer hours for the Information Technology career cluster (Career Cluster 11)

Variables	b	Beta	SE Beta	t	p
Hispanics of any race	1.03	0.02	3.04	0.34	0.73
Asian	7.98	0.11	3.70	2.16	0.03*
Black or African American	0.39	0.01	2.50	0.16	0.88
Two or more races	-2.67	-0.02	5.53	-0.48	0.63
Other (Non-White)	2.76	0.03	4.31	0.64	0.52
Female	8.13	0.20	2.10	3.87	0.00***
Age Entering	0.15	0.06	0.13	1.18	0.24
Pell	-5.38	-0.15	1.76	-3.05	0.00**
(Constant)	46.20		3.47	13.30	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.076)

Law, Public Safety, Corrections & Security. The Law, Public Safety, Corrections & Security career cluster contains 710 students. Table 4.34 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=410, 57.75%) is the largest ethnic group and Black or African American (n=189, 26.62%) is the second largest ethnic group represented in the career cluster. The average age of the students is 28.83 (SD=8.78) and males make-up 57%

(n=406) of the career cluster. Non-Pell recipient's make-up 52% (n=370) of the students in the career cluster.

Table 4.34

Law, Public Safety, Corrections & Security - Cluster 12, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	2	0.3
Race and Ethnicity Unknown	15	2.1
Hispanics of any race	53	7.5
American Indian or Alaska Native	24	3.4
Asian	6	0.8
Black or African American	189	26.6
White	410	57.7
Two or more races	11	1.5
Gender		
Female	304	42.8
Male	406	57.2
Socioeconomic Status		
Non-Pell	370	52.1
Pell	340	47.9
Total	710	

In Table 4.35, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.33, df=8, p=.225). Table 4.36 shows in the Law, Public Safety,

Corrections & Security career cluster one coefficient were significantly related to applicable credit hours. For every year older a student enters a North Carolina public university they earn 0.19 ($p<=.01$) more credits in a major of the career cluster. The regression shows the independent variables predict approximately 2% of the dependent variable ($R^2=.015$).

Table 4.35

Student Demographic ANOVA results for the Law, Public Safety, Corrections & Security career cluster (Career Cluster 12)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2701.57	8	337.70	1.33	.225
Residual	177919.28	701	253.81		
Total	180620.85	709			

Table 4.36

Regression Model for Student Characteristics to predict transfer hours for the Law, Public Safety, Corrections & Security career cluster (Career Cluster 12)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	4.81	0.04	4.22	1.14	0.25
Hispanics of any race	0.25	0.00	2.38	0.11	0.92
American Indian or Alaska Native	2.68	0.03	3.36	0.80	0.43
Black or African American	0.47	0.01	1.50	0.32	0.75
Two or more races	2.29	0.02	4.87	0.47	0.64
Female	0.11	0.00	1.29	0.09	0.93
Age Entering	0.19	0.10	0.07	2.72	0.01**
Pell	-1.15	-0.04	1.25	-0.92	0.36
(Constant)	54.92		2.23	24.62	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show $R^2=.015$)

Manufacturing. The Manufacturing career cluster contains 850 students. Table 4.37 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=524, 61.65%) is the largest ethnic group and Black or African American (n=125, 14.71%) is the second largest ethnic group represented in the career cluster. The average age of the students is

29.26 (SD=8.62) and males make-up the large majority of the students in the career cluster, at 89% (n=755). Non-Pell recipient's make-up 64% (n=544) of the students in the career cluster.

Table 4.37

Manufacturing - Cluster 13, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	5	0.6
Race and Ethnicity Unknown	59	6.9
Hispanics of any race	59	6.9
American Indian or Alaska Native	11	1.3
Asian	40	4.7
Black or African American	125	14.7
White	524	61.6
Two or more races	27	3.2
Gender		
Female	95	11.2
Male	755	88.8
Socioeconomic Status		
Non-Pell	544	64.0
Pell	306	36.0
Total	850	

In Table 4.38, the ANOVA (F=2.98, df=9, p=.002) indicates the model is statistically significant and overall the is a good fit. Table 4.39 shows in the Manufacturing career cluster one

coefficient were significantly related to applicable credit hours. For every year older a student enters a North Carolina public university they earn 0.32 (p<.01) more credits in a major of the career cluster. The regression shows the independent variables predict approximately 3% of the dependent variable (R^2=.031).

Table 4.38

Student Demographic ANOVA results for the Manufacturing career cluster (Career Cluster 13)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	7549.77	9	838.86	2.98	.002
Residual	236157.74	840	281.14		
Total	243707.51	849			

Table 4.39

Regression Model for Student Characteristics to predict transfer hours for the Manufacturing career cluster (Career Cluster 13)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	-0.31	-0.01	2.32	-0.13	0.90
Hispanics of any race	-0.45	-0.01	2.31	-0.19	0.85
American Indian or Alaska Native	4.47	0.03	5.13	0.87	0.38
Black or African American	-1.34	-0.03	1.73	-0.78	0.44
Two or more races	1.91	0.02	3.31	0.58	0.56
Asian	-4.27	-0.05	2.78	-1.54	0.13
Female	1.84	0.03	1.84	1.00	0.32
Age Entering	0.32	0.16	0.07	4.54	0.00***
Pell	-0.35	-0.01	1.22	-0.28	0.78
(Constant)	51.96		2.14	24.29	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.031)

Marketing. The Marketing career cluster contains 64 students. Table 4.40 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=46, 71.88%) is the largest ethnic group and Two or more races (n=4, 6.25%) is the second largest ethnic group represented for the career cluster. The average age of the students is 29.36 (SD=7.26) and

Females make-up 55% (n=35) of the career cluster. Non-Pell recipient's make-up 61% (n=39) of the students in the career cluster. For the regression analysis Race and Ethnicity Unknown, Hispanic of any race, American Indian or Alaska Native, Asian, Black or African American, and Two or more races were combined due to small numbers in these groups.

Table 4.40

Marketing - Cluster 14, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Race and Ethnicity Unknown	3	4.7
Hispanics of any race	3	4.7
American Indian or Alaska Native	2	3.1
Asian	3	4.7
Black or African American	3	4.7
White	46	71.9
Two or more races	4	6.3
Gender		
Female	35	54.7
Male	29	45.3
Socioeconomic Status		
Non-Pell	39	60.9
Pell	25	39.1
Total	64	

In Table 4.41, the ANOVA (F=2.68, df=4, p=.040) indicates the model is statistically significant and overall the is a good fit. Table 4.42 shows in the Marketing career cluster one coefficient were significantly related to applicable credit hours. For every year older a student enters a North Carolina public university they earn 0.76 (p=.02) more credits in a major of the career cluster. The regression shows the independent variables predict approximately 15% of the dependent variable (R^2=.154).

Table 4.41

Student Demographic ANOVA results for the Marketing career cluster (Career Cluster 14)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2799.88	4	699.97	2.68	.040
Residual	15410.73	59	261.20		
Total	18210.61	63			

Table 4.42

Regression Model for Student Characteristics to predict transfer hours for the Marketing career cluster (Career Cluster 14)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-2.23	-0.06	4.76	-0.47	0.64
Female	8.08	0.24	4.31	1.87	0.07
Age Entering	0.76	0.33	0.30	2.50	0.02*
Pell	5.73	0.17	4.28	1.34	0.19
(Constant)	33.70		9.73	3.46	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.154)

Science, Technology, Engineering, and Mathematics. The Science, Technology, Engineering, and Mathematics career cluster contains 835 students. Table 4.43 provides the race/ethnicity, gender, age, and Pell status of the participants. White (n=545, 65.27%) is the largest ethnic group and Black or African American (n=106, 12.69%) is the second largest ethnic group represented for the career cluster. The average age of the students is 27.82 (SD=8.57) and

males make-up 65% (n=539) of the career cluster. Non-Pell recipient's make-up 60% (n=502) of the students in the career cluster.

Table 4.43

Science, Technology, Engineering, and Mathematics - Cluster 15, Student Demographic Frequencies and Percentages

Variable	Frequency	Percentage
Race/Ethnicity		
Non-Resident Alien	21	2.5
Race and Ethnicity Unknown	22	2.6
Hispanics of any race	61	7.3
American Indian or Alaska Native	20	2.4
Asian	31	3.7
Black or African American	106	12.7
White	545	65.3
Two or more races	29	3.5
Gender		
Female	296	35.4
Male	539	64.6
Socioeconomic Status		
Non-Pell	502	60.1
Pell	333	39.9
Total	835	

In Table 4.44, the ANOVA (F=2.93, df=10, p<=.001) indicates the model is statistically significant and overall the is a good fit. Table 4.45 shows in the Science, Technology,

Engineering, and Mathematics career cluster three coefficients were significantly related to applicable credit hours. Students with ethnicity of Hispanic of any race show to earn 5.37 (p=.03) less credits and students with ethnicity of American Indian or Alaska native show to earn 9.94 (p=.02) less credits on average than White students. Pell recipients show to earn 2.73 (p=.04) less credits than students that do not receive Pell. The regression shows the independent variables predict approximately 3% of the dependent variable (R^2=.034).

Table 4.44

Student Demographic ANOVA results for the Science, Technology, Engineering, and Mathematics career cluster (Career Cluster 15)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9886.38	10	988.64	2.93	.001
Residual	278505.06	824	337.99		
Total	288391.44	834			

Table 4.45

Regression Model for Student Characteristics to predict transfer hours for the Science, Technology, Engineering, and Mathematics career cluster (Career Cluster 15)

Variables	b	Beta	SE Beta	t	p
Non-Resident Alien	4.22	0.04	4.11	1.03	0.31
Race and Ethnicity Unknown	5.69	0.05	4.00	1.42	0.16
Hispanics of any race	-5.37	-0.08	2.49	-2.15	0.03*
American Indian or Alaska Native	-9.94	-0.08	4.21	-2.36	0.02*
Asian	3.27	0.03	3.41	0.96	0.34
Black or African American	-3.32	-0.06	2.05	-1.62	0.11
Two or more races	1.54	0.02	3.52	0.44	0.66
Female	-1.03	-0.03	1.41	-0.73	0.47
Age Entering	-0.08	-0.04	0.08	-1.03	0.30
Pell	-2.73	-0.07	1.33	-2.06	0.04*
(Constant)	60.69		2.30	26.42	

Note. ***p<.001, **p<.01, *p<.05. (Model Summary for the regression show R^2=.034)

Exploring the Relationship between UNC System Institutions and Applicable Credit Hours by Career Cluster

Multivariable linear regression models were used to analyze the coefficients for various student characteristics and for the North Carolina public university's students transferred into for majors in each career cluster. Pathways with less than ten students transferring with a degree from the career cluster to one of the North Carolina public university's is noted and will not be used in the regression analysis in the study. Ethnicity's with less than ten students were grouped together and considered "Other" in the regression results, except when combining students from various ethnicity's did not equal ten after grouping. The regression model to evaluate each public university for each career cluster was built on to the previous model used in the study that focused on student characteristics, which is as follows:

$$(2)\ Y_i = \beta_0 + \beta_1 UNC\_University + \gamma X_i + \varepsilon_i$$

In (2), $\beta_1 UNC\_University$ was added to model (1). The coefficient β_0 was the constant term and the coefficient β_1 indicated the UNC public university of choice by the student. The term γX_i represented the covariate effects of race/ethnicity, gender, age, socioeconomic status, and career cluster of choice for the student. The linear regression ran once for each career cluster in the study, resulting in fifteen analyses.

The previous model used to analyze student characteristics was added to for the second regression model. An additional model, Model 5, consisted of the North Carolina public universities students transferred to in each sample was added in in SPSS.

Models for career clusters 1 and 7 (Agriculture, Food & Natural Resources and Government & Public Administration) did not generate significant models using race/ethnicity, gender, age, Pell, or North Carolina public universities as predictors. The Government & Public Administration career cluster only had one North Carolina public university meeting the

requirement of ten or more students for the study, which was WCU (N=91), and was not included in the following results for career clusters.

The Agriculture, Food & Natural Resources. Table 4.46 shows NCSU having the highest mean ($\bar{x}$=63.07) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.47, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.04, df=7, p=.412). Table 4.48 shows that none of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. The regression analysis only accounts for about 9% of the variation in applicable transfer credit (R^2=.087).

Table 4.46

Descriptive statistics for schools in the Agriculture, Food & Natural Resources career cluster (Career Cluster 1)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	55.30	13.86	10	11.90
ASU	63.07	14.73	15	17.86
NCSU	58.00	14.78	41	48.81
WCU	58.11	18.82	18	21.43
Total			84	100%

Table 4.47

Student Demographic and North Carolina public universities ANOVA results for the Agriculture, Food & Natural Resources (Career Cluster 1)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1740.58	7	248.66	1.038	.412
Residual	18207.45	76	239.57		
Total	19948.03	83			

Table 4.48

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Agriculture, Food & Natural Resources career cluster (Career Cluster 1)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	3.81	0.09	4.79	0.80	0.43
Female	2.22	0.07	3.95	0.56	0.58
Age Entering	0.59	0.20	0.36	1.63	0.11
Pell	2.68	0.09	3.65	0.74	0.47
NCA&T	-8.12	-0.17	6.60	-1.23	0.22
NCSU	-2.50	-0.08	4.95	-0.51	0.62
WCU	-5.16	-0.14	5.64	-0.92	0.36
(Constant)	45.41		9.49	4.78	

Note. ***p<.001, **p<.01, *p<.05; ASU (n=15), NCA&T (n=10), NCSU (n=41) and WCU (n=18). (School being compared to is ASU with an average of 63.07 credit hours in career cluster 1). (Model Summary for the regression show R^2=.087.)

