An Evaluation of Network2work at Piedmont Virginia Community College

Cynthia M. Finley
Old Dominion University

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AN EVALUATION OF NETWORK2WORK AT
PIEDMONT VIRGINIA COMMUNITY COLLEGE

by

Cynthia M. Finley
B.A. May 1995, Virginia Tech
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A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

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December 2023

Approved by:

Dr. Mitchell R. Williams (Director)
Dr. David F. Ayers (Member)
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ABSTRACT

AN EVALUATION OF NETWORK2WORK AT PIEDMONT VIRGINIA COMMUNITY COLLEGE

Cynthia M. Finley
Old Dominion University, 2023
Director: Dr. Mitchell R. Williams

Barriers to education and training can have a generational impact on socioeconomic status and economic development. Post-traditional students have been shown to experience a variety of barriers to education and family sustaining employment. Social capital has been shown to help alleviate some of the barriers for students resulting in stronger economic outcomes, such as job retention, and higher wages. This case study examined a workforce development approach to providing support to post-traditional students in non-credit industry training. The researcher examined student outcomes, credential attainment and employment, between two student groups (Network2Work versus a nonNetwork2Work group) using chi-square and logical regression analysis. This study found no significant relationship between Network2Work and student outcomes. Further examination determined that older students and female students participating in Network2Work had higher credential rates, and Black students had higher employment rates compared to the control group. Students participating in Network2Work also had higher employment rates in quarter two of fiscal year 2020, during the peak COVID-19 pandemic. This study provided a new angle, a social capital perspective, to examine the role community college and nonprofit programs can play in removing barriers for diverse student populations in workforce development.
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This dissertation is dedicated to Ken Thompson whose legacy inspired me to do great things. To my little brother, a genius whose time was cut short. To my mom who taught me that I can do hard things and inspires me more than she will ever know. And to Kara, this one’s for you.
ACKNOWLEDGMENTS

There are many people who have contributed to the successful completion of this dissertation. This work would not have been possible without support from my dissertation committee, Dr. David F. Ayers, Associate Professor at ODU, Dr. William R. Muth, Associate Professor, VCU, and Dr. Mitchell R. Williams, Associate Professor at ODU. I would especially like to thank Dr. Mitchell R. Williams, the chairman of my committee, who has been supportive of my educational goals and who worked actively to provide me with the support to achieve those goals. Dr. Williams balanced patience and rigor, making me a better student and professional. I am grateful to all of those with whom I have had the pleasure to work with this and other related projects. A special thanks to Daniel Feagans who taught me that math is hard.

Nobody has been more important to me in the pursuit of this project than my cohort partner Dr. Amy Henecke. I am proud that we accomplished our goals; one lecture online at a time. I am honored to call her a friend. I would like to thank my mother, whose love and guidance is with me in whatever I pursue. She is the ultimate role model. Most importantly, I wish to thank my friends and family who supported me throughout this journey. To my husband who tolerated my late nights and crazy schedule, here’s to the next part of our journey! To my son, Chase, you are an inspiration, thank you for your endless patience and encouragement as I worked at the baseball field- but I never missed you at bat!
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CHAPTER I

INTRODUCTION

The United States Census Bureau uses income thresholds to determine individuals who experience poverty. The income thresholds for determining poverty status vary by the number of family members. Total incomes below the designated family threshold indicate poverty status (U.S. Census Bureau, 2020). The established thresholds are used throughout the country and vary by family size and the members' age (U.S. Census Bureau, 2020). The calculations to determine poverty-level incomes combine all related family members living together in a household to generate an index for the estimated cost of living. Mollie Orshansky, an economist at the Social Security Administration, developed the measure for poverty in the 1960s (U.S. Census Bureau, 2020). The thresholds included the minimum cost of food multiplied by three to account for other expenses because no other standard for minimum needs related to daily life (housing, medical care, clothing, etc.) existed (U.S. Census Bureau, 2020). The poverty thresholds, developed by Orshansky, were initially designed to assess the difference in opportunities and risk of low socioeconomic status among different demographic groups (U.S. Census Bureau, 2020). Orshansky sought to create a standard for basic life necessities, the cost of essentials for life.

The calculations considered multiple factors, including the size of the family, geographic location (urban versus rural), farming versus nonfarm families, and age of individuals. Orshansky used the 1955 Agriculture Department survey, which used a one-to-three ratio of food cost to after-tax income to develop the threshold (U.S. Census Bureau, 2020). Each piece of the threshold calculation was based on the assumption of spending at the time. The result was thresholds designed to measure income inadequacy (U.S. Census Bureau, 2020). As
In the 1970s, the terminology changed from poverty and poor to "low income" (U.S. Census Bureau, 2020). As the workforce and income levels changed, the calculations needed to be updated again. In the 1990s, the House Appropriations Committee mandated the Bureau of Labor and Statistics to develop a new method for measuring poverty. The new calculation would reflect growth in the standard of living, a first since the establishment of the metric three decades prior (U.S. Census Bureau, 2020).

In the current measure of poverty, an individual's income (or family's income) is compared to a minimum amount of income needed to cover basic living expenses, which have since been itemized. The Census Bureau uses an official poverty measure (OPM), compares pretax income, and is only adjusted for price changes using the Consumer Price Index (U.S. Census Bureau, 2018). The 1963 formula would look vastly different today, considering the drastic difference in the cost of food. The average inflation rate for food is 3.90% per year. Therefore, food costing $20 in 1963 would cost $191 today (U.S. Inflation Calculator, 2020).

How poverty is defined in the United States could be subjective, excluding social and cultural inequities, geographic discrepancies, and fluctuating changes in the workforce. The struggle is not equally shared, and finding a solution is complex.

**Background of Study**

In Virginia, 9% of the population lives in poverty, which is equivalent to over 822,000 people (U.S. Census Bureau, 2018). Among them, 13% are children and 16% identify as Black, 13% as Hispanic, 9% as Native American, and 7% as White. The median household income between 2016 and 2020 was $76,398 (U.S. Census Bureau, 2020). For those living in poverty in Virginia, services are available to help ease the burden and trauma of poverty. Emergency
funding and programs such as Supplemental Nutrition Assistance, Temporary Assistance for Needy Families, and even Emergency Broadband Assistance are available (Virginia Department of Social Services, 2022). However, eligibility requirements for these services can often exclude a group of individuals earning just a bit too much to meet the poverty threshold.

In Virginia, 30% of the population is asset limited, income constrained, employed (ALICE), and do not earn enough to care for their families (United Way, 2018). Economic conditions improved as unemployment rates fell across the United States and Virginia. According to the United Way (2018), almost 40% of Virginians still struggled to meet their basic needs despite statewide economic improvements. Only 10% of these individuals lived below the Federal Poverty Level (United Way, 2018). The remaining thirty percent were employed and still struggled to earn a living wage to support their family. United Way (2018) defined these individuals as Asset Limited, Income Constrained, Employed (ALICE).

Piedmont Virginia Community College serves a 65-mile radius, including Charlottesville City and six surrounding counties. Over 64,000 families are living in the Charlottesville region. Approximately 20% of the families in the Charlottesville region live in poverty or identify as ALICE struggling to earn enough money to sustain essential needs such as food, shelter, clothing, childcare, and transportation (U.S. Census Bureau, 2019; United Way, 2018). Earning a family-sustaining wage is not an equitable struggle in the region. Thirty-five percent of Black families earn less than $35,000 a year, compared to 14% of White families (United Way, 2018). Figure 1 shows the percentage of families earning less than $35,000 by county or city in the region.
The earning capacity for some families is limited, with incomes as low as zero to $14,999 reported (U.S. Census Bureau, 2019). Eighteen percent of the families in the region have a family income lower than $9,999 per year, 10% have a family income lower than $14,999 per year, and 72% earn between $15,000 and $34,999 per year (U.S. Census Bureau, 2019). According to Charlottesville's housing affordability study, approximately one-third of families struggling cannot earn their way to self-sufficiency (Charlottesville Low-Income Housing Coalition, 2020). These families rely on a mix of government assistance and community organization programs. The remaining families are classified as ALICE; they are working but not earning enough to sustain a family.
The economics of Charlottesville is as diverse as the geography. For example, Charlottesville City, the location of Piedmont Virginia Community College, is roughly 10 square miles (U.S. Census Bureau, 2019). The neighboring county of Albemarle is 726 square miles and comprises both urban and rural neighborhoods. Expenses for families differ throughout the region. For example, housing in Buckingham and Louisa Counties is less expensive than in Charlottesville City. Childcare costs are also vastly different throughout the region. Tables 1 and 2 show a comparison of the annual expenses required to survive and the cost of some barriers preventing meaningful employment opportunities between two areas in the region (Virginia Department of Health, 2019). Earning minimum wage in Virginia will result in a gross income of $14,400 per year (U.S. Census Bureau, 2019). Individuals must demonstrate the capacity to earn more income to be elevated above the ALICE threshold.