The Agriculture, Food & Natural Resources. Architecture & Construction. Table 4.49 shows UNC-C having the highest mean ($\bar{x}$=59.09) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.50, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=2.18, df=5, p=.078). Table 4.51 shows two of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Pell recipients show to earn 10.79 (p=.04) more credits than non-Pell recipients for the career cluster. Students who chose ASU show to earn 14.27 (p=.02) less credits than students who chose UNC-C. The regression analysis only accounts for about 23% of the variation in applicable transfer credit (R^2=.227). Adding North Carolina public universities to the model shows significance, which was not shown in the model where they are excluded. UNC-C and ASU are the only North Carolina public universities with pathways for this career cluster.

Table 4.49

Descriptive statistics for schools in the Architecture & Construction career cluster (Career Cluster 2)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
ASU	48.45	22.99	11	25.58
UNC-C	59.09	11.99	32	74.42
Total			43	100%

Table 4.50

Student Demographic ANOVA results for the Architecture & Construction career cluster (Career Cluster 2)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2423.84	5	484.77	2.18	.078
Residual	8244.21	37	222.82		
Total	10668.05	42			

Table 4.51

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Architecture & Construction career cluster (Career Cluster 2)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-2.76	-0.08	5.08	-0.54	0.59
Female	3.98	0.09	7.30	0.55	0.59
Age Entering	-1.01	-0.20	0.76	-1.34	0.19
Pell	10.79	0.34	4.92	2.19	0.04*
ASU	-14.27	-0.40	5.85	-2.44	0.02*
(Constant)	78.45		17.29	4.54	

Note. ***p<.001, **p<.01, *p<.05; ASU (n=11) and UNC-C (n=32). (School being compared to is UNC-C with an average of 59.09 credit hours in career cluster 2). (Model Summary for the regression show R^2=.227.)

Arts, Audio/Video Technology & Communications. Table 4.52 shows ASU having the highest mean ($\bar{x}$=52.70) for all UNC System schools with degrees in the career cluster and was

used as the comparison variable in the regression model. In Table 4.53, the ANOVA (F=2.95, df=10, p=.003) indicates the model is statistically significant and overall a good fit. Table 4.54 shows three of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Females show to earn 8.47 (p=.01) more credits than males and for every year older a student enters a North Carolina public university they earn 0.51 (p=.03) more credits in a major of the career cluster. Students who chose UNC-G show to earn 17.71 (p<=.01) less credits than students who chose ASU. The regression analysis only accounts for about 21% of the variation in applicable transfer credit (R^2=.213).

Table 4.52

Descriptive statistics for schools in the Arts, Audio/Video Technology & Communications career cluster (Career Cluster 3)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	40.00	15.71	10	8.33
ASU	52.70	12.20	27	22.50
ECU	50.56	19.85	39	32.50
UNC-C	46.47	15.70	17	14.17
UNC-G	36.59	16.80	17	14.17
UNC-W	44.90	21.42	10	8.33
Total			120	100%

Table 4.53

Student Demographic ANOVA results for the Arts, Audio/Video Technology & Communications career cluster (Career Cluster 3)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	7961.86	10	796.19	2.95	.003
Residual	29440.00	109	270.09		
Total	37401.87	119			

Table 4.54

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Arts, Audio/Video Technology & Communications career cluster (Career Cluster 3)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-6.26	-0.12	4.59	-1.37	0.18
Black or African American	-0.02	0.00	4.94	0.00	1.00
Female	8.47	0.24	3.22	2.64	0.01*
Age Entering	0.51	0.20	0.22	2.27	0.03*
Pell	-6.05	-0.17	3.16	-1.92	0.06
ECU	-7.17	-0.19	4.33	-1.66	0.10
NCA&T	-13.81	-0.22	6.95	-1.99	0.05
UNC-G	-17.71	-0.35	5.26	-3.37	0.00**
UNC-W	-12.02	-0.19	6.34	-1.89	0.06
UNC-C	-8.60	-0.17	5.27	-1.63	0.11
(Constant)	41.50		6.90	6.01	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=10), ASU (n=27), ECU (n=39), UNC-C (n=17), UNC-G (n=17), and UNC-W (n=10). (School being compared to is ASU with an average of 52.70 credit hours in career cluster 3). (Model Summary for the regression show R^2=.213.)

Business Management & Administration. Table 4.55 shows NCSU having the highest mean ($\bar{x}$=67.18) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.56, the ANOVA (F=5.45, df=21, p<=.001) indicates the model is statistically significant and a good fit. Table 4.57 shows seven of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. For every year older a student enters a North Carolina public university they earn 0.14 (p=.03) more credits in a major of the career cluster. Students who attended ASU earned 13.34 (p=.03) less credits, students who attended ECSU earned 23.08 (p<.01) less credits, students who attended ECU earned 11.09 (p=.03) less credits, students who attended NCCU earned 26.14 (p<.01) less credits, students who attended UNC-C earned 23.33 (p<.01) less credits, and students who attended UNC-P earned 12.13 (p=.02) less

credits, when compared to students who chose NCSU. The regression analysis only accounts for about 12% of the variation in applicable transfer credit (R^2=.122), which increased by 10.4% after adding in UNC System schools to the model.

Table 4.55

Descriptive statistics for schools in the Business Management & Administration career cluster (Career Cluster 4)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	56.62	15.99	13	1.53
ASU	53.35	17.04	17	2.00
ECU	56.32	17.70	205	24.17
ECSU	44.00	14.37	11	1.30
FSU	63.37	17.21	35	4.13
NCCU	42.61	16.85	18	2.12
UNC-P	55.22	17.71	129	15.21
NCSU	67.18	12.96	11	1.30
UNC-C	43.64	12.97	42	4.95
UNC-G	58.29	12.79	217	25.59
WCU	65.39	16.15	126	14.86
UNC-W	62.64	18.80	14	1.65
WSSU	55.20	14.73	10	1.18
Total			848	100%

Table 4.56

Student Demographic ANOVA results for the Business Management & Administration career cluster (Career Cluster 4)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	28943.94	21	1378.28	5.45	.000
Residual	208798.30	826	252.78		
Total	237742.24	847			

Table 4.57

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Business Management & Administration career cluster (Career Cluster 4)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	3.97	0.04	3.65	1.09	0.28
Hispanics of any race	0.67	0.01	2.27	0.30	0.77
American Indian or Alaska Native	2.95	0.03	3.68	0.80	0.42
Asian	1.89	0.02	3.86	0.49	0.62
Black or African American	0.32	0.01	1.44	0.22	0.83
Two or more races	5.82	0.05	3.71	1.57	0.12
Female	-1.43	-0.04	1.22	-1.17	0.24
Age Entering	0.14	0.08	0.07	2.13	0.03*
Pell	1.75	0.05	1.13	1.54	0.12
ECSU	-23.08	-0.16	6.86	-3.37	0.00**
ECU	-11.09	-0.28	4.98	-2.23	0.03*
FSU	-5.32	-0.06	5.64	-0.94	0.35
NCA&T	-11.30	-0.08	6.64	-1.70	0.09
NCCU	-26.14	-0.23	6.19	-4.22	0.00***
UNC-G	-8.78	-0.23	4.98	-1.76	0.08
UNC-P	-12.41	-0.27	5.09	-2.44	0.02*
UNC-W	-4.80	-0.04	6.51	-0.74	0.46
WSSU	-11.33	-0.07	7.05	-1.61	0.11
UNC-C	-23.33	-0.30	5.45	-4.28	0.00***
ASU	-13.34	-0.11	6.22	-2.15	0.03*
WCU	-1.80	-0.04	5.06	-0.36	0.72
(Constant)	62.72		5.22	12.03	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=13), ASU (n=17), ECU (n=205), ECSU (n=11), FSU (n=35), NCCU (n=18), UNC-P (n=129), NCSU (n=11), UNC-C (n=42), UNC-G (n=217), WCU (n=126), UNC-W (n=14), and WSSU (n=10). (School being compared to is NCSU with an average of 67.18 credit hours in career cluster 4). (Model Summary for the regression show R^2=.122.)

Education & Training. Table 4.58 shows WCU having the highest mean ($\bar{x}$=72.26) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.59, the ANOVA (F=23.03, df=22, p<=.001) indicates the model is statistically significant and a good fit. Table 4.60 shows fourteen of the

coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Students with a race/ethnicity of two or more races earned 5.14 ($p=.04$) less credits than White students. Female students earned 7.29 ($p<.01$) more credits than male students, which is 3.53 less credits than the first regression model. Pell recipients showed to earn 2.48 ($p<.01$) less credits than non-Pell recipients, which is .61 more credits than the first regression model.

Students who attended ASU look to earned 14.59 ($p<.01$) less credits, students who attended ECSU students earned 15.38 ($p<.01$) less credits, students who attended ECU earned 15.22 ($p<.01$) less credits, students who attended NCA&T earned 13.58 ($p<.01$) less credits, students who attended NCCU earned 22.23 ($p<.01$) less credits, students who attended UNC-A earned 31.33 ($p<.01$) less credits, students who attended UNC-C earned 21.35 ($p<.01$) less credits, students who attended UNC-G earned 11.44 ($p<.01$) less credits, students who attended UNC-P earned 22.45 ($p<.01$) less credits, students attended who UNC-W earned 17.23 ($p<.01$) less credits, and students who attended WSSU earned 10.77 ($p<.01$)less credits than students that chose WCU. The regression analysis only accounts for about 24% of the variation in applicable transfer credit ($R^2=.235$), which increased by 15.9% after adding in UNC System schools to the model.

Table 4.58

Descriptive statistics for schools in the Education & Training career cluster (Career Cluster 5)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	54.76	14.80	131	7.82
ASU	56.27	16.89	78	4.65
UNC-A	35.39	17.04	41	2.45
ECU	55.62	17.65	152	9.07
ECSU	56.47	12.19	15	0.89
FSU	66.70	16.20	214	12.77
NCCU	49.41	18.39	58	3.46
UNC-P	48.78	18.33	99	5.91
NCSU	59.00	15.46	10	0.60
UNC-C	46.68	16.61	137	8.17
UNC-G	59.85	13.65	537	32.04
WCU	72.26	11.14	133	7.94
UNC-W	51.93	15.78	40	2.39
WSSU	60.26	10.804	31	1.85
Total			1,676	100%

Table 4.59

Student Demographic ANOVA results for the Education & Training career cluster (Career Cluster 5)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	114664.41	22	5212.02	23.03	.000
Residual	374160.19	1653	226.35		
Total	488824.60	1675			

Table 4.60

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Education & Training career cluster (Career Cluster 5)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	0.02	0.00	2.67	0.01	0.99
Hispanics of any race	-1.89	-0.03	1.71	-1.10	0.27
American Indian or Alaska Native	1.24	0.01	2.64	0.47	0.64
Asian	-1.37	-0.01	3.22	-0.43	0.67
Black or African American	-0.85	-0.02	0.89	-0.96	0.34
Two or more races	-5.14	-0.05	2.48	-2.07	0.04*
Female	7.29	0.16	1.10	6.61	0.00***
Age Entering	0.07	0.04	0.04	1.72	0.09
Pell	-2.48	-0.07	0.75	-3.31	0.00**
ECSU	-15.38	-0.09	4.13	-3.73	0.00***
ECU	-15.22	-0.26	1.80	-8.44	0.00***
FSU	-3.37	-0.07	1.73	-1.94	0.05
NCA&T	-13.58	-0.21	1.93	-7.02	0.00***
NCCU	-22.23	-0.24	2.42	-9.18	0.00***
UNC-A	-31.33	-0.28	2.80	-11.18	0.00***
UNC-G	-11.44	-0.31	1.48	-7.71	0.00***
UNC-P	-22.45	-0.31	2.14	-10.51	0.00***
UNC-W	-17.23	-0.15	2.76	-6.24	0.00***
WSSU	-10.77	-0.09	3.05	-3.53	0.00***
UNC-C	-21.35	-0.34	1.93	-11.05	0.00***
ASU	-14.59	-0.18	2.16	-6.75	0.00***
NCSU	-8.59	-0.04	4.98	-1.72	0.09
(Constant)	64.09		2.18	29.43	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=131), ASU (n=78), UNC-A (n=41), ECU (n=152), ECSU (n=15), FSU (n=214), NCCU (n=58), UNC-P (n=99), NCSU (n=10), UNC-C (n=137), UNC-G (n=537), WCU (n=133), UNC-W (n=40), and WSSU (n=31). (School being compared to is WCU with an average of 72.26 credit hours in career cluster 5). (Model Summary for the regression show R^2=.235.)

Finance. Table 4.61 shows WCU having the highest mean ($\bar{x}$=73.45) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.62, the ANOVA (F=2.68, df=12, p=.003) indicates the model is statistically significant and a good fit. Table 4.63 shows four of the coefficients were significant

when considering UNC System school of choice and demographic characteristics of these students. Students who attended ECU earned 15.54 ($p<.01$) less credits, students who attended UNC-C earned 19.73 ($p<.01$) less credits, students who attended UNC-G earned 16.40 ($p<.01$) less credits, and students who attended UNC-P earned 20.83 ($p<.01$) less credits when compared to students who chose WCU. The regression shows the independent variables predict approximately 21% of the dependent variable ($R^2=.212$), which increased by 16.5% after adding in North Carolina public universities.