### Table 1

**Household Expenses Charlottesville City**

<table>
<thead>
<tr>
<th></th>
<th>Annual</th>
<th>Monthly</th>
<th>Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>$6,344.50</td>
<td>$528.71</td>
<td>$122.01</td>
</tr>
<tr>
<td>Clothing</td>
<td>$1,090.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shelter</td>
<td>$15,192.00</td>
<td>$1,266.00</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>$2,658.78</td>
<td>$221.56</td>
<td></td>
</tr>
<tr>
<td>Necessary Costs</td>
<td>$5,057.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival Expenses</td>
<td>$30,342.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childcare</td>
<td>$13,520.00</td>
<td>$1,126.67</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>$2,588.24</td>
<td>$215.69</td>
<td></td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$46,450.70</td>
<td></td>
<td></td>
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</table>
### Table 2

#### Household Expenses Buckingham Country

<table>
<thead>
<tr>
<th>Buckingham Expenses Single Household + 2 children (1 toddler)</th>
<th>Annual</th>
<th>Monthly</th>
<th>Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>$6,344.52</td>
<td>$528.71</td>
<td>$122.01</td>
</tr>
<tr>
<td>Clothing</td>
<td>$1,090.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shelter</td>
<td>$8,916.00</td>
<td>$743.00</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>$2,658.78</td>
<td>$221.56</td>
<td></td>
</tr>
<tr>
<td>Necessary Costs</td>
<td>$3,801.86</td>
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</tr>
<tr>
<td>Survival Expenses</td>
<td>$22,811.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childcare</td>
<td>$6,760.00</td>
<td>$563.33</td>
<td>$130.00</td>
</tr>
<tr>
<td>Transportation</td>
<td>$2,588.24</td>
<td>215.69</td>
<td></td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$32,159.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Skills Gap

Improving the economic situation for these individuals may require advancing their education and skill set to provide them with labor market skills valued by employers. Education is a strong predictor of income in the United States (Acs & Zimmerman, 2008; Sommer et al., 2018; Williams & Perry, 2020). Acquiring these valuable skills can be difficult for adults struggling to make ends meet. Adults without a high school diploma or postsecondary experience may lack the core skills required in the workforce. In the Charlottesville region, over 20,000 adults are without a high school diploma (Virginia Department of Health, 2019). Figure 2 shows adults over the age of 25 without a high school diploma (Virginia Department of Health, 2019).
The labor market is defined by global changes and competition requiring postsecondary education or training (Carnevale et al., 2013). According to the National Skills Coalition (2017a), a middle-skills gap makes it difficult for employers to fill jobs. Middle-skills jobs have been defined as requiring a credential such as a certificate program or degree (National Skills Coalition, 2017a). Previous researchers have illuminated a 53% gap in preparing workers for labor market demands and discussed middle-skill jobs as a pathway to increased earning potential (Carnevale & Smith, 2018). One of the most significant and disruptive events impacting the workforce has been COVID-19; changes in how we work and technological advances have led people to change paths or return to college to advance skills sets (Lund et al., 2021).
Bridging the Skills Gap

According to the Institute for Higher Education Policy (2010), 35.2 million low-income young adults in the United States earned incomes at 200% of the federal poverty level. These adults were more likely to be first-generation ethnic minority individuals and classified as ALICE in Virginia (United Way, 2018). Ways of addressing this gap included providing services to combat the barriers faced by these individuals has been a focus in higher education. There can be many barriers to pursuing postsecondary training, especially for post-traditional students. A post-traditional or nontraditional student may be first-generation, low-income, minority individual, or from other underrepresented groups. According to Deil-Amen and Rosenbaum (2003), these characteristics reduce the likelihood of completion and retention. First-generation and first-year students suffer higher attrition rates, 17% higher compared with their peers, creating another barrier to employment opportunities and increasing wage gains to support a family (D’Alessio & Banerjee, 2016; Fentress & Collopy, 2011; Gampert & Jones, 2013).

Matt Helmer (2013) illuminated the value of an industry credential in getting a better job but noted that the credential alone was insufficient. He pointed out that a jobseeker's professional and personal network played a role in obtaining a secure economic future. Underemployed adult learners typically lack these essential networks. Researchers noted several barriers low socioeconomic and low-income students faced to gaining access to complete noncredit training (Wyner et al., 2007). Low-income students tended to be first-generation students lacking social, cultural, and financial capital to assist them to complete noncredit training and credential attainment (Lohfink & Paulsen, 2005; McGregor et al., 1991). Building a social network has been shown to help individuals combat some of the operational challenges related to poverty and the acquisition of education and training. According to Perna and Titus (2005), a robust social
network can help break the generational cycle of poverty. James Coleman (1988) defined social capital as a social structure that facilitates action. Social capital can be a conduit to education, training outcomes, and improved income opportunities (Gándara & Contreras, 2009). However, underemployed or unemployed individuals may not have sufficient networks or connections related to education and employment to help change their circumstances, lifting them out of poverty.

**Network2Work**

In 2016, Piedmont Virginia Community College launched a web-based application to address poverty and the workforce skills gap in the Charlottesville, Virginia, region. The Network2Work model is a job network application utilizing volunteers to connect students to the skills, training, and resources they need to gain in-demand employment in their area (Piedmont Virginia Community College, 2021). The tool is divided into four essential components: a) peer connections with students, b) education and training, c) support services, and d) employment assistance—Piedmont Virginia Community College staff work to establish relationships with local employers (Piedmont Virginia Community College, n.d.). The staff populates the web-based application with job opportunities paying a family-sustaining living wage. Family-sustaining wages are determined by estimating the essential economic circumstances in the PVCC service area, including food, shelter, clothing, utilities, childcare, transportation, and other necessary costs (U.S. Bureau of Labor Statistics, 2018; U.S. Department of Agriculture, Center for Nutrition Policy, and Promotion, 2017, 2018; U.S. Department of Housing and Urban Development, 2018; Virginia Department of Social Services, 2022; Virginia Housing Development Authority, 2018).
The Network2Work planning phase includes a labor market analysis conducted by the Dean of Student Self-Sufficiency to determine in-demand industries in the region. The Dean develops relationships with local employers to determine employer needs. The Chief Workforce Officer (CWO), workforce faculty, and staff design career pathways aligned with the employer's needs, leading to in-demand industry credentials. During the implementation phase, the volunteer coordinator at PVCC conducts community outreach to recruit peer volunteers (connectors). The volunteer coordinator trains volunteers to use the application, recruit students who may fit the employment and training criteria, provide needs assessments, collaborate with the college staff to align services, and support students from enrollment to employment. Could the Network2Work program help create a bridge lifting underserved students out of poverty, and if so, would other community colleges want to follow suit?

Social relationships serving as a resource leading to the development and accumulation of human capital is the premise of social capital theory. For example, strong social support (family) impacts the educational attainment of individuals (Coleman, 1988). According to Savage and Kanazawa (2002), social capital has evolved to include any feature of a social relationship that yields benefits. The concept of social capital is often defined in terms of networks, built on trust (Schuller & Theisens, 2010). Social capital is the premise of the N2W program. The Increasing College Opportunity for Low-Income Students report revealed that low-income students were disadvantaged with fewer resources for mentorships, college, and employment insight (Executive Office of the President, 2014). Community college leaders will be interested in the possibility of replicating these essential networks for their students, and the findings from this study will enrich the literature on the topic. Helping this demographic group earn family-sustaining wages by identifying jobs and positioning them to secure and excel at those jobs is the impetus for the
Network2Work is designed to help provide the social structures, connections, and access to the capital they need to earn family-sustaining wages (Piedmont Virginia Community College, n.d.).

**Purpose Statement**

The purpose of this case study was to determine if the Network2Work model at PVCC can affect student outcomes by comparing the model outcomes to nonNetwork2Work noncredit industry training outcomes offered by Piedmont Virginia Community College. The researcher compared outcome metrics of the independent variable (Network2Work program) while controlling for potential intervening variables (employment, age, race, sex, and first-generation status) to examine the extent to which the program design contributes to credential attainment and employment. For this study, low income, as defined by the United Way, includes individuals or households earning incomes that exclude them from receiving federal assistance, the Federal Poverty level, but are below the basic cost of living (United Way, 2018).

**Research Questions**

To examine the potential impact of the N2W model on noncredit student enrollment, course completion, and industry credential attainment, this study was guided by the following Research Questions:

1. Is there a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students, enrolled in FastForward training, at Piedmont Virginia Community College?

   1a. How do credential attainment rates vary by student demographics (age, race, and sex)?
2. Is there a significant difference in employment outcomes between Network2Work students versus similar nonNetwork2Work students, enrolled in FastForward training, at Piedmont Virginia Community College?

2a. How do employment rates vary by student demographics (age, race, and sex)?

Significance

Enrollment in and completing noncredit workforce training programs is a focal point in community colleges (Buckwalter & Maag, 2019; Hanushek & Kimko, 2000; Lam, 2019). Completion of noncredit training can impact a student's earning potential. Retention and completion rates for community college students suggest that more should be done to support students (Holzer, 2018; Tripp, 2008). In 2012, the American Association of Community Colleges (AACC) reported concerns related to the increase in poverty since 2000. The report noted that younger generations had less education than previous generations (AACC, 2022a). The report emphasized a call to action for community colleges.

According to Global Partnership for Education (2019), educational gains lead to increased social mobility, resulting in increased employment opportunities and wage increases. These advances result in more taxes and increased spending, which supports the economy, and increased community involvement, creating social capital for future generations. The American Association of Community Colleges (2022a) also noted that two-thirds of all jobs required postsecondary credentials. Integrated Postsecondary Education Data System (IPEDS) statistics indicate that state enrollment was 7.7 million students in 2-year institutions in 2019-2020, representing 35% of all undergraduate enrollments (National Center for. Education Statistics (NCES), 2020). In the fall of 2020, 4.8 million students were enrolled full-time in 2-year institutions and 3.1 million part-time. Community colleges enrolled more students aged 25-59
(43%) compared to 4-year institutions (36%) (NCES, 2022). Minority enrollments in community colleges have remained steady since 2008 with a slight increase reported in Hispanic enrollments from 2012. Community colleges’ enrollment for White students has declined since 2008 (NCES, 2022). In 2016, over one-fourth of community college students had dependent children and close to one-third of the students enrolled were first-generation students (NCES, 2022).

Post-traditional students may also lack support from family or the support necessary to make gains in education and employment (Cataldi et al., 2018). According to one study, financial barriers and social capital may affect student retention (Fentress & Collopy, 2011). Researchers noted that underserved populations might need more support during postsecondary training than others. Researchers examined poverty rates by ethnicity, noting that poverty rates were higher for Black and Hispanic individuals than for White individuals (de Brey et al., 2019; Holzer, 2018).

Strengthening the workforce continues to be strongly connected to education and training, and in Virginia, the focus includes short-term, in-demand industry training. In 2020, Virginia’s Community College noncredit workforce programs reported approximately a 31% wage gain for students who completed training and received a workforce credential. Strengthening Virginia's workforce continues to be a priority for community colleges (Joint Legislative Audit and Review Commission, 2017).

The inception of House Bill 66, 2016 (H.B. 66), may generate continued interest from policymakers working to close the skills gap in Virginia’s workforce. The creation of pay-for-performance programs in Virginia helps to reduce the cost for noncredit workforce training (H.B. 66 Virginia General Assembly, 2016). Affordable statewide workforce programming was established to help increase economic output and tax revenue (FastForward, n.d.a; H.B. 66
Virginia General Assembly, 2016). Noncredit workforce training includes short-term, in-demand training for jobs requiring less than a bachelor’s degree but more than a high school diploma. Graduates could experience a 25-50% wage gain after credential attainment (H.B. 2204 Virginia General Assembly, 2021), which would have a positive impact on Virginia’s economy.

**Relative Issues Addressed**

Community college leaders may be interested in a cost-effective way to provide students with the skills they need to meet the rapidly changing needs of employers. Credential attainment may provide a pathway to higher-paying middle-class jobs; however, whether Network2Work can help ensure its success is unclear. Virginia has a 70% credential attainment goal by 2025, including noncredit industry credentials (Lumina Foundation, 2020). The Governor of Virginia also set a goal to increase educational degree or credential attainment by 2030 (Office of the Governor, 2021). To reach this goal, Virginia's Community Colleges will need to increase enrollments and outcomes. Examining new methods to increase enrollments, course completion, and credential attainment will benefit Virginia's Community Colleges and help Virginia reach its 70% credential attainment goal by 2025 (Lumina Foundation, 2020). Examining the Network2Work model may help illuminate ways the community colleges can meet those needs, keep pace with the changing demands of the workforce, and achieve statewide credentialing goals.

**Why it Matters**

Network2Work focuses on serving low-income students, understanding the components required to execute the program, and replicating it in other community colleges to help community college leaders better address the needs of this population. This study included a synthesis of important information related to meeting the needs of low-income adults, increasing
noncredit training enrollment, course completion, and credential attainment built on a foundation of social capital. Each of these steps aims to increase the opportunity for students to earn family-sustaining wages. Community college leaders continue to address the changing needs of their students and their local economy while being responsible for student outcomes (Li & Kennedy, 2018). This study’s findings may influence leaders to examine current program approaches and consider implementing new solutions for students. The findings may also encourage future research on replicating social capital for low-income first-generation noncredit community college students. Examining the nuances of the Network2Work model may provide leaders with a roadmap to replicate and implement similar programs.

**Overview of Methodology**

The data collected for this research study included student demographic characteristics, program logistics (industry, class start and end dates, class completion, and financial aid source), industry credential attainment (FastForward credential), and employment data. The data were pulled from the Workforce Enterprise System (WES) at VCCS. A purposeful sampling of Network2Work students and nonNetwork2Work students receiving financial aid connected to their income levels yielded the “treatment” and control sample groups. For this study, participation in “Network2Work” was the independent variable. The dependent variables were “Credential Attainment” (FastForward industry credential) and “Employment” (employment gain demonstrated by the Virginia Employment Commission). Piedmont Virginia Community College staff enters data into a case management system, Workforce Enterprise System (WES), for FastForward students and works with Network2Work to identify students participating in the program.
Analytic Procedures

Data from Piedmont Virginia Community College’s FastForward programs were collected and compiled from 2017 to 2022. I analyzed categorical variables such as sex (male/female/nonbinary), age by groups (18-24, 25-34, 35-54, 55+), and race/ethnicity (none specified, American Indian, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, Hispanic, and White). VCCS collects student demographics by race and includes a question on Hispanic or Latino origin. Although I acknowledge that race and ethnicity are not the same and may differ by individual self-identification, VCCS collects the data in this way. I matched students with like demographic characteristics from both groups (treatment/control) to help reduce threats to internal validity. As Network2Work is a relatively new program, validity was strengthened with larger sample sizes to ensure that the study would be replicated with additional Network2Work programs in the future.

Accurate data entry was crucial to increase reliability and reduce errors. Network2Work data were cross-referenced in WES to ensure accuracy. I used measures to compare the outcomes of treatment (Network2Work students) against control students (non-Network2Work students) to determine if the Network2Work program influences credential attainment and employment compared to non-Network2Work students in the FastForward training. Logistic regression and chi-square were used to determine if the differences between the groups of data (treatment/control) were statistically significant. I analyzed the levels of variance within the two groups using logistic regression and provided empirical data to support the hypothesis that Network2Work has a statistically significant impact on FastForward credential attainment and employment for post-traditional community college students.
Delimitations

The following is a list of delimitations for this study:

- In this study, an *ex post facto* nonexperimental quantitative approach was used with no random selection of students or manipulation of variables.
- Only Network2Work and nonNetwork2Work students enrolled in FastForward training and eligible for income-based financial aid were included in this study.
- The inclusion criteria were adult students, low socioeconomic or low-income status, and meeting the specified income thresholds (200% of the federal poverty level).
- Noncredit industry training offerings were based on the availability of training at Piedmont Virginia Community College during the specified program year.
- Credential attainment and employment were examined as outcome variables.
- Quantitative analysis was used to compare the treatment and control group outcomes to measure elements factoring in student outcomes.
- The decision to examine student demographic characteristics, including age, race (as defined by VCCS), and sex, was also a delimitation for this study.
- A further delimitation was that only data from Piedmont Virginia Community College were used. Network2Work was initiated at Piedmont Virginia Community College.

Definition of Terms

**Asset Limited Income Constrained, Employed (ALICE):** As defined by the United Way (2018), people categorized as the ALICE population earn just above the federal poverty level but not enough to sustain a family.
**Credential Attainment:** Credential attainment is the percentage of students who pass a recognized postsecondary credentialing exam in the designed industry. A passing score provides an industry credential with value in their selected industry market (FastForward, n.d.a).

**Employment:** Employment is defined as possessing a wage-earning job after course completion.

**Financial Assistance for Noncredit Training and Industry Credentials (FANTIC):** FANTIC is financial assistance for students enrolled in the FastForward program in Virginia community colleges (Northern Virginia Community College Student Connect, 2022).

**FastForward:** FastForward is noncredit, short-term industry training in in-demand fields in Virginia’s community colleges (FastForward, n.d.a).

**First-generation Student:** A first-generation student is a student who is the first in their family to attend college or postsecondary training.

**Get Skills, Get a Job, Get Ahead (G3):** G3 is tuition assistance for students from households with earnings less than $100,000 per year. G3 is available for select programs in Virginia, Early Childhood Education, Healthcare, Information Technology, Public Safety, and Skilled Trades.

**Low Socioeconomic Background:** For the purposes of this study, the term low-socioeconomic background included students who had low-income, low socioeconomic status, working-class students earning less a family-sustaining wage, first-generation students, and students falling 200% below the federal poverty level.

**Middle Skilled Job:** Using the National Skills Coalition definition, a middle-skilled job is any job “which requires education beyond high school but not a four-year degree” (National Skills Coalition, 2017b, para. 2).
**Post-traditional Student:** A post-traditional student is an individual meeting any criteria established by the National Center for Education Statistics (NCES) including race (as collected by VCCS), sex (females in industries typically dominated by males), age (over the age of 25), socioeconomic status, employment level, dependents, and first-generation students (NCES, 2022).

**Post training Employment:** Post training employment refers to employment gains, post-FastForward training and credential attainment.