Table 4.61

Descriptive statistics for schools in the Finance career cluster (Career Cluster 6)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
ECU	56.44	15.27	34	25.56
FSU	69.74	12.50	19	14.29
UNC-P	52.90	20.65	10	7.52
UNC-C	52.92	12.87	13	9.77
UNC-G	56.11	12.93	46	34.59
WCU	73.45	11.73	11	8.27
Total			133	100%

Table 4.62

Student Demographic ANOVA results for the Finance career cluster (Career Cluster 6)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	6596.45	12	549.70	2.68	.003
Residual	24584.49	120	204.87		
Total	31180.93	132			

Table 4.63

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Finance career cluster (Career Cluster 6)

Variables	b	Beta	SE Beta	t	p
Hispanics of any race	-3.10	-0.07	3.97	-0.78	0.44
Asian	0.21	0.00	4.68	0.05	0.96
Black or African American	-2.45	-0.06	3.54	-0.69	0.49
Other (Non-White)	-0.24	-0.01	4.47	-0.05	0.96
Female	-2.23	-0.07	2.80	-0.80	0.43
Age Entering	0.10	0.06	0.15	0.71	0.48
Pell	-1.95	-0.06	2.64	-0.74	0.46
ECU	-15.54	-0.44	5.13	-3.03	0.00**
FSU	-2.95	-0.07	5.76	-0.51	0.61
UNC-G	-16.40	-0.51	4.90	-3.35	0.00**
UNC-P	-20.83	-0.36	6.56	-3.18	0.00**
UNC-C	-19.73	-0.38	6.22	-3.17	0.00**
(Constant)	72.82		6.33	11.51	

Note. ***p<.001, **p<.01, *p<.05; ECU (n=34), FSU (n=19), UNC-P (n=10), UNC-C (n=13), UNC-G (n=46), and WCU (n=11). (School being compared to is WCU with an average of 73.45 credit hours in career cluster 6). (Model Summary for the regression show R^2=.212.)

Health Science. Table 4.64 shows FSU having the highest mean ($\bar{x}$=73.72) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.65, the ANOVA (F=22.93, df=19, p<=.001) indicates the model is statistically significant and a good fit. Table 4.66 shows ten of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Pell recipients showed to earn 1.18 (p=.04) less credits than non-Pell recipients, which is .55 less credits than the first regression model.

Students who attended ASU earned 5.44 (p<.01) less credits, students who attended ECU earned 23.80 (p<.01) less credits, students who attended NCA&T earned 18.36 (p<.01) less credits, students who attended UNC-C earned 13.39 (p<.01) less credits, students who attended UNC-G earned 10.95 (p<.01) less credits, students who attended UNC-P earned 21.66 (p<.01)

less credits, students who attended UNC-W earned 17.76 ($p<.01$) less credits, students who attended WCU earned 9.90 ($p<.01$) less credits, and students who attended WSSU earned 15.40 ($p<.01$) less credits when compared to students who chose FSU. The regression shows the independent variables predict approximately 13% of the dependent variable ($R^2=.126$), which increased by 12.1% after adding in North Carolina public universities.

Table 4.64

Descriptive statistics for schools in the Health Science career cluster (Career Cluster 8)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	53.31	21.09	51	1.68
ASU	68.32	10.45	291	9.56
ECU	49.81	19.74	128	4.21
FSU	73.72	20.03	121	3.98
UNC-P	52.72	17.89	18	0.59
UNC-C	60.39	8.49	445	14.62
UNC-G	62.67	7.80	236	7.76
WCU	63.86	14.64	339	11.14
UNC-W	56.03	15.61	1,021	33.55
WSSU	58.22	12.74	393	12.91
Total			3,043	100%

Table 4.65

Student Demographic ANOVA results for the Health Science career cluster (Career Cluster 8)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	84432.15	19	4443.80	22.93	.000
Residual	585748.17	3023	193.76		
Total	670180.31	3042			

Table 4.66

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Health Science career cluster (Career Cluster 8)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	-2.04	-0.02	1.56	-1.31	0.19
Hispanics of any race	0.66	0.01	1.22	0.54	0.59
American Indian or Alaska Native	2.39	0.02	2.22	1.08	0.28
Asian	1.58	0.01	1.89	0.84	0.40
Black or African American	-0.63	-0.01	0.86	-0.73	0.47
Two or more races	1.60	0.01	2.08	0.77	0.44
Non-Resident Alien	-1.14	-0.01	2.67	-0.43	0.67
Female	-0.22	-0.01	0.80	-0.27	0.79
Age Entering	0.03	0.02	0.03	1.06	0.29
Pell	-1.18	-0.04	0.58	-2.02	0.04*
ECU	-23.80	-0.32	1.78	-13.40	0.00***
NCA&T	-18.36	-0.16	2.35	-7.83	0.00***
UNC-G	-10.95	-0.20	1.58	-6.92	0.00***
UNC-P	-21.66	-0.11	3.53	-6.13	0.00***
UNC-W	-17.76	-0.57	1.36	-13.04	0.00***
WSSU	-15.40	-0.35	1.47	-10.51	0.00***
UNC-C	-13.39	-0.32	1.45	-9.26	0.00***
ASU	-5.44	-0.11	1.54	-3.54	0.00***
WCU	-9.90	-0.21	1.51	-6.56	0.00***
(Constant)	73.21		1.83	39.93	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=51), ASU (n=291), ECU (n=128), FSU (n=121), UNC-P (n=18), UNC-C (n=445), UNC-G (n=236), WCU (n=339), UNC-W (n=1021), and WSSU (n=393). (School being compared to is FSU with an average of 73.72 credit hours in career cluster 8). (Model Summary for the regression show R^2=.126.)

Hospitality & Tourism. Table 4.67 shows WCU having the highest mean ($\bar{x}$=67.29) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.68, the ANOVA assesses the overall fit of the model using an F ratio and did not indicate an overall fit (F=1.71, df=5, p=.165). Table 4.69 shows that none of the coefficients were significant when considering UNC System school of choice and

demographic characteristics of these students. The regression analysis only accounts for about 23% of the variation in applicable transfer credit (R^2=.227).

Table 4.67

Descriptive statistics for schools in the Hospitality & Tourism career cluster (Career Cluster 9)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
ECU	53.48	21.65	21	60.00
WCU	67.29	13.91	14	40.00
Total			35	100%

Table 4.68

Student Demographic ANOVA results for the Hospitality & Tourism career cluster (Career Cluster 9)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3066.09	5	613.22	1.71	.165
Residual	10427.91	29	359.58		
Total	13494.00	34			

Table 4.69

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Hospitality & Tourism career cluster (Career Cluster 9)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-11.67	-0.28	7.76	-1.51	0.14
Female	-9.65	-0.24	7.21	-1.34	0.19
Age Entering	0.44	0.19	0.51	0.85	0.40
Pell	-3.25	-0.08	6.95	-0.47	0.64
ECU	-11.70	-0.29	8.79	-1.33	0.19
(Constant)	62.60		12.40	5.05	

Note. ***p<.001, **p<.01, *p<.05; ECU (n=21) and WCU (n=14). (School being compared to is WCU with an average of 67.29 credit hours in career cluster 9). (Model Summary for the regression show R^2=.227.)

Human Services. Table 4.70 shows FSU having the highest mean ($\bar{x}$=68.96) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.71, the ANOVA (F=3.90, df=17, p<=.001) indicates the model is statistically significant and a good fit. Table 4.72 shows ten of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Females show to earn 6.52 (p=.04) less credits than male students, which is 1.23 less credits than the first regression model and not significant in the previous regression model for student characteristics.

Students who attended ASU earned 13.41 (p<=.01) less credits, students who attended ECSU earned 21.02 (p<.01) less credits, students who attended ECU earned 18.65 (p<.01) less credits, students who attended NCA&T earned 13.50 (p<.01) less credits, students who attended NCCU earned 25.48 (p<.01) less credits, students who attended NCSU earned 18.47 (p<.01) less credits, students who attended UNC-C earned 23.25 (p<.01) less credits, students who attended UNC-G earned 9.14 (p=.02) less credits, and students who attended UNC-P earned 21.34 (p<.01) less credits when compared to students who chose FSU. The regression shows the independent variables predict approximately 24% of the dependent variable (R^2=.239), which increased by 21.8% after adding in North Carolina public universities.

Table 4.70

Descriptive statistics for schools in the Human Services career cluster (Career Cluster 10)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	54.47	12.16	17	7.42
ASU	55.69	11.86	13	5.68
ECU	50.63	20.02	27	11.79
ECSU	46.69	13.19	13	5.68
FSU	68.96	13.82	24	10.48
NCCU	43.07	19.30	15	6.55
UNC-P	47.48	18.25	21	9.17
NCSU	52.83	23.51	12	5.24
UNC-C	46.35	14.81	20	8.73
UNC-G	60.20	9.78	41	17.90
WCU	65.90	13.09	10	4.37
WSSU	60.81	5.18	16	6.99
Total			229	100%

Table 4.71

Student Demographic ANOVA results for the Human Services career cluster (Career Cluster 10)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	14977.25	17	881.02	3.90	.000
Residual	47682.12	211	225.98		
Total	62659.37	228			

Table 4.72

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Human Services career cluster (Career Cluster 10)

Variables	b	Beta	SE Beta	t	p
Black or African American	-1.68	-0.05	2.44	-0.69	0.49
Hispanics of any race	0.29	0.00	4.71	0.06	0.95
Other (Non-White)	0.23	0.00	4.14	0.06	0.96
Female	-6.52	-0.13	3.13	-2.08	0.04*
Age Entering	0.00	0.00	0.10	0.01	0.99
Pell	-0.52	-0.02	2.16	-0.24	0.81
ECSU	-21.02	-0.29	5.25	-4.01	0.00***
ECU	-18.65	-0.36	4.25	-4.39	0.00***
NCA&T	-13.50	-0.21	4.87	-2.77	0.01**
NCCU	-25.48	-0.38	4.99	-5.11	0.00***
UNC-G	-9.14	-0.21	3.90	-2.35	0.02*
UNC-P	-21.34	-0.37	4.55	-4.69	0.00***
WSSU	-6.80	-0.11	4.92	-1.38	0.17
UNC-C	-23.25	-0.40	4.57	-5.08	0.00***
ASU	-13.41	-0.19	5.37	-2.50	0.01*
NCSU	-18.47	-0.25	5.45	-3.39	0.00**
WCU	-3.90	-0.05	5.79	-0.67	0.50
(Constant)	75.79		5.53	13.72	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=17), ASU (n=13), ECU (n=27), ECSU (n=13), FSU (n=24), NCCU (n=15), UNC-P (n=21), NCSU (n=12), UNC-C (n=20), UNC-G (n=41), WCU (n=10), and WSSU (n=16). (School being compared to is FSU with an average of 68.96 credit hours in career cluster 10). (Model Summary for the regression show R^2=.239.)

Information Technology. Table 4.73 shows NCSU having the highest mean ($\bar{x}$=69.58) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.74, the ANOVA (F=6.14, df=15, p<=.001) indicates the model is statistically significant and a good fit. Table 4.75 shows nine of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Female students show to earn 8.14 (p<.01) more credits than male students, which is .01 more credits than the first regression model, and students who

received a Pell grant award show to earn 3.91 (p=.02) less credits than students who are not granted a Pell grant award, which is 1.46 more credits than the first regression model.

Students who attended ASU earned 18.56 (p<.01) less credits, students who attended ECU earned 19.41 (p<.01) less credits, students who attended NCA&T earned 17.00 (p<.01) less credits, students who attended UNC-C earned 22.89 (p<.01) less credits, students who attended UNC-G earned 20.81 (p<.01) less credits, students who attended UNC-P earned 27.82 (p<.01) less credits, and students who attended UNC-W earned 21.14 (p<.01) less credits when compared to students who chose NCSU. The regression shows the independent variables predict approximately 20% of the dependent variable (R^2=.196), which increased by 12% after adding in North Carolina public universities.

Table 4.73

Descriptive statistics for schools in the Information Technology career cluster (Career Cluster 11)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	54.05	14.21	21	5.34
ASU	49.46	20.04	13	3.31
ECU	50.23	18.35	40	10.18
UNC-P	41.79	18.06	29	7.38
NCSU	69.58	16.82	31	7.89
UNC-C	45.86	17.16	86	21.88
UNC-G	50.34	15.42	153	38.93
UNC-W	47.00	16.53	20	5.09
Total			393	100%

Table 4.74

Student Demographic ANOVA results for the Information Technology career cluster (Career Cluster 11)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	23928.65	15	1595.24	6.14	.000
Residual	97905.81	377	259.70		
Total	121834.46	392			

Table 4.75

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Information Technology career cluster (Career Cluster 11)

Variables	b	Beta	SE Beta	t	p
Hispanics of any race	0.52	0.01	2.89	0.18	0.86
Asian	6.54	0.09	3.54	1.85	0.07
Black or African American	0.80	0.02	2.41	0.33	0.74
Two or more races	-1.41	-0.01	5.24	-0.27	0.79
Other (Non-White)	4.85	0.06	4.11	1.18	0.24
Female	8.14	0.20	2.03	4.02	0.00***
Age Entering	0.21	0.09	0.12	1.75	0.08
Pell	-3.91	-0.11	1.69	-2.32	0.02*
ASU	-18.56	-0.19	5.40	-3.44	0.00**
ECU	-19.41	-0.33	3.91	-4.96	0.00***
NCA&T	-17.00	-0.22	4.70	-3.61	0.00***
UNC-C	-22.89	-0.54	3.41	-6.71	0.00***
UNC-G	-20.81	-0.58	3.35	-6.22	0.00***
UNC-P	-27.82	-0.41	4.26	-6.54	0.00***
UNC-W	-21.14	-0.26	4.68	-4.52	0.00***
(Constant)	63.40		4.11	15.41	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=21), ASU (n=13), ECU (n=40), UNC-P (n=29), NCSU (n=31), UNC-C (n=86), UNC-G (n=153), and UNC-W (n=20). (School being compared to is NCSU with an average of 69.58 credit hours in career cluster 11). (Model Summary for the regression show R^2=.196.)