**Re-employ Virginia (REV):** The REV program provided a voucher for students enrolling in a high-demand education program at a Virginia Community College. The student had to certify that they lost their job due to COVID-19 and received state employment benefits on or after August 1, 2020, or lost their full-time job because COVID-19 caused their place of employment to close or reduce staffing and were working a part-time job paying less than $15 per full-time per hour (VCCS, 2021).

**Skills Gap:** A skill gap is the overall lack of trained workers needed by employers and industry. The number of available skilled workers is less than the number of open positions.

**Social Capital:** Social capital is a network of support with the potential for individuals to secure benefit through relationships (Coleman, 1988).

**Virginia Ready State Aid (VRSA):** The Virginia Ready program was available for domiciled Virginians seeking an industry credential in identified in-demand sectors. Students eligible for FANTIC were from household incomes at or below 200% of the poverty guidelines. VRSA funding was available for eligible enrollees. Funding covered the first third of the training.
**Workforce Credentials Grant (WCG):** The WCG, also known as the New Economy Workforce Credential Grant Program (2016), was developed during the 2016 General Assembly Session to create a supply of credentialed workers aligned with in-demand occupations. WCG is a pay-for-performance model providing funding to students for up to two-thirds of the cost of training depending on their performance (FastForward, n.d.b)
CHAPTER II

LITERATURE REVIEW

This chapter includes a review of the current literature on poverty, higher education, and social capital. First, a discussion of the current literature about poverty and determining formulas is detailed. Next, the benefits of higher education related to poverty are discussed. Then, a discussion of social capital is presented. Lastly, a discussion of studies utilizing the concept of social capital to help obtain credentials in higher education and impact poverty is presented. This literature review includes an analysis of the available research on the impact of social capital on community college noncredit occupational training completion, industry credential attainment, and employment.

The literature review focuses on post-traditional students, barriers to higher education, the impact of social capital on enrollment, completion, and employment, and the types of social capital developed among different demographics. The literature review is narrowed further to include a specific focus on the value and trust of social capital from resources such as family, peers, or educational institutions. This review includes details of existing research on the benefits of social capital compared to specific networks (e.g., family, peers, and institutions) and the network's value to the student. The aim of this research was to evaluate a workforce development program in Virginia, Network2Work. This program model is designed to help facilitate postsecondary enrollment, leading to better employment opportunities for the ALICE population. The Network2Work model aligned with literature findings by creating social capital through trusted peer networks and community colleges' resources to impact program completion and employment for the ALICE population.
Method of the Literature Review

Systematic searches were conducted for relevant studies from 2006 through 2022. The techniques for literature compilation included electronic database/internet searches and bibliography searches from prior research. I also used keyword searches in databases such as Academic Search Premier (EBSCO), the Education Resources Information Center (ERIC), PsycINFO, ProQuest, and Journal Storage (JSTOR).

Literature was also retrieved from web searches using the Google Scholar search engine. The keywords entered were “poverty” or “low-income” or ”social class” or “post-traditional student” or “educational inequity or educational stratification” and ”enrollment” or “industry credentials” or “career pathways” or “retention” or “adult education” or “community college” or “higher education” and “social capital” or “mentors” or “support services” or “educational barriers” and “industry credential attainment” or “economic mobility” or “labor market returns” or ”industry credentials” or “workforce development” or “employment trends” or “sector strategies”. Bibliographies of prior research were examined (Acar, 2011; Chen & Starobin, 2019; Deil-Amen, 2011; Klevan et al., 2016; Moschetti & Hudley, 2015; Perna & Titus, 2005; Sommer et al., 2018; Stephan, 2013; Swartz, 2008; Wang et al., 2018).

Theoretical Foundation

One theoretical perspective related to the potential impact post-traditional student characteristics may have on the student experience and educational outcome is through the lens of social capital (Attinasi, 1989; Bourdieu, 1986; Coleman, 1988; Stanton-Salazar, 2001). Paxton (1999) illuminated the opportunities social capital provides students and resources to acquire from the networks to which they belong. According to Bourdieu (1986) and Coleman (1988), social capital intertwines in relationships between people and the resources they facilitate. This
theoretical perspective would suggest that non-first-generation students would have personal (possibly family) resources to help navigate the culture of higher education.

Social capital contributes to the development and, ultimately, the ability to attain a higher socioeconomic status (Coleman, 1988; Moschetti & Hudley, 2008). Both Bourdieu (1986) and Coleman (1988) indicated students' ability to bring social capital to college and acquire social capital during college. Bourdieu (1986) and Coleman (1988) also noted that social capital influenced social and economic well-being when individuals belonged to groups. In the context of education, Parks (2000) detailed how social capital could include networks among students, faculty, and staff, any group providing resources and support as they traverse the nuances of college.

In the literature, social capital theory provided a framework to explain the differences in education outcomes between traditional and post-traditional students, particularly the influence on noncredit industry credential attainment and employment attainment. Industry credentials have historically influenced employment and earnings, which have become essential to workforce development programming. In this review, the literature on social capital's impact on barriers to course completion and credential attainment for post-traditional students was examined in consideration of this theory.

**Poverty**

*Poverty* is a term used to describe the state of being poor. The federal government sets a guideline further delineating what it means to be poor in America. In 2021, an individual living in poverty in the United States had income earnings of approximately $12,880 per year. According to the United Way (2018), 10% of Virginians live in poverty. Virginia has approximately 30% of citizens classified as Asset Limited Income Constrained Employed
(ALICE; United Way, 2018). Despite being employed, individuals meeting the ALICE classification still struggle to earn family-sustaining wages but earn too much income to meet poverty criteria and receive financial assistance. According to United Way (2018), ALICE characteristics may include low socioeconomic status, minority status, first-generation students, and parents lacking postsecondary experience. ALICE individuals also experience barriers to education and employment. Education can serve as a vehicle to elevate students out of poverty (Piketty, 2014).

According to Acs and Zimmerman (2008), individuals with a high school diploma are 30% more likely to escape poverty than those without a high school diploma. Education is a strong predictor of income in the United States (Emmons & Ricketts, 2017; Sommer et al., 2018). Researchers at the Pew Institute (Fry, 2021) noted that first-generation college students fall behind in economic outcomes compared to their peers who may be second- or third-generation students (Fry, 2021). Lower academic achievements and a lack of experienced support have been identified as barriers to postsecondary achievement and subsequently economic pathways out of poverty (Steiger et al., 2023).

A robust social network can also help break the generational cycle of poverty (Perna & Titus, 2005). James Coleman (1988) defined social capital as a social structure that facilitates action. For this dissertation, social capital is a network of relationships in which one source benefits another, for example, helps with connecting to resources or educational attainment. In this research, I sought to evaluate a workforce development program in Virginia: Network2Work. This program model is designed to help facilitate postsecondary enrollment, leading to better employment opportunities for the ALICE population.
Higher Education and Workforce Development

Meeting labor market demands is a part of some community college missions (Ayers, 2002). Community colleges play a crucial role in increasing access to education, especially for underserved populations, minority students, students from low socioeconomic or low-income backgrounds, or older adult students, through their open admissions process and affordable tuition (Goldrick-Rab, 2010). The aim of this research was to examine industry workforce credentials and a program designed to increase attainment and employment. The foundation of this research is short-term noncredit training and a social capital approach to student success. To situate these two variables, it is important to discuss noncredit industry training, specific to post-traditional students, and the industry skills gap. Data specific to noncredit training and social capital approaches for underserved populations are limited, but preparing students for the workforce is the mission of community colleges (D’Amico, et al., 2017).

Community colleges have integrated workforce development into training and academic activities, preparing students for employment (Ayers, 2002; Dougherty & Bakia, 2000; Holzer, 2018; Jacobs & Dougherty, 2006). The community college mission includes service to the community (O'Banion, 2019). Community colleges are dedicated to community and education, crucial elements to address poverty. Flexibility, proximity to industry, and lower costs position community colleges to adequately serve workforce development needs (Jacobs & Dougherty, 2006; Kasper, 2003). Academic and credit-based programs earning traditional degrees and transfer to 4-year institutions continue to be a focus for community colleges, but there has been an increased focus on employment preparation achieved by industry training and credentials (D’Amico et al., 2017).
Skills Gap

Economic Modeling Specialist Intl and Wright (2013) suggested the creation of partnerships between industry and community colleges to prepare students with industry-specific skills to address the skills gap (Economic Modeling Specialist Intl & Wright, 2013). Olugbemiga (2020) noted 52% of jobs require training past a high school degree but less than a 4-year degree but only 43% of workers have the skills training needed to meet the demand. Community colleges work closely with local industry leaders to help identify these demands and design training to help fill positions (D’Amico et al., 2017). In some colleges, the workforce development growth, in noncredit enrollments, has surpassed some credit programs (Van Noy et al., 2008a).

Affordability, Flexibility and Access

The Joint Economic Committee Democrats (2019) noted the lack of options for students struggling financially to enroll as a full-time student. Community colleges offer an affordable option for students and short-term industry training, such as FastForward, offers an expedited path back into the workforce (Grubb et al., 2003; Xu & Ran, 2020). Affordability and access can be particularly impactful in rural areas where 4-year institutions may not be accessible (Goldrick-Rab, 2010; Grubb et al., 2003). Noncredit programs provide flexibility for working students, providing easier access to credential attainment, which, for an ALICE student, provides an opportunity to earn a family sustaining wage (Xu & Ran, 2020). The FastForward program provides short-term noncredit options increasing accessibility for students. FastForward students can complete training in weeks, or a few months compared to years for a credit program, allowing them to more quickly obtain an industry credential and gain employment (FastForward, n.d.a). According to the American Council on Education (2022), post-traditional learners
typically work while in school, are aged 25 and older, and care for dependents. The flexibility and duration of FastForward programming may increase accessibility for post-traditional students, allowing them to navigate work and family while advancing their education.

**The Socioeconomic and Student Outcomes Connection**

Almost 20% of families in the Charlottesville region live in poverty, struggling to earn enough money to sustain essentials like food, shelter, clothing, childcare, and transportation (U.S. Census Bureau, 2019). In Virginia, 30% of Virginians are asset limited, income constrained, employed (i.e., qualify as ALICE), and do not earn enough to care for their families (United Way, 2018). Piketty (2014) noted that education could close the gap in wealth for those living in poverty. Income and education inequality has changed over the 20th century, and social class mobility has decreased (Piketty, 2014). Goldrick-Rab (2007) speculated that socioeconomic status was a factor compared to race and sex when determining college transitions. Goldrick-Rab looked at income, parent's education, occupations, and assets when defining one's socioeconomic status.

First-generation students often come from low-income homes with few assets (Carnevale & Smith, 2018). Socioeconomic status is a determining factor in student outcomes, specifically completion. Astin (1993) examined outcomes in college students as they related to their peers. Astin determined that first-year students from higher socioeconomic backgrounds were more likely to finish their degrees on time. Palardy (2013) reported similar findings, noting a relationship between socioeconomic status and college attainment. Palardy illustrated that students were 68% more likely to matriculate to a 4-year college if students were of higher socioeconomic status, noting this was due to peer influences. Attrition rates impact income earned, with up to $25,000 less per year for students who do not complete a degree (Hanson,
2022). The risk of unemployment rises, and potential employment opportunities decrease for students who drop out of college (Hanson, 2022). The lack of postsecondary degrees and dropout rates impact unemployment rates, have socioeconomic consequences, and affect equity (Hanson, 2022). According to Grossman et al. (2015), completing occupational training and credential rates resulted in higher wages and employment outcomes.

**Credential Attainment and Employment**

Since 2011, the United States economy has added approximately 11.5 million jobs for those with some postsecondary education, but for people with less than a high school diploma, only 80,000 new jobs were added (Lumina Foundation, 2020). A 2018 report on postsecondary credentials noted that 65% of the jobs would require some postsecondary education by 2020 (Credential Engine, 2018). Carnevale et al. (2013) indicated a forecast of 44% for jobs requiring an associate degree or higher just 5 years prior to this report, demonstrating a steady climb in the forecasted demand for some postsecondary exposure. The U.S. Bureau of Labor Statistics designates eight different education levels required to enter an occupation, ranging from less than a high school diploma to a doctoral degree. The U.S. Census Bureau (2021) noted that 322 occupations require a high school diploma or equivalent. Job openings for this educational category were twice as high as in other categories. Jobs requiring a high school diploma or equivalent had average salary of $31,000 per year (U.S. Census Bureau, 2021). One hundred occupations were identified, typically requiring some education beyond high school but less than a bachelor's degree. This group was projected to have the most significant number of openings over the next decade (U.S. Census Bureau, 2021).

Government agencies, foundations, and educational institutions have focused on credential-based initiatives and programming, which has brought about a keen awareness of
industry credentialing. The Lumina Foundation is a private foundation with a mission to expand postsecondary opportunities for Americans. Lumina's goal is for 60% of Americans to have a postsecondary credential (degree, certificate, or high-quality credential) by 2025 (Lumina Foundation, 2020). The Workforce Innovation and Opportunity Act (WIOA, 2014) established credential attainment as a performance indicator. Some states adopted it as a key performance indicator for workforce programming (U.S. Department of Labor, 2010).

Economic pressures led President Obama to set a national goal to expand the number of Americans with postsecondary credentials by 2020 (U.S. Department of Labor, 2010). According to the Institute for Higher Education Policy (1998), a student with postsecondary experience contributes to economic growth. The workforce will need students with postsecondary experience to meet changes in economic demands.

**Workforce Noncredit Industry Credentials**

The American labor market is experiencing a trend where job openings outnumber those seeking employment. The lack of enough skilled workers to fill positions represents a skills gap, a void filled by noncredit occupational training. Typically, noncredit workforce programs are responsive to local workforce needs (Oleksiw et al., 2007). Researchers demonstrated a correlation between credential attainment and earnings throughout a career; higher levels of education resulted in higher wages (Arkes, 1999; Carnevale & Smith, 2018; Ma et al., 2016; Oreopoulos & Petronijevic, 2013). Unemployment rates for college graduates were significantly lower, at 5.6%, compared to high school graduates, at almost 17% (Kroeger & Gould, 2017). Carnevale et al. (2011) illuminated the impact just some postsecondary education can have over a lifetime compared to those only receiving a high school diploma.
Occupational training provides short-term courses for personal enrichment or employment gains and can be classified as a credit or noncredit course (Cohen et al., 2014; Erwin, 2019; Ma et al., 2016). Occupational training for industry-recognized credentials is a shorter, lower-cost alternative option for postsecondary education (Schneider, 2015). Forty percent of community college students were enrolled in noncredit programs in 2022, with approximately 4.1 million students (American Association of Community Colleges, 2022a). Sometimes called "blue-collar" jobs, in-demand industry jobs often align with short-term noncredit credentials (FastForward, n.d.b). Ewart and Kominski (2014) and Renski (2018) found that individuals without a college degree but with an occupational credential earned significantly higher wages than those without no credentials.

Federal and private initiatives emphasized noncredit workforce coursework and industry credentials to support local and regional workforce development aligned with the needs of local industry (Lumina Foundation, 2020; Van Noy et al., 2008b). In 2016, the Virginia Community College System (VCCS) implemented a performance-based workforce program, FastForward. The Workforce Credential Grant (WCG) funded the initiative (FastForward, n.d.a; State Council for Higher Education Council, 2021).

State Legislation

In 2016, House Bill 66 established the New Economic Workforce Credentials Grant Program to close the skills gap in Virginia's workforce. Industry stakeholders identified loss of workforce productivity and tax revenue due to the skills gap (Butterworth, 2020). The bill outlined details for a pay-for-performance program and provided support and guidance for implementation. The pay-for-performance program reduced the upfront cost of noncredit workforce training (H.B. 66 Virginia General Assembly, 2016). The expectation was that the
program would decrease costs for training and statewide marketing for enrollments to impact training and employment across the state, resulting in an increase in economic output and tax revenue (FastForward, n.d.a; H.B. 66 Virginia General Assembly, 2016).

The purpose of this program was to create short-term, in-demand training for jobs requiring less than a bachelor's degree but more than a high school diploma. Graduates could experience a 25-50% wage gain after credential attainment (H.B. 2204 Virginia General Assembly, 2021). The Workforce Credentials Grant supports the FastForward Program in Virginia and represents a new funding model for in-demand industry training in Virginia (FastForward, n.d.b; H.B. 66 Virginia General Assembly, 2016). Students enroll in a workforce training program and pay one-third of the full tuition cost, a two-third discounted amount. This cost can be offset for students earning incomes 200% or below federal poverty levels (Northern Virginia Community College Student Connect, 2022). The grant will reimburse the community college a second-third of the tuition when the student successfully completes the program (FastForward, n.d.a). Finally, the grant will reimburse the college the final third of the tuition when the student successfully attains the industry credential aligned with the training program.

The pay-for-performance program is designed to ensure that students hold some responsibility for their own success and receive college support for their success. If a student does not successfully complete their training program, the responsibility of the second third of the tuition falls to the student who must then pay back the second-third of the tuition to the college. If a student fails to attain an industry credential, the college is responsible for the last third of the tuition. Students sign an agreement and are provided with clear guidance regarding the grant requirements and expectations (FastForward, n.d.b). The overarching expectation for the FastForward program is that a student will successfully complete training, earn an industry
credential associated with training, enter the workforce in the selected industry, and earn a living way (paying income tax).

**Retention, Completion, and Credential Attainment**

In 2019, fewer than half of adults aged 25 to 35 obtained a postsecondary credential, with approximately 52% dropping out of either a 4-year or 2-year institution (Hanson, 2022). Low retention and completion rates for community college students present reasonable concern for institutions with the lowest completion rates compared to other educational institutions (Hanson, 2022; Tripp, 2008). College dropout rates, especially among first-year students, were significant, with up to 89% of those enrolled not receiving a credential and only 5% graduating on time from a 2-year school (Hanson, 2022). According to Hanson (2022), Black students had a dropout rate of 54%, representing the highest dropout rate of all students. High socioeconomic students had lower dropout rates, but the overall dropout rate was still 40% for undergraduate students, with 30% dropping out in their first year (D'Alessio & Banerjee, 2016; Gampert & Jones, 2013; Hanson, 2022). Hanson (2022) noted the benefit of vocational training or industry certificate on those who dropped out, illuminating the higher unemployment rates they experienced compared to those with more postsecondary experience.