Law, Public Safety, Corrections & Security. Table 4.76 shows FSU having the highest mean ($\bar{x}$=68.13) for all UNC System schools with degrees in the career cluster and was used as

the comparison variable in the regression model. In Table 4.77, the ANOVA (F=16.26, df=15, p<=.001) indicates the model is statistically significant and a good fit. Table 4.78 shows six of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Female students show to earn 8.14 (p<.01) more credits than male students, which is .01 more credits than the first regression model, and students who received a Pell grant award show to earn 3.91 (p=.02) less credits than students who are not granted a Pell grant award, which is 1.46 more credits than the first regression model.

Students who attended ASU earned 20.83 (p<.01) less credits, students who attended ECU earned 28.15 (p<.01) less credits, students who attended NCA&T earned 18.37 (p<.01) less credits, students who attended NCCU earned 13.93 (p<.01) less credits, students who attended UNC-C earned 18.61 (p<.01) less credits, and students who attended UNC-P earned 11.16 (p<.01) less credits when compared to students who chose FSU. The regression shows the independent variables predict approximately 26% of the dependent variable (R^2=.260), which increased by 24.5% after adding in North Carolina public universities.

Table 4.76

Descriptive statistics for schools in the Law, Public Safety, Corrections & Security career cluster (Career Cluster 12)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	51.23	14.11	13	1.83
ASU	46.60	14.89	20	2.82
ECU	40.45	17.56	22	3.10
FSU	68.13	14.03	201	28.31
NCCU	55.41	13.59	87	12.25
UNC-P	57.59	15.37	141	19.86
UNC-C	49.23	13.87	82	11.55
WCU	66.76	11.43	144	20.28
Total			710	100%

Table 4.77

Student Demographic ANOVA results for the Law, Public Safety, Corrections & Security career cluster (Career Cluster 12)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	46978.35	15	3131.89	16.26	.000
Residual	133642.50	694	192.57		
Total	180620.85	709			

Table 4.78

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Law, Public Safety, Corrections & Security career cluster (Career Cluster 12)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	2.80	0.03	3.69	0.76	0.45
Hispanics of any race	0.36	0.01	2.09	0.17	0.86
American Indian or Alaska Native	4.08	0.05	3.00	1.36	0.17
Black or African American	2.04	0.06	1.38	1.48	0.14
Two or more races	5.53	0.04	4.27	1.30	0.20
Female	1.27	0.04	1.15	1.10	0.27
Age Entering	0.04	0.02	0.06	0.70	0.49
Pell	1.05	0.03	1.10	0.95	0.34
ASU	-20.83	-0.22	3.32	-6.28	0.00***
ECU	-28.15	-0.31	3.17	-8.89	0.00***
NCA&T	-18.37	-0.15	4.02	-4.57	0.00***
NCCU	-13.93	-0.29	1.85	-7.53	0.00***
UNC-C	-18.61	-0.37	1.86	-10.02	0.00***
UNC-P	-11.16	-0.28	1.58	-7.06	0.00***
WCU	-0.89	-0.02	1.54	-0.57	0.57
(Constant)	65.14		2.21	29.54	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=13), ASU (n=20), ECU (n=22), FSU (n=201), NCCU (n=87), UNC-P (n=141), UNC-C (n=82), and WCU (n=144). (School being compared to is FSU with an average of 68.13 credit hours in career cluster 12). (Model Summary for the regression show R^2=.260.)

Manufacturing. Table 4.79 shows WCU having the highest mean ($\bar{x}$=61.47) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.80, the ANOVA (F=3.63, df=12, p<=.01) indicates the model is statistically significant and a good fit. Table 4.81 shows two of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Age shows students earn .30 (p<=.01) more credits for every year older they are at the time of transfer, which is .02 less credits than the first regression model. Students who attended NCA&T earned 19.52 (p<.01) less credits when compared to students who chose WCU. The regression shows the independent variables predict approximately 5% of the dependent variable (R^2=.049), which increased by 1.8% after adding in North Carolina public universities.

Table 4.79

Descriptive statistics for schools in the Manufacturing career cluster (Career Cluster 13)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	43.88	14.44	17	2.00
ECU	61.33	17.92	679	79.88
UNC-C	61.08	10.58	139	16.35
WCU	61.47	12.09	15	1.76
Total			850	100%

Table 4.80

Student Demographic ANOVA results for the Manufacturing career cluster (Career Cluster 13)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	12054.20	12	1004.52	3.63	.000
Residual	231653.31	837	276.77		
Total	243707.51	849			

Table 4.81

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Manufacturing career cluster (Career Cluster 13)

Variables	b	Beta	SE Beta	t	p
Race and Ethnicity Unknown	-0.11	0.00	2.31	-0.05	0.96
Hispanics of any race	0.57	0.01	2.31	0.25	0.81
American Indian or Alaska Native	4.31	0.03	5.09	0.85	0.40
Black or African American	0.28	0.01	1.77	0.16	0.88
Two or more races	1.89	0.02	3.29	0.57	0.57
Asian	-4.73	-0.06	2.78	-1.70	0.09
Female	1.52	0.03	1.83	0.83	0.41
Age Entering	0.30	0.15	0.07	4.26	0.00***
Pell	-0.30	-0.01	1.22	-0.25	0.81
ECU	-3.20	-0.08	4.41	-0.73	0.47
NCA&T	-19.52	-0.16	6.05	-3.23	0.00**
UNC-C	-2.17	-0.05	4.55	-0.48	0.63
(Constant)	55.51		4.69	11.85	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=17), ECU (n=679), UNC-C (n=139), and WCU (n=15). (School being compared to is WCU with an average of 61.47 credit hours in career cluster 13). (Model Summary for the regression show R^2=.049.)

Marketing. Table 4.82 shows WCU having the highest mean ($\bar{x}$=66.19) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.83, the ANOVA (F=2.60, df=6, p=.027) indicates the model is statistically significant and a good fit. Table 4.84 shows two of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Age shows students earn .76 (p<=.01) more credits for every year older they are at the time of transfer, which is .01 less credits than the first regression model. Students who attended ECU earned 8.96 (p=.05) less credits when compared to students who chose WCU. The regression shows the independent variables predict approximately 22% of the dependent variable (R^2=.215), which increased by 6.1% after adding in North Carolina public universities.

Table 4.82

Descriptive statistics for schools in the Marketing career cluster (Career Cluster 14)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
ASU	64.55	13.89	11	17.19
ECU	56.38	17.98	26	40.63
WCU	66.19	16.22	27	42.19
Total			64	100%

Table 4.83

Student Demographic ANOVA results for the Marketing career cluster (Career Cluster 14)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3914.94	6	652.49	2.60	.027
Residual	14295.70	57	250.80		
Total	18210.61	63			

Table 4.84

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Marketing career cluster (Career Cluster 14)

Variables	b	Beta	SE Beta	t	p
Other (Non-White)	-3.29	-0.09	4.71	-0.70	0.49
Female	6.38	0.19	4.37	1.46	0.15
Age Entering	0.76	0.33	0.30	2.56	0.01*
Pell	6.13	0.18	4.21	1.46	0.15
ASU	-0.92	-0.02	5.87	-0.16	0.88
ECU	-8.96	-0.26	4.43	-2.02	0.05*
(Constant)	38.36		10.02	3.83	

Note. ***p<.001, **p<.01, *p<.05; ASU (n=11), ECU (n=26), and WCU (n=27). (School being compared to is WCU with an average of 66.19 credit hours in career cluster 14). (Model Summary for the regression show R^2=.215.)

Science, Technology, Engineering, and Mathematics. Table 4.85 shows NCSU having the highest mean ($\bar{x}$=68.25) for all UNC System schools with degrees in the career cluster and was used as the comparison variable in the regression model. In Table 4.86, the ANOVA (F=7.72, df=21, p<=.001) indicates the model is statistically significant and a good fit. Table 4.87 shows twelve of the coefficients were significant when considering UNC System school of choice and demographic characteristics of these students. Students with a race/ethnicity of Hispanic of any race earned 6.62 (p<.01) less credits than White students, which is 1.26 less credits than the first regression model. Female students earned 3.06 (p=.04) more credits than male students, which is 4.01 more credits than the first regression model.

Students who attended ASU look to earned 17.71 (p<.01) less credits, students who attended ECU students earned 12.44 (p<.01) less credits, students who attended NCA&T earned 22.06 (p<.01) less credits, students who attended NCCU earned 26.84 (p<.01) less credits, students who attended UNC-C earned 13.62 (p<.01) less credits, students who attended UNC-CH earned 15.04 (p<.01) less credits, students who attended UNC-G earned 22.73 (p<.01) less credits, students who attended UNC-P earned 22.87 (p<.01) less credits, students attended who UNC-W earned 18.04 less credits(p<.01) , and students who attended WCU earned 8.46 (p<.01) less credits when compared to students who chose NCSU. The regression shows the independent variables predict approximately 17% of the dependent variable (R^2=.166), which increased by 13.2% after adding in North Carolina public universities.

Table 4.85

Descriptive statistics for schools in the Science, Technology, Engineering, and Mathematics career cluster (Career Cluster 15)

School	Credit Hours Transferred		Number of Students Transferring	Percent of Total Cluster Transferring
	Mean	SD	n	%
NCA&T	49.00	21.06	58	6.95
ASU	52.28	20.11	18	2.16
ECU	57.50	19.46	109	13.05
FSU	64.45	19.04	11	1.32
NCCU	45.38	18.90	21	2.51
UNC-P	49.52	19.54	155	18.56
NCSU	68.25	14.20	105	12.57
UNC-CH	54.13	15.02	16	1.92
UNC-C	56.47	14.70	143	17.13
UNC-G	48.79	16.46	53	6.35
WCU	61.96	16.31	105	12.57
UNC-W	51.34	13.75	41	4.91
Total			835	100%

Table 4.86

Student Demographic ANOVA results for the Science, Technology, Engineering, and Mathematics career cluster (Career Cluster 15)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	47921.77	21	2281.99	7.72	.000
Residual	240469.68	813	295.78		
Total	288391.44	834			

Table 4.87

Regression Model for Student Characteristics and North Carolina public universities to predict transfer hours for the Science, Technology, Engineering, and Mathematics career cluster (Career Cluster 15)

Variables	b	Beta	SE Beta	t	p
Non-Resident Alien	0.80	0.01	3.90	0.21	0.84
Race and Ethnicity Unknown	6.64	0.06	3.78	1.76	0.08
Hispanics of any race	-6.62	-0.09	2.37	-2.80	0.01**
American Indian or Alaska Native	-4.61	-0.04	4.06	-1.14	0.26
Asian	2.48	0.03	3.22	0.77	0.44
Black or African American	0.19	0.00	2.04	0.09	0.93
Two or more races	2.48	0.02	3.32	0.75	0.45
Female	3.06	0.08	1.45	2.11	0.04*
Age Entering	0.08	0.04	0.08	0.92	0.36
Pell	-1.75	-0.05	1.26	-1.39	0.17
ASU	-17.71	-0.14	4.43	-4.00	0.00***
ECU	-12.44	-0.23	2.38	-5.22	0.00***
NCA&T	-22.06	-0.30	2.89	-7.63	0.00***
NCCU	-26.84	-0.23	4.32	-6.22	0.00***
UNC-C	-13.62	-0.28	2.23	-6.11	0.00***
UNC-CH	-15.04	-0.11	4.70	-3.20	0.00**
UNC-G	-22.73	-0.30	3.03	-7.51	0.00***
UNC-P	-22.87	-0.48	2.55	-8.96	0.00***
UNC-W	-18.04	-0.21	3.25	-5.55	0.00***
FSU	-6.38	-0.04	5.68	-1.12	0.26
WCU	-8.46	-0.15	2.46	-3.44	0.00**
(Constant)	68.62		2.59	26.47	

Note. ***p<.001, **p<.01, *p<.05; NCA&T (n=58), ASU (n=18), ECU (n=109), FSU (n=11), NCCU (n=21), UNC-P (n=155), NCSU (n=105), UNC-CH (n=16), UNC-C (n=143), UNC-G (n=53), WCU (n=105), and UNC-W (n=41). (School being compared to is NCSU with an average of 68.25 credit hours in career cluster 15). (Model Summary for the regression show R^2=.166.)

Chapter Summary

In looking at the results from the data, each career cluster shows different variables that effect applicable transfer credit to North Carolina public universities. Each career cluster varied greatly in size and in demographic characteristics, which had different bearings for each career

cluster. When each North Carolina public university is included, each career cluster varied on which school had a higher average and variance of credit hours after transfer.