Using a logistic regression model, Wang (2013) explored baccalaureate expectations. Controlling for extraneous variables, Wang found socioeconomic status to predict baccalaureate expectations. Astin (1993) categorized students into peer groups with similar socioeconomic backgrounds and indicated that students from higher socioeconomic backgrounds were more likely to complete their degrees on time compared to students from lower socioeconomic backgrounds. Compared to higher-income students, low-income students typically worked during school. Carnevale and Smith (2018) noted that low-income working students were
mature, female, and from diverse races or cultures. These students were also less likely to continue to a bachelor's degree (Carnevale & Smith, 2018; Ma et al., 2016). Post-traditional students have different experiences and backgrounds compared to traditional student peers. These experiences may create obstacles or barriers to educational attainment and, as a result, limit future employment opportunities.

**Post-traditional Students**

Student success continues to have ties to social class backgrounds (Bahr, 2010; Carnevale & Smith, 2018; Hossler et al., 1999; McDonough, 1997; Pelletier, 2010; Walpole, 2003). Post-traditional students are also more likely to be categorized as underrepresented ethnic minorities (Black, Latin, and Native American) and come from single-parent homes. Post-traditional students may also be first-generation, have children, and work full-time (Carnevale & Smith, 2018; Pascarella et al., 2004; Soares, 2013). According to Hanson (2022), older students, especially those between the ages of 20 and 25, were more likely to drop out of college. Minority students had higher dropout rates compared to their White peers; 35% of Asian students dropped out of community colleges, and only 23% of first-time, full-time, Native American students graduated within 4 years with degree attainment declining between 2000 and 2017, from 30% to 27% (Hanson, 2022). Student characteristics, such as low socioeconomic background and first-generation status, may yield adverse outcomes in educational attainment and perpetuate systematic cycles of poverty (Astin, 1993; Astin & Oseguera, 2004; Bahr, 2010; Carnevale & Smith, 2018; Engle & O'Brien, 2007; Tinto, 2006; Walpole, 2007). Other criteria used to identify post-traditional students include enrollment criteria (delayed or part-time enrollment), family size (number of dependents), employment (working while in school), and prior academic achievements (high school diploma or GED).
The lack of data specific to traditional versus post-traditional students has expanded over the years. However, some researchers noted that limited data are available on post-traditional students in noncredit programs (Grubb et al., 2003; Leventoff, 2018; Xu & Ran, 2020). A 2015 study illuminated the differences in demographic makeup between traditional and post-traditional students (Xu & Ran, 2020). Researchers noted a 12-year age gap between the two groups and an average age of 34 years for post-traditional students. Post-traditional noncredit students were also noted to enroll part-time and have differences in race demographics compared to credit students. Xu and Ran (2020) noted that noncredit students were more likely to identify as Black or Hispanic and fell into lower socioeconomic brackets compared to credit students.

**Post-traditional Student and Noncredit Training**

In a preliminary study, Grubb et al. (2003) interviewed students from 13 different community colleges in five states to investigate the connection between the community college, noncredit training, and post-traditional students (i.e., students from historically underserved populations). Those interviewed noted low income as a primary indicator for enrollment in noncredit training. The convenience and attraction to noncredit training for post-traditional students sparked the question of equity early on. Breneman and Pusser (2002) raised the question of equity in their research. Post-traditional student populations were growing creating an increased demand for training to align with their needs, but little was being done by the way of research and policy to support these changes (Breneman & Pusser, 2002).

Noncredit training and career pathways are not new but have become more prominent. Breneman and Pusser (2002) noted the increase in partnerships, course and curricula development, and operation changes to meet the needs of post-traditional learners. This study noted the balance between economic demand for skilled workers and the growing cost of higher
education and created a database of post-traditional learners to examine the issues of access and equity. Suggestions included recognizing adult learners’ diverse aspirations and providing innovative tools, flexible subsidies, and affordable access (Pusser et al., 2007; Steiger et al., 2023). Despite the wide range of characteristics defining post-traditional students, risk factors for successful outcomes have included first-generation status.

**First-Generation Students and Credential Attainment**

Carnevale et al. (2013) found that credential attainment was critical to securing employment and potentially higher wages. Researchers noted that expanding employment opportunities and higher wages was key to social mobility (Hossler et al., 1999; Walpole, 2003). First-generation students or students from low socioeconomic backgrounds may not be as eligible or less likely to enroll in postsecondary programs and may exhibit lower retention and completion rates (Astin & Oseguera, 2004; Engle & O'Brien, 2007; McDonough, 1997; Pascarella & Terenzini, 2005; Santiago & Brown, 2004; Tinto, 2006; Walpole, 2007). According to Hanson (2022), first-generation students do not fare as well, with as many as 89% not receiving a credential, with many who did not persist, not re-enrolling after dropping out.

The disparities between social classes are also evident in degree attainment (Mortenson, 2010). Students from families with higher income rates were more likely to earn a baccalaureate degree compared to students from lower socioeconomic backgrounds (Mortenson, 2010). Goldrick-Rab (2007) suggested that socioeconomic status was as crucial as race and sex in determining success in college and transition to 4-year institutions. Titus (2006) noted a link between higher socioeconomic status and postsecondary completion. Social class can be subjective in its definition. Class identity may be difficult to describe with wealth or income alone (Walpole, 2007). In this study, poverty was defined as earned income less than the
designated federal threshold. Degree attainment rates between social classes perpetuate class differences due to fewer economic opportunities for students lacking postsecondary experiences (Mortenson, 2010). Students from low socioeconomic backgrounds may also be more likely to earn less than a high school diploma (GED) and may not enroll in postsecondary from high school but instead choose to go directly to work (Bahr, 2010; Carnevale & Smith, 2018; Engle & O'Brien, 2007; Government Accountability Office, 2007; Santiago & Brown, 2004). Walpole (2003) noted that more students from lower socioeconomic backgrounds reported working while in school compared to their peers from higher socioeconomic backgrounds. Work responsibilities precede educational responsibilities (Bahr, 2010; Carnevale & Smith, 2018; Hurst, 2010).

Schwartz et al. (2009) illuminated cultural differences related to working students and social class. The authors noted that Mexican males prioritized work over education and family expectation. Walpole (2003) connected the benefit of work and social capital and noted the detraction from academic outcomes. Working students reported lower grade point averages and fewer hours dedicated to school, resulting in lower completion and credential attainment rates (Walpole, 2003). According to Piketty (2014), parents in the bottom half of income distribution also lacked postsecondary experience. Postsecondary degrees for parents ranking in the top quarter of income distribution more than doubled compared to lower-income families. Piketty indicated that parents’ income predicted children's access to postsecondary opportunities.

**Access and Social Class.** The academic literature shows that higher education stratification is linked to disparities in retention and completion rates for low socioeconomic students. Students from low socioeconomic backgrounds were five times more likely to drop out of school compared to students from higher socioeconomic families (Chapman et al., 2011). Haveman and Wilson (2007) noted the difference in graduation rates between students from low
socioeconomic backgrounds and peers from higher socioeconomic backgrounds. According to Long (2008), only 43% of students with families earning under $30,000 a year entered postsecondary education, compared to 75% of students with family incomes over $50,000 per year. Lynch and Engle (2010) noted the contribution to gaps in access rates due to fewer social and financial resources low socioeconomic students have, limiting enrollment and success in postsecondary education. Income is not the only confounding variable serving as a barrier for post-traditional students, but college preparation, knowledge of the higher education system, and lack of family support related to education may also contribute (Chambers & Deller, 2011).

**Class Disparities beyond Completion**

Walpole (2003) noted disparities between social classes beyond postsecondary completion. Examining students 9 years after entering postsecondary, low socioeconomic students reported lower-income academic persistence to higher degrees than peers from higher socioeconomic backgrounds. Walpole illuminated the difference in employment between the two groups. Students from lower socioeconomic backgrounds were more likely to be employed in a vocational field and earn more in the short term than peers from higher socioeconomic backgrounds. Students from higher socioeconomic backgrounds are more likely to attend graduate school, giving them an advantage (Goyette & Mullen, 2006). First-generation and working-class students view postsecondary through a career lens; the sole benefit of college is to advance employment (Longwell-Grice, 2003). According to Walpole, this may explain the low likelihood of low socioeconomic students to pursue postsecondary beyond industry credential attainment. These barriers may perpetuate a stratified educational system, which continues to disadvantage post-traditional students’ years after completion. Students who drop out tend to
stay in a low socioeconomic demographic and struggle to advance in employment opportunities (Hanson, 2022).

**Social Capital and Educational Outcomes**

Social capital is a beneficial resource for academic achievements (Rogošić & Baranović, 2016). Pierre Bourdieu and James Samuel Coleman are highly cited authors of social capital theory. This study is built on their landmark contributions. Bourdieu's theory on social capital focused on the individual versus the collective, highlighting the benefit of one's social position or status (Rogošić & Baranović, 2016). Bourdieu suggested that an individual must acquire a social capital network, noting that it was not the size of the social network but having a social position in the network that created the advantage (Rogošić & Baranović, 2016). Coleman (1988) included an economic viewpoint in his social capital theory. Both Bourdieu and Coleman based the social structure of relationships on social capital theory. However, Coleman speculated that social capital benefits the greater good and the individual (Coleman, 1988). According to Bourdieu's theory, social capital limited social equality and perpetuated class stratification (Rogošić & Baranović, 2016).