Research Question 1

FOR EACH CAREER CLUSTER, WHAT AMOUNT OF VARIANCE DOES GENDER, RACE, AGE, AND PELL STATUS EXPLAIN IN THE NUMBER OF CREDIT HOURS APPLIED TOWARD A BACHELOR'S DEGREE FOR AAS DEGREE EARNERS? In analyzing the results of the regression analysis for each career cluster regression analysis in concern to student characteristics, six of the fifteen career clusters showed significance for pathways to North Carolina public universities. As shown in Figure 2, there was no student characteristic variable that showed consistency throughout the cluster. Age showed to be a significant in transfer for four career clusters, race/ethnicity in one career cluster, socioeconomic status in three career clusters, and gender in three career clusters.

	Arts, A/V Tech & Comm	*Education & Training*	*Gov & Public Admin*	*IT*	*Manufacturing*	*Marketing*
Gender	Female, +8.47	Female, +10.83		Female, +8.13		
Race/ Ethnicity				Asian, +7.98		
Age	.51	.13			.32	.76
Pell		-3.09	+13.06	-5.38		

Figure 2

Note. The figure shows the six career clusters that show an overall significance in the regression model used for the study. Significant values for each career cluster are indicated in the figure.

Research Question 2

FOR EACH CAREER CLUSTER, AFTER CONTROLLING FOR GENDER, RACE, AGE, AND PELL STATUS WHAT AMOUNT OF VARIANCE DOES THE COLLEGE EXPLAIN IN THE NUMBER OF CREDIT HOURS APPLIED TOWARD A BACHELOR'S DEGREE FOR AAS DEGREE EARNERS? The results of the regression analysis show that eleven of the fourteen career clusters had significant effects on applicable transfer credit for pathways to North Carolina public universities. Career clusters that did not show significance in the ANOVA had less than 100 students, except for one. The Marketing career cluster still showed an overall significant model for the ANOVA with 66 students. One of the North Carolina public universities was a significant predictor in twelve career clusters, the career clusters and the significant variables are shown in Figure 3.

	Arts, A/V Tech & Comm	*Bus. Man. & Admin.*	*Education & Training*	*Finance*	*Health Science*	*Human Services*
No of Pathway	6	13	14	6	10	12
Compar. Institution (app. trans. hours)	ASU (52.70)	NCSU (67.18)	WCU (72.26)	WCU (73.45)	FSU (73.72)	FSU (68.96)
Findings	4 schools similar, 1 was significant	6 schools similar, 6 were significant	2 schools similar, 13 were significant	1 school similar, 4 were significant	All other schools were significant	2 schools similar, 10 were significant

	IT	*Law, Pub. Safety, Corr. & Sec*	*Manufacturing*	*Marketing*	*STEM*
No of Pathway	8	8	4	3	12
Compar. Institution (app. trans. hours)	NCSU (69.58)	FSU (68.13)	WCU (61.47)	WCU (66.19)	NCSU (68.25)
Findings	All other schools show significantly less credit	1 school similar, 7 were significant	2 schools similar, 1 was significant	1 school similar, 1 was significant	1 school similar, 10 were significant

Figure 3

Note. The figure shows the eleven career clusters with overall significance in the regression model for the study. The number of pathways, comparison institution with the highest mean for all schools in the cluster, and a summary of the other schools in how they compare to the institution with the highest mean average used in the model is shown in the summary.

Research Question 3

WHICH COMMUNITY COLLEGES HAVE THE HIGHEST PERFORMING TRANSFER PATHWAYS IN THE IDENTIFIED UNC SYSTEM UNIVERSITY AND CAREER CLUSTER? The mean number of applicable transfer credits for AAS transfer students

was 58.09. Seven (7) career clusters had an average of 58 or higher applicable transfer hours after rounding up and were deemed high performing pathways.

The Marketing career cluster was the highest performing transfer pathway ($\bar{x}$=61.56, SD=16.96). The three universities with the highest average of applicable transfer credits were WCU, ASU, and ECU. There was not any significant difference between WCU and ASU, but the regression analysis that included North Carolina public universities did show significance between WCU and ECU. WCU had the highest frequency (n=27), ECU had the second highest frequency (n=26), and ASU had the lowest frequency of students for the four-year institutions listed (n=11). Table 4.88 shows the top three community colleges, with ties, by frequency of students that transferred to each North Carolina public university listed.

Table 4.88

Highest frequency for highest performing pathways, Marketing Career Cluster

University/Community College	Number of Students
WCU	
Southwestern Community College	6
Asheville-Buncombe Tech Cmty Col	4
Gaston College	4
ASU	
Catawba Valley Community College	3
Surry Community College	3
Haywood Community College	1
Wake Technical Community College	1
Guilford Technical Community Col	1
Central Piedmont Community College	1
Alamance Community College	1
ECU	
Wake Technical Community College	4
Catawba Valley Community College	3
Pitt Community College	3

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Manufacturing career cluster, career cluster 13, showed to have the second highest performing transfer pathway ($\bar{x}$= 60.87, SD= 16.97). The three universities with the highest average of applicable transfer credits were WCU, UNC-C, and ECU. There was not any significant difference between the three four-year institutions. ECU served the most students in the cluster (n=679), UNC-C had the second highest frequency (n=139), and WCU had the lowest frequency of students for the four-year institutions listed (n=15). Table 4.89 shows the top three community colleges by frequency of students that transferred to each North Carolina public university listed.

Table 4.89

Highest frequency for highest performing pathways, Manufacturing Career Cluster

University/Community College	Number of Students
WCU	
Western Piedmont Community College	3
Asheville-Buncombe Tech Cmty Col	2
Haywood Community College	2
UNC-C	
Central Piedmont Community College	30
Forsyth Technical Community College	11
Rowan-Cabarrus Community College	10
ECU	
Wake Technical Community College	114
Pitt Community College	55
Cape Fear Community College	52

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Law, Public Safety, Corrections career cluster, career cluster 12, showed to be the third highest performing transfer pathway ($\bar{x}$= 60.13, SD= 15.91). The three universities with the highest average of applicable transfer credits were FSU, WCU, and UNC-P. There was not any significant difference between FSU and WCU, but the regression analysis that included North Carolina public universities did show significance between FSU and UNC-P. FSU served the most students in the cluster (n=201), WCU had the second highest frequency (n=144), and UNC-P had the lowest frequency of students for the four-year institutions listed (n=141). Table 4.90 shows the top three community colleges by frequency of students that transferred to each North Carolina public university listed.

Table 4.90

Highest frequency for highest performing pathways, Law, Public Safety, Corrections Career Cluster

University/Community College	Number of Students
FSU	
Fayetteville Tech Community College	46
Central Piedmont Community College	14
Johnston Community College	14
WCU	
Asheville-Buncombe Tech Cmty Col	15
Western Piedmont Community College	11
Stanly Community College	10
UNC-P	
Fayetteville Tech Community College	26
Sandhills Community College	15
Randolph Community College	14

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Health Science career cluster, career cluster 8, showed to be the fourth highest performing transfer pathway ($\bar{x}$= 59.86, SD= 14.88). The three universities with the highest average of applicable transfer credits were FSU, ASU, and WCU. The regression analysis that included North Carolina public universities showed significance between FSU, which had the highest mean, and the other two four-year institutions. WCU served the most students in the cluster (n=339), ASU had the second highest frequency (n=291), and FSU had the lowest frequency of students for the four-year institutions listed (n=121). Table 4.91 shows the top three community colleges by frequency of students that transferred to each North Carolina public university listed.

Table 4.91

Highest frequency for highest performing pathways, Health Science Career Cluster

University/Community College	Number of Students
FSU	
Fayetteville Tech Community College	33
Sampson Community College	8
Southeastern Community College	8
ASU	
Catawba Valley Community College	31
Gaston College	23
Caldwell Cmty College & Tech Inst	20
WCU	
Asheville-Buncombe Tech Cmty Col	42
Cleveland Community College	23
Southwestern Community College	22

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Agriculture, Food & Natural Resources career cluster, career cluster 1, showed to be the fifth highest performing transfer pathway ($\bar{x}$= 57.98, SD= 15.88). The three universities with the highest average of applicable transfer credits were ASU, NCSU, and WCU. The regression analysis that included North Carolina public universities did not show any significance between the three four-year institutions. NCSU served the most students in the cluster (n=41), WCU had the second highest frequency (n=18), and ASU had the lowest frequency of students for the four-year institutions listed (n=15). Table 4.92 shows the top three community colleges, with ties, by frequency of students that transferred to each North Carolina public university listed.

Table 4.92

Highest frequency for highest performing pathways, Agriculture, Food & Natural Resources Career Cluster

University/Community College	Number of Students
ASU	
Cape Fear Community College	5
Central Carolina Community College	4
Wake Technical Community College	1
Randolph Community College	1
Forsyth Technical Community College	1
Asheville-Buncombe Tech Cmty Col	1
Caldwell Cmty College & Tech Inst	1
Lenoir Community College	1
NCSU	
Wayne Community College	12
Haywood Community College	5
Montgomery Community College	5
WCU	
Haywood Community College	13
Blue Ridge Community College	2
Forsyth Technical Community College	2

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Education & Training career cluster, career cluster 5, showed to be the sixth highest performing transfer pathway ($\bar{x}$= 57.87, SD= 17.06). The three universities with the highest average of applicable transfer credits were WCU, FSU, and NCU. The regression analysis that included North Carolina public universities did not show any significance between the three four-year institutions. FSU served the most students in the cluster (n=214), WCU had the second highest frequency (n=133), and NCSU had the lowest frequency of students for the four-year

institutions listed (n=10). Table 4.93 shows the top three community colleges, with ties, by frequency of students that transferred to each North Carolina public university listed.

Table 4.93

Highest frequency for highest performing pathways, Education & Training Career Cluster

University/Community College	Number of Students
WCU	
Stanly Community College	15
Haywood Community College	14
Southwestern Community College	10
FSU	
Fayetteville Tech Community College	107
Central Carolina Community College	28
Sampson Community College	7
NCSU	
Wilson Community College	2
Sampson Community College	1
Pitt Community College	1
Forsyth Technical Community College	1
Sandhills Community College	1
Cape Fear Community College	1
Gaston College	1
Vance-Granville Community College	1
Durham Technical Community College	1

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

The Business Administration career cluster, career cluster 4, showed to be the seventh highest performing transfer pathway ($\bar{x}$= 57.44, SD= 16.76). The three universities with the highest average of applicable transfer credits were NCSU, WCU, and UNC-W. The regression analysis that included North Carolina public universities did not show any significance between the three four-year institutions. WCU served the most students in the cluster (n=126), UNC-W

had the second highest frequency (n=14), and NCSU had the lowest frequency of students for the four-year institutions listed (n=11). Table 4.94 shows the top three community colleges, with ties, by frequency of students that transferred to each North Carolina public university listed.

Table 4.94

Highest frequency for highest performing pathways, Business Administration Career Cluster

University/Community College	Number of Students
NCSU	
Wake Technical Community College	8
Cleveland Community College	1
Central Carolina Community College	1
Sandhills Community College	1
WCU	
Southwestern Community College	19
Asheville-Buncombe Tech Cmty Col	14
Haywood Community College	10
UNC-W	
Cape Fear Community College	8
Wake Technical Community College	1
Brunswick Community College	1
Coastal Carolina Community College	1
Pamlico Community College	1
Richmond Community College	1
Sampson Community College	1

Note. Students could have been coded differently for each cluster at each North Carolina public institution.

Chapter 5 – Conclusion/Discussion

Introduction

The focus of this study was to explore for AAS degree earners the amount of variance demographics (gender, race/ethnicity, age, and Pell status) and North Carolina public university selection explain in the number of credit hours applied toward the bachelor's degree. The study explored these pathways for each of the fifteen career clusters in focus. At the time of this study, research on transfer for AAS degree earners has been limited and there has not been research on which career areas and North Carolina public universities offer the most efficient transfer pathways.

The study used a regression analysis to study the variance demographics and school explain in the number of credit hours that were applied toward a bachelor's degree. Students were grouped into career clusters, based on the degree they transferred into at a North Carolina public university. The researcher examined for efficiency for each of the career clusters. By identifying efficient pathways, students could be presented with options to help increase their probability of finishing a bachelor's degree in a timely manner.

Identification of the variables that relate to the number of transfer hours that are applied toward the bachelor's degree can help students better understand the transfer process. Understanding which schools apply more hours toward a bachelor's degree can provide opportunities to explore best practices to increase transfer efficiency. A student should be able to transfer knowledge from one institution to another, but this does not happen in a consistent manner for all institution's students transferred into in this study. While it is outside the scope of this study, students had significant differences in applicable credits based on their choice of

university. However, the analysis does show some efficient pathway options for students transferring with an AAS from a NCCCS institution to a UNC System institution.

Discussion of Findings

The results from the study led to several findings in relation to the pathways for AAS degree earners from North Carolina community colleges to obtain a bachelor's degree from one of the North Carolina public universities. The findings are discussed for each cluster by the demographics and North Carolina public university choice after transferring for the sample of students in the study.

Race/Ethnicity

When exploring ethnicity for students in each career cluster, the make-up of students in each cluster varied greatly. One finding what was consistent with other studies was White students made up the majority of the sample (AACC, 2019; Calcagno et al., 2007). When ethnicity was looked at by each cluster, the percentages of each race/ethnicity category typically varied from the overall sample.