**Educational Outcomes**

Scholarship related to connecting social capital and the impact on educational outcomes is significant. Positive outcomes, including outcomes related to career success, are associated with social capital (Gabby & Zuckerman, 1998). Prior research focused on social capital through relationships with coaches or counselors, peers, family, and institutional support. Empirically, these studies focused on social capital benefits for low-income students with barriers, specifically educational attainment and employment. Social capital and educational achievement are embedded in structural functionalism (Rogošić & Baranović, 2016). Various forms of social
capital, including economic, cultural, and social factors, influence students' academic achievement. (Coleman, 1988; Lin, 1999; Yosso, 2016). The focus demographics included first-generation minority students (Brawner, 2018; Perna & Titus, 2005; Yosso, 2016). These students lacked strong social networks, had barriers to overcome, and often needed to learn to become more proactive about achieving their success. Through social networks, students were linked to resources necessary to overcome specific barriers to completion (Coleman, 1988; Stanton-Salazar, 1997; Yosso, 2016). The level of education attained by the student's parents, transportation, childcare, and developmental needs are just a few barriers that ALICE students face (Acar, 2011; Bartik & Hershbein, 2016; Chen & Starobin, 2019; Hertz, 2006; Perna & Titus, 2005; Wang et al., 2018).

**Value and Trust**

Critical factors of social capital include value and trust. For social capital to impact enrollment, credential attainment, and employment, students must trust their network, and the network must provide value as a resource for the student. Social capital significantly influenced degree aspiration for first-generation, low-income, and minority students, especially in a community college setting (Chen & Starobin, 2019; Coleman, 1988; Deil-Amen, 2011; Gándara & Contreras, 2009; Perna & Titus, 2005; Stanton-Salazar, 1997). However, according to Coleman (1988), social networks benefit the greater good. Trusted relationships with family members, community college staff, or peers positively impacted student enrollment for low socioeconomic, first-generation students (Stanton-Salazar, 1997; Stephan, 2013). For example, Perna and Titus (2005) found that parental postsecondary education strongly predicts student enrollment.
**Family Connections.** Given some young adults' semi-dependent relationships with their families, Swartz (2008) illuminated the family's role in reproducing social class from one generation to the next. Swartz utilized interview data from the Research Network on Transitions to Adulthood study conducted with 462 young adults aged 18-34 years. Participants were from diverse races and social class backgrounds. Swartz concluded that a positive connection exists between family social capital and student achievements.

Similarly, Moschetti and Hudley (2015) found that family capital benefits students, primarily as emotional support. Although this research supported the social capital between parents and students, it did not provide empirical evidence about the impact of social capital from other sources. Trusted social networks outside the family may also impact enrollment in postsecondary. Chen and Starobin (2019) measured family and college social capital by investigating student interaction with advisory faculty and the impact on transfer capabilities. Social networks from community college staff proved to have a more substantial influence on degree aspiration than family capital, especially for first-generation students (Chen & Starobin, 2019; Perna & Titus, 2005; Wells et al., 2019). The sources of a student's social capital may determine the significance of their achievements. ALICE students may be working parents, older adults, or first-generation students with minor or insignificant ties to substantial family capital. A trusted social network might impact their recruitment and enrollment into postsecondary institutions. This network can come from sources outside the family.

**Types of Social Capital**

A valued social network may influence a student's decision to enroll in postsecondary education and training. Stephan (2013) conducted qualitative research examining the interaction between low-income, first-generation students and college coaches. Interview topics included the
college cost, decisions to enroll, the enrollment process, and the students' barriers. Stephan concluded that the rapport between the coaches and students helped build social capital and increased students' number of actions to begin the enrollment process. Stephan focused on social capital built from an institution. This network provided an institutional resource for the student but not necessarily a personal connection. A more personal connection may help them face barriers beyond enrollment and positively impact completion and employment.

Several studies suggested a difference in social capital between races, socioeconomic backgrounds, and first-generation students (Moschetti & Hudley, 2015; Perna & Titus, 2005; Stanton-Salazar, 1997). By comparing students whose parents had postsecondary experience, Perna and Titus (2005) concluded that parental education was a determining factor in the student's success. Students with limited resources from parents were not aware of the importance of networking. However, first-generation students often struggled with social capital when family members were unfamiliar with navigating college enrollment and completion (Moschetti & Hudley, 2015; Perna & Titus, 2005; Stanton-Salazar, 1997).

A student's socioeconomic background is directly related to the acquisition of social capital (Lareau, 2003). Lareau (2003) noted the difference in structured interactions between faculty and other students between middle- and upper-class students. Low socioeconomic and first-generation students had not acquired strong social capital networks to succeed in higher education (Gupton et al., 2009; Stanton-Salazar & Dornbusch, 1995). Brawner (2018), for example, measured the social capital of low socioeconomic students utilizing data from the National Education Longitudinal Survey (NCES, 2018) conducted in 1988 with subsequent follow-up interviews with participants until 2000. Brawner focused on the follow-up data from 2000 and conducted an exploratory factor analysis to determine variables for measuring capital.
The factors found included parent involvement with the student, the student's educational level, student’s reported engagement with the parent, educational level (s), student's extracurricular activities, and awareness of college norms. Brawner could not make a solid empirical case for lack of capital as a cause for educational inequalities. However, Brawner aimed to explore variables that would help counselors define social capital for their students rather than focusing on specific educational outcomes.

Moschetti and Hudley (2015) evaluated interviews with students to determine the most valuable variables when transitioning to college based on grounded theory. The variables included support from the institution, family support, financial resources, and their characteristics. The authors concluded that institutional support was the least helpful. Family only provided emotional support, financial resources caused the most stress for students, and student characteristics influenced their decisions the most. Moschetti and Hudley focused on the student perspective and provided specific delineation between different types of social capital.

Several authors noted the impact of social networks on attrition rates (Grossman et al., 2015; Klevan et al., 2016; Sommer et al., 2018; Wells, 2008). Klevan et al. (2016) explored the impact of social capital on enrollment, precisely the potential difference between sexes. The authors concluded that social capital might be positively associated with enrollment. Using logistic regression modeling, they concluded that women did not experience a difference in return for enrollment compared to men.

Rogošić and Baranović (2016) examined educational achievements and the strength of the student's relationship with various forms of capital, concluding that the more access you have to capital, the greater the educational attainment. Building social capital through relationships and connections provides students with a resource for navigating success barriers (Perna & Titus,
Developing solid networks outside the family can help students navigate unfamiliar environments by providing knowledge, guidance, and support (Moschetti & Hudley, 2015; Stanton-Salazar, 1997). Resourceful and valuable networks created outside the family.

**Employment and Social Capital**

A strong connection is insufficient to yield positive credential attainment and employment results. The connection's value was also key in producing meaningful student outcomes (Bartik & Hershbein, 2016; Coleman, 1988; Granovetter, 1985; Pedulla & Pager, 2019; Stanton-Salazar, 1997; Stanton-Salazar & Dornbusch, 1995). Swartz (2008) examined the impact of student's family background and social class on upward mobility. Individual attributes did not solely impact a student's success. Access to resources, parental achievement, economic capital, and cultural capital are all connected to a student's family and impact student success (Hertz, 2006; Wellman, 1983). However, the connections made outside of a family were just as valuable, especially when developed with trusted and resourceful individuals (Swartz, 2008; Wellman, 1983). The level of attachment a student had to peers, parents, or academic staff, accounted for observed differences in academic achievement. Similarly, a network's value contributes to positive employment outcomes (Coleman, 1988; Pedulla & Pager, 2019; Wellman, 1983; Wells et al., 2019).

For social capital to be adequate for employment, a student's network must be productive and provide value as a resource for the student. Social capital was considered a resource similar to tangible items such as a car (Lin, 1999). According to Coleman (1988), social capital has a purpose and allows students to reach goals otherwise unattainable. Coleman illuminated how social capital provided an advantage encouraging upward social and economic mobility, which
led to the question, is it really whom you know or what you know that matters more when getting a job?

Pedulla and Pager (2019) examined racial labor market stratification using social capital as a variable. They dissected social networks into two lines of observation: access to social capital and return on social capital. Like earlier researchers (Granovetter, 1985; Lin, 1999), recent authors examined how social networks shaped labor market outcomes and concluded that social connections are impactful despite specific barriers. Pedulla and Pager collected data randomly from households across the United States between February 2013 and November 2014.