Students with a race/ethnicity of non-resident alien were found in seven career clusters and had representation above the overall sample average for this race/ethnicity in three career clusters. Health Science, Information Technology, and Science, Technology, Engineering, and Mathematics career clusters had a higher percentage of students that identified as non-resident alien. The variable non-resident alien was not statistically significant in any of the regression models.

Students with race and ethnicity unknown were represented in fourteen career clusters and had representation above the overall sample average for this race/ethnicity in five of the career clusters. Manufacturing, Finance, Architecture & Construction, and Marketing had a

higher percentage of students with race and ethnicity unknown. The race/ethnicity category of unknown was not statistically significant and did not impact any of the regression models.

Hispanic students were represented in all fifteen career clusters and had representation above the overall sample average for this race/ethnicity in ten career clusters. Finance, Architecture & Construction, and Information Technology had higher career cluster percentages for students with an ethnicity of Hispanic of any race. Students with an ethnicity of Hispanic of any race was significant in the regression model for the Science, Technology, Engineering, and Mathematics career cluster. Hispanic students showed to transfer less applicable credit hours when significant.

Students with an ethnicity of American Indian or Alaska Native were represented in fourteen career clusters and had representation above the overall sample average for this race/ethnicity in nine career clusters. Architecture & Construction, Law, Public Safety, Corrections & Security, and Marketing had higher career cluster percentages for students with an ethnicity of American Indian or Alaska Native. Students with an ethnicity of American Indian or Alaska Native showed to be significant when transferring into a degree in the Science, Technology, Engineering, and Mathematics career cluster. American Indian or Alaska Native students showed to transfer less applicable credit hours when significant.

Students with an ethnicity of Asian were represented in fourteen career clusters and had had representation above the overall sample average for this race/ethnicity in six career clusters. Finance, Information Technology, Manufacturing, and Marketing had higher career cluster percentages for students with an ethnicity of Asian. Students with an ethnicity of Asian showed to be significant when transferring into a degree in the Information Technology career cluster, which indicated better transfer of applicable credit hours than White students.

Students with an ethnicity of Black or African American was represented in all fifteen career clusters and had representation above the overall sample average for this race/ethnicity in four career clusters. Hospitality & Tourism, Education & Training, Law, Public Safety, Corrections & Security had higher career cluster percentages for students with an ethnicity of Black or African American. Students with an ethnicity of Black or African American showed to be significant when transferring into a degree in the Health Science career cluster. which indicated less applicable transfer credit hours than White students.

Students with an ethnicity of two or more races were represented in fourteen career clusters and had representation above the overall sample average for this race/ethnicity in ten career clusters. Marketing, Finance, and Agriculture, Food & Natural Resources had higher career cluster percentages for students with an ethnicity of two or more races. Students with an ethnicity of two or more races showed to be significant. Students transferring into the Business Management & Administration career cluster showed to earn more applicable credit hours than White students.

Students with an ethnicity of White was represented in all fifteen career clusters and had representation above the overall sample average for this race/ethnicity in eight career clusters. Government & Public Administration, Agriculture, Food & Natural Resources, and Health Science had higher career cluster percentages for students with an ethnicity of White. Students with an ethnicity of White were used as the comparison variable in all instances of the regression model, due to the fact that this ethnic group was the majority in all career clusters.

Age

The age of students in the study did have bearing on credits transferred for some career clusters. Past studies show students in CTE programs are typically older than non-CTE students,

which shows to be consistent for the sample in this study (AACC, 2020; Hirschy et al., 2011). When age is significant, the results indicate older students may have earned more credits through more years of classwork at the community college; thus, having more credits that were applicable during transfer. Six career clusters showed age to be significant for transfer hours. The age of students was most significant in the Marketing, Arts, Audio/Video Technology & Communications, and Manufacturing career clusters.

Gender

Female students accounted for just under two-thirds of the sample for this study and males accounted for just over one-third. Past studies show female populations in CTE programs are higher historically and this was consistent with the findings of this study (AACC, 2020; Calcagno et al., 2007; Kasper, 2002; Laanan, 1996). Female populations were highest in the Health Science, Human Services, and Education & Training career clusters. Males had the highest percentage in Manufacturing, Architecture & Construction, and Government & Public Administration career clusters.

Gender showed to be significantly related to credit hours that applied toward a bachelor's degree in three career clusters in the study. Education & Training showed females earning a little more than ten applicable transfer credit hours after transferring than males. The Information Technology and Arts, Audio/Video Technology & Communications career clusters showed females earning a little more than eight credit hours upon transfer than males.

Socioeconomics

Sixty percent (n=5,646) of the students in the sample for the study were not Pell recipients, five career clusters averaged more than 60 percent of students as non-Pell recipients.

Forty percent of students in the sample were Pell recipients, ten career clusters averaged more than 40 percent of students receiving Pell.

Students who received Pell showed significance in four career clusters. The Education & Training career cluster showed Pell recipients to earn three less credits after transferring than non-Pell recipients. The Government & Public Administration career cluster showed Pell recipients to earn thirteen more credits after transferring than non-Pell recipients. The Information Technology career cluster showed Pell recipients to earn five less credits after transferring than non-Pell recipients. The Science, Technology, Engineering, & Mathematics career cluster showed Pell recipients to earn two less credits after transferring than non-Pell recipients.

Career Cluster Efficiency

This study found differences in credit hours applied toward a bachelor's degree at UNC System institutions for AAS degree earners from NCCCS intuitions by career cluster. Below are findings for each career cluster in the study.

The Agriculture, Food & Natural Resources. The Agriculture, Food & Natural Resources career cluster had less than the average number of students, however, the students in the cluster on average transferred more applicable hours than four other clusters. Of the sixteen schools, three North Carolina public universities had pathways for this cluster. ASU provided the most efficient pathway for students in this cluster; however, none of the other schools transferred significantly fewer hours. There were no factors in the analysis that showed to have a statistical significance on the students that transferred to a North Carolina public university in this career cluster.

Architecture & Construction. The Architecture & Construction career cluster had less than the average number of students when compared to other career clusters in the study. Of the sixteen schools, two North Carolina public universities had pathways for this cluster. UNC-C had the highest average of the UNC public universities, with ASU showing significantly less credits after transfer for students graduating from AAS degree programs in North Carolina.

Arts, Audio/Video Technology & Communications. The Arts, Audio/Video Technology & Communications career cluster had pathways to six UNC public universities. The average applicable credits transferred was the lowest of all the career clusters when compared to other career clusters in the study. ASU had the highest average transfer of the schools with pathways for the career cluster. ECU and UNC-C showed to provide a similar transfer rate as well.

Business Management & Administration. The Business Management & Administration career cluster had more than the average number of students when compared to other career clusters in the study. The average applicable credits transferred showed to be similar to other career clusters in the study. The Business Management & Administration career cluster provided pathways to thirteen UNC public universities, where NCSU showed to have the highest average of applicable transfer credits. WCU, UNC-W, FSU, and UNC-G also showed to provide higher average applicable transfer credit hours for the career cluster.

Education & Training. The Education & Training career cluster provided the second largest sample for the study when compared to other career clusters. The applicable credits transferred was similar to other career clusters in the study. The Education & Training career cluster provided pathways to fourteen UNC public universities, where WCU showed to have the highest average of applicable transfer credits. FSU and NCSU also showed to provide higher average applicable transfer credit hours for the career cluster.

Finance. The Finance career cluster had less than the average number of students to other career clusters in the study. The applicable credit hours transferred for this career cluster was similar to other career clusters in the study. The Finance career cluster provided pathways to six UNC public universities, where WCU had the highest average of applicable transfer credits. FSU was close to WCU and provided a pathway with higher average applicable transfer credit hours for the career cluster.

Government & Public Administration. The Government & Public Administration career cluster had less than the average number of students when compared to other career clusters in the study. The applicable credits transferred was lower than average when compared to other career clusters in the study and did not show to be very efficient. There was only one UNC public university that met the threshold for enough students to consider in the study, which was WCU.

Health Science. The Health Science career cluster had the largest number of students in the sample and one of the highest average applicable credits transferred when compared to other career clusters in the study. The career cluster provided pathways to ten UNC public universities, where FSU showed to have the highest average of applicable transfer credits. No other UNC public universities showed to provide as high a transfer average for applicable transfer credits, when looking at the result from a statistically significant viewpoint. From a practically significant viewpoint, ASU and WCU provided pathways for students with a relatively higher average applicable transfer credit hours for the career cluster.

Hospitality & Tourism. The Hospitality & Tourism career cluster provided the smallest sample size for the study, when being compared to other career clusters. The applicable credits transferred was also lower on average when compared to other career clusters in the study. Only

two UNC public universities provided pathways for students in this career cluster, ECU and WCU. Both schools showed to be similar in average applicable transfer credit hours for the career cluster, with WCU having a slightly higher average.

Human Services. The Human Services career cluster's sample size was similar to other career clusters in the study. The average applicable credits transferred was slightly lower than the other career clusters in the study. The Human Services career cluster provided pathways to twelve UNC public universities, where FSU showed to have the highest average of applicable transfer credits. WCU and WSSU also showed to provide higher average applicable transfer credit hours for the career cluster.

Information Technology. The Information Technology career cluster provided a sample size that was similar to the other career clusters in the study. The applicable credits transferred was lower than average when compared to other career clusters in the study. The Information Technology career cluster provided pathways to eight UNC public universities, where NCSU showed to have the highest average of applicable transfer credits. No other UNC public university showed to provide a highly efficient pathway for students transferring to the career cluster from a North Carolina community college.

Law, Public Safety, Corrections & Security. The Law, Public Safety, Corrections & Security career cluster's sample size was similar to other career clusters in the study. The average applicable credits transferred was one of the highest compared to other career clusters in the study. The career cluster provided pathways to eight UNC public universities, where FSU showed to have the highest average of applicable transfer credits. WCU also showed to provide higher average applicable transfer credit hours for the career cluster.

Manufacturing. The Manufacturing career cluster provided one of the largest sample sizes in comparison to the other career clusters in the study. The average applicable credits transferred was one of the highest compared to other career clusters in the study. The Manufacturing career cluster provided pathways to four UNC public universities, where WCU showed to have the highest average of applicable transfer credits. UNC-C and ECU also showed to provide higher average applicable transfer credit hours for the career cluster.

Marketing. The Marketing career cluster had significantly less than the average number of students than other career clusters in the study, however, the students in the cluster had the highest average of applicable hours on transfer in the study. The Marketing career cluster provided pathways to three UNC public universities, where WCU showed to have the highest average of applicable transfer credits. Both ASU and ECU showed to provide similar applicable transfer credit hours for the career cluster, with ASU having a slightly higher average.

Science, Technology, Engineering, and Mathematics. The Science, Technology, Engineering & Mathematics career cluster provided one of the larger samples for the study. The applicable credits transferred was similar to other career clusters in the study. The Science, Technology, Engineering & Mathematics career cluster provided pathways to twelve UNC public universities, where NCSU showed to have the highest average of applicable transfer credits. WCU, UNC-W, FSU, and UNC-G also showed to provide higher average applicable transfer credit hours for the career cluster. From a statistically significant viewpoint, FSU showed to provide a higher average applicable transfer pathway for the career cluster. From a practically significant viewpoint, WCU and ECU showed to provide efficient transfer pathways.

Discussion

The purpose of this study was to identify efficient pathways from North Carolina community colleges to North Carolina public universities for students that graduated with an AAS degree. Very little was known about transfer to UNC System institutions for students that graduated with an AAS degrees from a NCCCS college at the time of this study. Career clusters were used to group students from similar degrees together and then see the efficiency of applicable transfer credits these students received when entering a UNC System university. The researcher determined this study was able to identify pathways for students who graduated from AAS programs at NCCCS colleges and then transferred to a UNC System university. The study was also able to examine transfer for students in the sample based on their characteristics and demographics. Lastly, the study was able to identify NCCCS colleges that provide the highest frequency of students to the most efficient UNC System universities for the career cluster.

Implications for Theory When Studying Transfer

The complex systems theory (Mason, 2008) was used to explain how the NCCCS and the UNC system work together during transfer. The researcher found this theory to be accurate when looking at the system as a whole, given transfer between the two North Carolina systems is derived from many different interactions as a student moves from one school to another.

Implication 1: Subcomponents of the transfer process could be looked at by using other theories, with the addition of the theory of reductionism (Descartes et al., 1996) to help explain the phenomena of transfer in specific pathways. Looking at individual components of the transfer process could allow for better understanding of the system as a whole. For this study, each career cluster showed a different efficiency rate, which would lead to think various factors attribute to the applicable transfer rate of credit hours for degrees in individual career clusters. A deeper look

into each career cluster could help better explain why there is a discrepancy between each career cluster.

Looking at each subcomponent could allow for better understanding of the issues faced by transfer students from AAS programs in North Carolina during transfer to UNC System institutions. A more general approach could then be taken in explaining the phenomenon for the specific area during transfer. By focusing on the elements of an identified subcomponent should reduce the complexity of the overarching occurrence of what this study refers to as "transfer". This would in turn make it easier for researchers to identify specific variables that could be hindering, or enhancing, the efficiency for students during transfer in a pathway.

Implication 2: The use of the human capital theory could be used in terms of how transfer relates to the labor market. Theodore Schultz uses the theory of human capital to argue how investment in people of a society will produce a positive return (Schultz, 1970). Schultz (1970) emphasizes that education is a catalyst to improve the contribution of individuals in society to the overall good of the society. While Gary Becker (1994) includes education as a major concern in the theory of human capital, he also emphasizes the influence from family, economic development, and specialization of job training. Human capital is defined as "a labour force, or the skills it possesses, regarded as a resource or asset" (Human Capital, 2018). Many times, this measure is equated to monetary value in terms of knowledge and skill level. By creating these measures for humans, the value can be used in economic terms to explain how people can potentially contribute to society.

In concern to human capital, the efficiency of transfer would lead to less time to completion of a bachelor's degree and allow a student to enter the labor market in a shorter time span. The less time at the university would equate to less money spent in degree attainment and

more possible lifetime earnings over their career in the workforce. The labor market would also benefit, by having additional well qualified candidates in the labor market to choose from in a timely manner.

Implications for Practice

This study shows there is considerable variation between career clusters in terms of applicable transfer credit during transfer from NCCCS colleges to UNC System universities. The following are suggested implications for practitioners to help increase efficiency for students transferring between the two systems.

Implication 1: Agreements between the systems would help create a more efficient pathway for students. Research shows that accrediting bodies determine which credits can be accepted in transfer, but institutional policies tend to be more constraining in the transfer for students from technical programs at community colleges (Fincher et al., 2017; Zinser & Hanssen, 2006). Many private institutions use a comprehensive policy for North Carolina community colleges, which could be looked at as a model for the UNC system.

A systemwide articulation agreement has been in place for traditional transfer degrees in North Carolina, but the agreement has very few courses specific to AAS programs. The inclusion of more courses from technical programs could help students from these AAS programs attain a four-year degree in a timelier manner. In many cases, core courses are generally similar at most colleges and universities which should alleviate concern to the information covered in these classes (Fincher et al., 2017). To further clarify and aid the articulation of applicable credits in transfer, a standardization of classes taught between the two systems through a shared course numbering catalog could be created. At the time of this study, eighteen states have a common

numbering system that is shared between community colleges and state universities (Anderson & Francies, 2020).

Implication 2: Having more options for students to transfer credits for knowledge attained, especially in terms of third-party credentialing or non-credit courses, would help students move more quickly to an academic credential. Many students come into academia with existing knowledge that would suffice for what is being taught in classes. By providing methods to show proficiency for these credits would both cutdown on time and expense for students.

Implication 3: Creating more equitable solutions for students in various demographics could help increase bachelor's degree completion rates. Research shows AAS programs have more diverse student populations, thus leading to increased diversity by improving transfer efficiency from these technical programs to universities (D'Amico at el., 2020). Student transfer efficiency can vary greatly between different groups based on demographic characteristics in specific career clusters. While great work is being done to improve equity, diversity, and inclusion for many areas in education, looking more closely at each career cluster for gaps unique to demographic characteristics could help in being more intentional with incentives to addressing issues for specific student populations.

Implications for Policy

The study showed that all pathways are not equal. Policymakers should look for ways to increase efficiency for students transferring with an AAS degree in the state of North Carolina. Students should have a pathway provided to them that is accessible and gives them a better chance to complete a four-year degree, if they decide to do so. Employers in the state of North Carolina will also be rewarded, by having more skilled workers available for employment for their organizations.

Implication 1: While North Carolina shows to be one of the better states for transfer from community colleges to public universities, there are other states that perform well too (Giani, 2019). Policymakers should look to the practices in other top performing states for ideas to increase efficiency. Possibly requiring the acceptance of applicable credits for AAS degrees for the first two years of a bachelor's degree at a UNC System university would help students transfer more efficiently. The acceptance of credits is being done in various states for specific degrees and could be expanded to be more inclusive of other programs to increase transfer opportunities (Anderson & Francies, 2020).

Implication 2: Each career cluster showed certain UNC schools to have better transfer of applicable credits after transferring than others. These schools varied greatly in each career cluster and this study highlighted pathways to specific schools a student could complete most efficiently. If certain UNC schools were to specialize in degrees within a specific career cluster, many schools could use their resources in a more cost-beneficial manner and students could make a more intentional choice when transferring to a 4-year institution in North Carolina.

Implication 3: Many career clusters show large discrepancies in demographics of students in these majors. Incentives to help encourage students in AAS programs from different ethnicities, genders, ages, and socioeconomics should be developed by policymakers to increase diversity. As stated in previous literature, many students cannot or will not start at a four-year institution and will take classes at a local community college (Hirschy et al., 2011).

Implication 4: Allowing NCCCS colleges to grant Bachelor's in Applied Science (BAS) degrees would help meet various issues for students needing to attain a bachelor's degree (Ignash, 2012). The NCCCS system has the infrastructure to offer accessibility to education past a two-year degree and offering BAS degrees would be a scalable solution in providing

opportunities to the citizens of North Carolina. Allowing access to BAS degrees would also be inclusive to minority populations, due to the community colleges' diverse make-up of students. As of 2019, 23 states in the United States allow community colleges to grant BAS degrees (Fulton, 2021). By allowing North Carolina community colleges to grant BAS degrees, the demand from North Carolina industries could help be met and citizens would have a chance for better careers.

Future Research

While this study did identify efficient transfer pathways for students graduating from an AAS program at a NCCCS institution before transferring to a UNC System institution, the study did not look into the factors that could be contributing to efficiency within these pathways. Future research into causes contributing into the efficiency of these pathways could help other schools understand how to increase student completion of bachelor's degrees in a more timely manner within their own transfer pathways. Looking into "why" certain groups of students transfer more, or less, efficiently would be another area to explore. Student demographics did not show to be consistent in efficiency when comparing career clusters, so analyzing the student groups for each career cluster could identify factors within each demographic to help address equity.

A sample that identified the student's degrees from the NCCCS institutions could help in explaining issues in applicable transfer credits for some career clusters. Lastly, some career clusters had small sample sizes and significance was harder to determine for some variables. The dataset given was just over 1 million records, but after analyzing the records a sample of 9403 was derived from the data given. A dataset constructed specifically for a study on transfer of AAS students in North Carolina could help in further research.

Conclusion

There are efficient pathways to UNC System institutions for students graduating from an AAS program at NCCCS schools, but these pathways are rare, in some cases, and could be better. Ultimately, having all credits apply toward a degree at UNC System schools would be the goal for students graduating from AAS programs in North Carolina. The labor market needs skilled workers in a timelier manner and the higher educational systems in North Carolina need to find ways to work together in meeting the demand of industry. If students cannot transfer and complete a degree in a suitable manner, the value of our educational systems could diminish and alternative methods of attaining an education could replace the purpose of the higher educational systems in North Carolina. I hope the research in this study will ultimately help the industries, the North Carolina higher education systems, and the citizens of North Carolina gain access through better transfer pathways to North Carolina public universities from AAS programs at North Carolina community colleges.

APPENDIX

Table A1

Frequency table for North Carolina public universities

Institution	Frequency	Percent
ASU	536	5.7
ECU	1488	15.8
ECSU	55	0.6
FSU	643	6.8
NCA&T	353	3.8
NCCU	229	2.4
NCSU	222	2.4
UNC-A	56	0.6
UNC-CH	43	0.5
UNC-C	1160	12.3
UNC-G	1326	14.1
UNC-P	608	6.5
UNC-W	1157	12.3
WCU	1043	11.1
WSSU	484	5.1
Total	9403	100.0

Note. UNCSA was not included in this study due to small representation (n=3).

Table A2

Frequency table of entry year for the student

Academic Year	Frequency	Percent
2014	1038	11.0
2015	1571	16.7
2016	1876	20.0
2017	2085	22.2
2018	2394	25.5
2019	439	4.7
Total	9403	100.0

Table A3

Frequency table of ethnicity for students in study

Ethnicity	Frequency	Percent
American Indian/Alaska Native	184	2.0
Asian	235	2.5
Black/African American	1848	19.7
Hispanic	569	6.1
Non-Resident Alien	71	.8
Two or more	206	2.2
Unknown	268	2.9
White	6022	64.0
Total	9403	100.0

Table A4

Frequency table of the North Carolina community colleges students transferred from in study

NC Community College	Frequency	Percent
Alamance Community College	239	2.54%
Asheville-Buncombe Tech Cmty Col	278	2.96%
Beaufort County Community College	55	0.58%
Bladen Community College	70	0.74%
Blue Ridge Community College	91	0.97%
Brunswick Community College	46	0.49%
Caldwell Cmty College & Tech Inst	104	1.11%
Cape Fear Community College	266	2.83%
Carteret Community College	46	0.49%
Catawba Valley Community College	210	2.23%
Central Carolina Community College	241	2.56%
Central Piedmont Community College	512	5.45%
Cleveland Community College	119	1.27%
Coastal Carolina Community College	97	1.03%
College of the Albemarle	66	0.70%
Craven Community College	99	1.05%
Davidson County Community College	228	2.42%
Durham Technical Community College	179	1.90%
Edgecombe Community College	85	0.90%
Fayetteville Tech Community College	522	5.55%

Table A4 (continued).

NC Community College	Frequency	Percent
Forsyth Technical Community College	510	5.42%
Gaston College	223	2.37%
Guilford Technical Community Col	531	5.65%
Halifax Community College	32	0.34%
Haywood Community College	114	1.21%
Isothermal Community College	69	0.73%
James Sprunt Community College	35	0.37%
Johnston Community College	163	1.73%
Lenoir Community College	188	2.00%
Martin Community College	20	0.21%
Mayland Community College	22	0.23%
McDowell Tech Community College	34	0.36%
Mitchell Community College	108	1.15%
Montgomery Community College	21	0.22%
Nash Community College	137	1.46%
Pamlico Community College	13	0.14%
Piedmont Community College	81	0.86%
Pitt Community College	457	4.86%
Randolph Community College	131	1.39%
Richmond Community College	132	1.40%
Roanoke-Chowan Community College	37	0.39%

Table A4 (continued).

NC Community College	Frequency	Percent
Robeson Community College	137	1.46%
Rockingham Community College	88	0.94%
Rowan-Cabarrus Community College	188	2.00%
Sampson Community College	55	0.58%
Sandhills Community College	223	2.37%
South Piedmont Community College	69	0.73%
Southeastern Community College	59	0.63%
Southwestern Community College	142	1.51%
Stanly Community College	224	2.38%
Surry Community College	110	1.17%
Tri-County Community College	45	0.48%
Vance-Granville Community College	149	1.58%
Wake Technical Community College	813	8.65%
Wayne Community College	150	1.60%
Western Piedmont Community College	145	1.54%
Wilkes Community College	123	1.31%
Wilson Community College	72	0.77%
Total	9403	100.0

Table A5

Frequency table for career clusters in study

Career Cluster	Frequency	Percent
1 - Agriculture, Food & Natural Resources	88	0.94
2 - Architecture & Construction	65	0.69
3 - Arts, Audio/Video Technology & Communications	153	1.63
4 - Business Management & Administration	851	9.05
5 - Education & Training	1680	17.87
6 - Finance	162	1.72
7 - Government & Public Administration	125	1.33
8 - Health Science	3052	32.46
9 - Hospitality & Tourism	64	0.68
10 - Human Services	238	2.53
11 - Information Technology	432	4.59
12 - Law, Public Safety, Corrections & Security	722	7.68
13 - Manufacturing	854	9.08
14 - Marketing	66	0.70
15 - Science, Technology, Engineering & Mathematics	851	9.05
Total	9403	100

Note. The Transportation, Distribution, & Logistics career cluster was not included due to a small number of students.

Table A6

Frequency table for economic status of students in study

Received Pell	Frequency	Percent
No	5646	60.0
Yes	3757	40.0
Total	9403	99.8

Table A7

Frequency table of gender for students in study

Gender	Frequency	Percent
F	6008	63.9
M	3395	36.1
Total	9403	100.0

Table A8

Frequency for Age of students

Age	Frequency	Percentage
15	1	0.01%
17	2	0.02%
18	13	0.14%
19	138	1.47%
20	509	5.41%
21	569	6.05%
22	561	5.97%
23	587	6.24%
24	552	5.87%
25	507	5.39%
26	474	5.04%
27	433	4.60%
28	432	4.59%
29	376	4.00%
30	328	3.49%
31	372	3.96%
32	289	3.07%
33	288	3.06%
34	292	3.11%
35	238	2.53%
36	229	2.44%

Table A8 (continued).

Age	Frequency	Percentage
37	237	2.52%
38	217	2.31%
39	202	2.15%
40	166	1.77%
41	141	1.50%
42	140	1.49%
43	129	1.37%
44	123	1.31%
45	138	1.47%
46	108	1.15%
47	91	0.97%
48	72	0.77%
49	56	0.60%
50	71	0.76%
51	62	0.66%
52	54	0.57%
53	42	0.45%
54	46	0.49%
55	22	0.23%
56	21	0.22%
57	22	0.23%
58	9	0.10%

Table A8 (continued).

Age	Frequency	Percentage
59	17	0.18%
60	9	0.10%
61	1	0.01%
62	4	0.04%
63	3	0.03%
64	4	0.04%
65	2	0.02%
68	1	0.01%
69	1	0.01%
70	1	0.01%
73	1	0.01%
Total	9403	100%

Table A9

Descriptive statistics of continuous variables in study

	Minimum	Maximum	Mean	Std. Deviation
Transfer Hours	3	90	58.09	16.69
Approx. Age	15	73	30.56	.09

Table A10

Descriptive Statistics in looking at mean transfer hours at each North Carolina Public Universities (Reporting Institutions)

Institution	Name	Mean	Std. Deviation
2905	NCA&T	52.35	17.41
2906	ASU	61.85	15.59
2907	UNC-A	42.43	21.04
2923	ECU	57.36	18.71
2926	ECSU	50.51	14.77
2928	FSU	68.49	16.32
2950	NCCU	49.04	17.43
2954	UNC-P	52.25	18.35
2972	NCSU	64.73	17.18
2974	UNC-CH	55.88	13.24
2975	UNC-C	55.28	13.94
2976	UNC-G	57.75	14.01
2981	WCU	64.43	15.23
2984	UNC-W	55.59	15.75
2986	WSSU	57.94	12.82
Total		58.09	16.69

Table A11

Least Significant Difference Post Hoc Test for North Carolina Public Universities (Reporting Institutions), Difference in Means

	NCA&T	ASU	UNC-A	ECU	ECSU	FSU	NCCU
NCA&T	X	9.50*	-9.93*	5.01*	-1.85	16.13*	-3.31*
ASU	-9.50*	X	-19.43*	-4.49*	-11.35*	6.63*	-12.81*
UNC-A	9.93*	19.43*	X	14.93*	8.08*	26.06*	6.62*
ECU	-5.01*	4.49*	-14.93*	X	-6.85*	11.12*	-8.32*
ECSU	1.85	11.35*	-8.08*	6.85*	X	17.98*	-1.47
FSU	-16.13*	-6.63*	-26.06*	-11.12*	-17.98*	X	-19.44*
NCCU	3.31*	12.81*	-6.62*	8.32*	1.47	19.44*	X
UNC-P	0.11	9.61*	-9.82*	5.12*	-1.74	16.24*	-3.20*
NCSU	-12.38*	-2.88*	-22.31*	-7.37*	-14.23*	3.75*	-15.69*
UNC-CH	-3.53	5.97*	-13.46*	1.48	-5.37	12.60*	-6.84*
UNC-C	-2.93*	6.57*	-12.86*	2.08*	-4.78*	13.20*	-6.24*
UNC-G	-5.39*	4.11*	-15.32*	-0.38	-7.24*	10.74*	-8.70*
UNCSA	-12.08*	-2.58*	-22.00*	-7.07*	-13.92*	4.06*	-15.39*
UNC-W	-3.24*	6.26*	-13.16*	1.77*	-5.08*	12.90*	-6.55*
WSSU	-5.58*	3.92*	-15.51*	-0.57	-7.43*	10.55*	-8.89*

** Notes the mean is significant at or below the 0.05 level*

Table A11 (continued)

	UNC-P	NCSU	UNC-CH	UNC-C	UNC-G	UNCSA	UNC-W	WSSU
NCA&T	-0.11	12.38*	3.53	2.93*	5.39*	12.08*	3.24*	5.58*
ASU	-9.61*	2.88*	-5.97*	-6.57*	-4.11*	2.58*	-6.26*	-3.92*
UNC-A	9.82*	22.31*	13.46*	12.86*	15.32*	22.00*	13.16*	15.51*
ECU	-5.12*	7.37*	-1.48	-2.08*	0.38	7.07*	-1.77*	0.57
ECSU	1.74	14.23*	5.37	4.78*	7.24*	13.92*	5.08*	7.43*
FSU	-16.24*	-3.75*	-12.60*	-13.20*	-10.74*	-4.06*	-12.90*	-10.55*
NCCU	3.20*	15.69*	6.84*	6.24*	8.70*	15.39*	6.55*	8.89*
UNC-P	X	12.49*	3.64	3.04*	5.50*	12.18*	3.35*	5.69*
NCSU	-12.49*	X	-8.85*	-9.45*	-6.99*	-0.30	-9.14*	-6.80*
UNC-CH	-3.64	8.85*	X	-0.60	1.86	8.55*	-0.29	2.05
UNC-C	-3.04*	9.45*	0.60	X	2.46*	9.15*	0.31	2.65*
UNC-G	-5.50*	6.99*	-1.86	-2.46*	X	6.68*	-2.16*	0.19
UNCSA	-12.18*	0.30	-8.55*	-9.15*	-6.68*	X	-8.84*	-6.49*
UNC-W	-3.35*	9.14*	0.29	-0.31	2.16*	8.84*	X	2.35*
WSSU	-5.69*	6.80*	-2.05	-2.65*	-0.19	6.49*	-2.35*	X

** Notes the mean is significant at or below the 0.05 level*

Table A12

Least Significant Difference Post Hoc Test for Career Clusters students, Difference in Means

	Agriculture, Food & Natural Resources	Architecture & Construction	Arts, Audio/Video Technology& Communications
Agriculture, Food & Natural Resources	X	-4.162	-9.91
Architecture & Construction	4.16	X	-5.74
Arts, Audio/Video Technology & Communications	9.91*	5.74	X
Business Management & Administration	0.53	3.63	-9.37
Education & Training	0.11	-4.05	-9.79
Finance	1.34	-2.83	-8.57
Government & Public Administration	6.46*	2.30	-3.45
Health Science	-1.89	-6.05	-11.79
Hospitality & Tourism	6.90*	2.73	-3.01
Human Services	2.95	-1.21	-6.95
Information Technology	7.12*	2.96	-2.79
Law, Public Safety, Corrections & Security	-2.15	-6.31	-12.06
Manufacturing	-2.89	-7.05	-12.80
Marketing	-3.58	-7.75	-13.49
Science, Technology, Engineering & Mathematics	1.53	-2.64	-8.38

* *Notes the mean is significant at or below the 0.05 level*

Table A12 (continued).

	Business Management & Administration	Education & & Training	Finance
Agriculture, Food & Natural Resources	-0.53	-0.11	-1.34
Architecture & Construction	3.63	4.05	2.83
Arts, Audio/Video Technology & Communications	9.37	9.79*	8.57*
Business Management & Administration	X	0.42	-0.80
Education & Training	-0.42	X	-1.22
Finance	0.80	1.22	X
Government & Public Administration	5.92	6.35*	5.12*
Health Science	-2.42	-2.00*	-3.22*
Hospitality & Tourism	6.37	6.79*	5.56*
Human Services	2.42	2.84*	1.62
Information Technology	6.59*	7.01*	5.79*
Law, Public Safety, Corrections & Security	-2.69*	-2.26*	-3.49*
Manufacturing	-3.43*	-3.00*	-4.23*
Marketing	-4.12	-3.70	-4.92*
Science, Technology, Engineering & Mathematics	0.99	1.41*	0.19

** Notes the mean is significant at or below the 0.05 level*

Table A12 (continued).

	Government & Public Administration	Health Science	Hospitality & Tourism
Agriculture, Food & Natural Resources	-6.46*	1.89	-6.90*
Architecture & Construction	-2.30	6.05*	-2.74
Arts, Audio/Video Technology & Communications	3.45	11.79*	3.01
Business Management & Administration	-5.92*	2.42*	-6.37*
Education & Training	-6.35*	2.00*	-6.79*
Finance	-5.12*	3.22*	-5.56*
Government & Public Administration	X	8.34*	-0.44
Health Science	-8.34*	X	-8.79*
Hospitality & Tourism	0.44	8.79*	X
Human Services	-3.51	4.84*	-3.95
Information Technology	0.66	9.01*	0.22
Law, Public Safety, Corrections & Security	-8.61*	-0.26	-9.05*
Manufacturing	-9.35*	-1.01	-9.79*
Marketing	-10.04*	-1.70	-10.48*
Science, Technology, Engineering & Mathematics	-4.93*	3.41*	-5.37*

** Notes the mean is significant at or below the 0.05 level*

Table A12 (continued).

	Human Services	Information Technology	Law, Public Safety Corrections & Security
Agriculture, Food & Natural Resources	-2.95	-7.12*	2.15
Architecture & Construction	1.21	-2.96	6.31*
Arts, Audio/Video Technology & Communications	6.95*	2.79	12.06*
Business Management & Administration	-2.412*	-6.59*	2.69*
Education & Training	-2.84*	-7.01*	2.26*
Finance	-1.62	-5.79*	3.49*
Government & Public Administration	3.51	-0.66	8.61*
Health Science	-4.84*	-9.01*	0.26
Hospitality & Tourism	3.95	-0.22	9.05*
Human Services	X	-4.17*	5.10*
Information Technology	4.17*	X	9.27*
Law, Public Safety, Corrections & Security	-5.10*	-9.27*	X
Manufacturing	-5.84*	-10.01*	-0.74
Marketing	-6.54*	-10.70*	-1.43
Science, Technology, Engineering & Mathematics	-1.43	-5.60*	3.68*

* *Notes the mean is significant at or below the 0.05 level*

Table A12 (continued).

	Manufacturing	Marketing	Science, Technology, Engineering & Mathematics
Agriculture, Food & Natural Resources	2.892	3.58	-1.53
Architecture & Construction	7.05*	7.75*	2.64
Arts, Audio/Video Technology & Communications	12.80*	13.49*	8.38*
Business Management & Administration	3.43*	4.12	-0.99
Education & Training	3.00*	3.70	-1.41*
Finance	4.23*	4.92*	-0.19
Government & Public Administration	9.35*	10.04*	4.93*
Health Science	1.01	1.70	-3.41*
Hospitality & Tourism	9.79*	10.48*	5.37*
Human Services	5.84*	6.54*	1.43
Information Technology	10.01*	10.70*	5.60*
Law, Public Safety, Corrections & Security	0.74	1.43	-3.68*
Manufacturing	X	0.69	-4.42*
Marketing	-0.692	X	-5.11*
Science, Technology, Engineering & Mathematics	4.42*	5.11*	X

* *Notes the mean is significant at or below the 0.05 level*

Table A13

Means for each Career Cluster at each North Carolina public university

	Agriculture, Food & Natural Resources	Architecture & Construction	Arts, Audio/Video Technology& Communications
NCA&T	55.3	52.333*	40.000
ASU	63.067	48.455	52.704
UNC-A	X	X	62.000*
ECU	X	43.000*	50.564
ECSU	X	X	11.000*
FSU	X	X	67.143*
NCCU	X	X	37.000*
UNC-P	20.000*	X	58.750*
NCSU	58.000	7*	41.250*
UNC-CH	X	X	44.667*
UNC-C	X	59.094	46.471
UNC-G	X	49.500*	36.588
UNCSA	58.111	54.200*	64.800*
UNC-W	53.000*	X	44.900
WSSU	X	X	37.500*

***** Notes the frequency of students for the career cluster at the institution is less than 10

Table A13 (continued).

	Business Management & Administration	Education & & Training	Finance
NCA&T	56.615	54.763	28.000*
ASU	53.353	56.269	55.125*
UNC-A	77.500*	35.39	76.000*
ECU	56.317	55.618	56.441
ECSU	44.000	56.467	X
FSU	63.371	66.701	69.737
NCCU	42.611	49.414	33.667*
UNC-P	55.225	48.778	52.900
NCSU	67.182	59.000	52.800*
UNC-CH	60.000*	63.250*	X
UNC-C	43.643	46.679	52.923
UNC-G	58.286	59.845	56.109
UNCSA	65.389	72.256	73.455
UNC-W	62.643	51.925	X
WSSU	55.200	60.258	58.333*

***** Notes the frequency of students for the career cluster at the institution is less than 10

Table A13 (continued).

	Government & Public Administration	Health Science	Hospitality & Tourism
NCA&T	X	55.314	X
ASU	58.500*	68.320	46.667
UNC-A	X	X	X
ECU	58.250*	49.813	53.476
ECSU	X	X	X
FSU	70.000*	73.719	X
NCCU	31.750*	31.833*	44.000*
UNC-P	75.000*	52.722	X
NCSU	31.000*	X	30.000*
UNC-CH	55.333*	55.667*	X
UNC-C	41.667*	60.393	X
UNC-G	38.000*	62.669	33.889
UNCSA	53.011	63.861	67.286
UNC-W	24.000*	56.031	50.000*
WSSU	54.800*	58.216	41.000*

***** Notes the frequency of students for the career cluster at the institution is less than 10

Table A13 (continued).

	Human Services	Information Technology	Law, Public Safety Corrections & Security
NCA&T	54.471	54.048	51.231
ASU	55.692	49.462	46.600
UNC-A	X	44.667*	X
ECU	50.630	50.225	40.455
ECSU	46.692	53.000*	51.400*
FSU	68.958	67.667	68.129
NCCU	43.067	67.333*	55.414
UNC-P	47.476	41.793	57.589
NCSU	52.833	69.581	X
UNC-CH	54.000*	56.556	X
UNC-C	46.350	45.860	49.232
UNC-G	60.195	50.340	X
UNCSA	65.900	X	66.757
UNC-W	59.400*	47	X
WSSU	60.813	50.375*	54.714*

***** Notes the frequency of students for the career cluster at the institution is less than 10

Table A13 (continued).

	Manufacturing	Marketing	Science, Technology, Engineering & Mathematics
NCA&T	43.882	X	49.000
ASU	49.000*	64.545	52.278
UNC-A	X	X	62.250*
ECU	61.334	56.385	57.505
ECSU	X	X	67.000*
FSU	X	X	66.455
NCCU	X	X	45.381
UNC-P	X	X	49.516
NCSU	X	X	70.248
UNC-CH	X	X	56.125
UNC-C	61.079	60.000*	56.469
UNC-G	31.000*	X	48.792
UNCSA	61.467	66.185	61.962
UNC-W	X	X	53.341
WSSU	X	40.000*	60.600*

***** Notes the frequency of students for the career cluster at the institution is less than 10

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