Questions about job attainment and the relationships with the persons who referred them (family, friends, co-workers, online search) led researchers to conclude that not all social capital operates similarly. Researchers illuminated the differences in the impact of social network on employment between Black and White people. They determined that both Blacks and Whites used their social network in the same way but the return on the social network impact was different between them (Pedulla & Pager, 2019). Social networks for White participants helped them get a job at almost twice the rate as social networks for Blacks. A direct connection exists between resources, position of a social network, and the amount of help they could provide. Pedulla and Pager (2019) suggested two reasons for this disparity: differences in attrition rates and cultural differences, particularly an apprehension of Black networks, which limits their referrals or level of position within a company. Chen and Starobin (2019) also concluded that a solid and connected social network assisted in transferring to 4-year universities and helped students find employment.
Potential Gaps in Social Capital Literature

In previous literature, a solid social network was shown to positively impact enrollment in postsecondary, retention and completion rates, and employment. The literature included discussions on the inequalities in social capital among low socioeconomic, first-generation, or diverse demographics. However, studies examining the nuances and interconnectedness of social capital from two sources working in concert (e.g., a constructed peer relationship and community college staff) were not readily available. Much of the literature is focused a connection to socioeconomic status, which is defined beyond income and may include multiple factors such as educational attainment, and occupational status (American Psychological Association, 2022). Such a review may benefit other community colleges. This case study focuses on examining a purposeful community peer network coupled with integrated support from the community college for students identified as ALICE and the impact on industry credential attainment, leading to viable employment.

Using a multinomial logit model with data from the National Education Longitudinal Survey of 1988 (NCES, 2018), Sandefur et al. (2006) researched the impact of social capital on postsecondary enrollment. Family income, first-generation status, and social capital led to a higher probability of postsecondary enrollment. Social capital includes connections inside and outside the student's family (Sandefur et al., 2006). Some types of social capital, intergenerational closure, may not yield significance.

Researchers recommended future measures to examine the impact of social capital to determine if current measures yield different outcomes. Wells (2008) also investigated the impact of social capital on college attendance. Using a binary logit model with NELS data, Wells examined the effect social capital had on student persistence in both 4-year and 2-year
institutions, from year one to year two. Wells determined that students with high levels of social and cultural capital also exhibited higher levels of persistence. However, when examining the impact between 2- and 4-year institutions, Wells found that the relationship between social capital and community college retention may not be significant.

An examination of social and cultural capital to predict enrollment for African Americans, Latin, and Whites was conducted by Perna (2000) using NELS data. Perna examined the variation in enrollments at 4-year institutions between different racial demographics. Using a logistic regression model to predict enrollment probability, she determined that social and cultural capital improved the power to predict enrollments (Perna, 2000). Perna controlled extraneous variables such as cost, academic ability, and levels of social capital. Perna determined a level of importance in social and cultural capital, but the impact was the different amount the three groups studied. Academic capability was a driving factor in enrollment, but financial aid did not impact access (Perna, 2000).

Building on the work of Perna (2000), Perna and Titus (2005) examined the social capital derived from parental involvement in 2- and 4-year institutions across different racial groups. More specifically, they used hierarchical linear modeling and NELS data. The authors illuminated social network characteristics and the impact on enrollment (Perna & Titus, 2005).

Network2Work

Social capital can contribute to education and training outcomes and improved income opportunities. However, individuals under or unemployed may not have sufficient networks or connections to help change their circumstances, lifting them out of poverty. To increase employment rates in Charlottesville, Virginia, Piedmont Virginia Community Colleges launched Network2Work in 2016. Network2Work is a community college program rooted in developing
community peer networks to strengthen recruitment, resources, and employment for ALICE students. The program replicates social capital for low-income students through a peer network and provides the resources and support to navigate the student through training leading to an industry credential. At the end of the program, the student has access to a network of employers paying family-sustaining wages (Piedmont Virginia Community College, n.d.).

Network2Work’s peer network component replicates social capital using peer connectors to support students through enrollment, occupational training, industry credential attainment, and employment. The design focuses on four areas: a) peer connection (replication of social capital), b) education and training, c) industry credential attainment, and d) employment. The model provides a conduit for students to connect with education, training, and employment opportunities by facilitating a peer network system in collaboration with the community college, creating social capital (Piedmont Virginia Community College, n.d.). The program model aligns with Coleman's (1988) social capital theory, providing a positive and functional resource, defined by productivity, creating unattainable opportunities and outcomes (Coleman, 1988; Granovetter, 1985).

Network2work serves ALICE students who may be first-generation, working students with limited or no family capital. According to the literature, building trusted networks outside the family may be a better student social capital source (Coleman, 1988; Granovetter, 1985). Trusted peers in the Network2Work program recruit low-income post-traditional students (ALICE) into education and training while providing them with the necessary resources to overcome barriers. With the community college's help, peers are directly connected to employers in the community and establish a network for students required to gain meaningful employment. The students enter the program with a trusted and valuable peer network and utilize them to
complete the program and become gainfully employed (Piedmont Virginia Community College, n.d.). This process benefits the student and the local economy, aligning with Coleman's theory (1988), integrating an economic viewpoint into social capital, and making social capital universally productive.

**Network2Work versus NonNetwork2Work**

*Ex post facto* data were used in this study. Student data from the Piedmont Virginia Community College FastForward program, 2017 to 2022, were analyzed. Each student included in this study participated in the short-term, in-demand industry training offered at Piedmont Virginia Community College (FastForward). As a part of the FastForward program, all students had access to a FastForward Coach to help them navigate the FastForward training at the college. The ratio of coaches to students for the 2021 fiscal year was 250:1. As a part of the FastForward program, each student was also responsible for the first and second thirds of the training cost if they failed to complete the training (promissory note). Each student had the cost of the credential exam paid for by the FastForward Workforce Credentials Grant. All students included in this study qualified for or received financial assistance and earned incomes 200% below the federal poverty level. Table 3 shows the differences between Network2Work and non-Network2Work students enrolled in the FastForward program at Piedmont Virginia Community College. Table 3 includes an “x” for each student service included to demonstrate the differences between the two groups. Connection to ancillary services includes referrals such as adult education, social services, and/or legal services. Supportive services include nonacademic financial assistance for burdens, including childcare, transportation, food, and or clothing.
Table 3

**Network2Work Services vs. NonNetwork2Work Services**

<table>
<thead>
<tr>
<th>Student Services</th>
<th>Network2Work Student</th>
<th>NonNetwork2Work Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Enrollment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Financial Assistance</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PVCC FastForward Coach</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Network2Work Peer Connector</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>In-demand industry training</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Credential costs paid</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Promissory costs paid</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Soft Skills Training</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Connection to ancillary services</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Supportive Services</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interview Preparation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Connection to employers</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Summary**

Virginia has a demonstrated number of individuals living in or near poverty. Researchers have demonstrated the benefits of higher education and specifically noncredit industry credentials on employment opportunities for students. Researchers have demonstrated that those most likely to live in poverty share similar characteristics, including coming from low socioeconomic backgrounds and representing diverse racial and cultural groups, single parents, working adults, and first-generation students. These characteristics can create barriers to
enrollment in the postsecondary, successful completion of postsecondary, credential attainment, and employment.

The social capital theory centers on a strong social network and its impact on these barriers. The Network2Work program is designed to replicate social capital through peer connectors, resources, and employment connections. An independent and formal evaluation of Network2Work does not exist. This aim of this research was to analyze the impact of a program, designed in alignment with social capital theory, on community college noncredit occupational training completion, industry credential attainment, and ultimately employment for post-traditional students.
CHAPTER III

METHODOLOGY

The purpose of this case study was to determine if the Network2Work model at Piedmont Virginia Community College can affect student outcomes (credential attainment and employment). The Network2Work model outcomes were compared with nonNetwork2Work outcomes based on noncredit industry training outcomes offered at Piedmont Virginia Community College (FastForward). I collected and compared outcome metrics for the independent variable (Network2Work program) while considering categorical variables (age, race, and sex) to examine the extent to which the Network2Work program design contributed to credential attainment and employment.

A description of the methodology includes design advantages, data, and variables best suited to compare noncredit industry training models at Piedmont Virginia Community College. In this method design, the outcomes of Network2Work students enrolled in FastForward training were compared with those of nonNetwork2Work students enrolled in FastForward training. The question addressed in this quantitative study related to the effectiveness of a social capital approach on noncredit outcomes of the workforce industry training. The aim of this quantitative study was to examine the relationship between Network2Work students and nonNetwork2Work FastForward students enrolled in noncredit workforce training at Piedmont Virginia Community College. There has been research on noncredit workforce programming, retention rates, and completion rates, but an examination of the Network2Work approach has not been done. Quantitative data were analyzed using binary logistic regression and chi-square to determine if Network2Work could predict credential attainment and employment. This analysis will assist in understanding if a social capital support approach for students is better than the existing
noncredit training approach at Piedmont Virginia Community College regarding credential and employment outcomes. \textit{Ex post facto} data collected by VCCS and Piedmont Virginia Community College were used in this study.

To examine the potential impact of the Network2Work model on noncredit student enrollment, course completion, and industry credential attainment, this study was guided by the following Research Questions:

1. Is there a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students, enrolled in FastForward training, at Piedmont Virginia Community College?
   
   1a) How do credential attainment rates vary by student demographics (age, race, and sex)?

2. Is there a significant difference in employment outcomes between Network2Work students versus similar nonNetwork2Work students, enrolled in FastForward training, at Piedmont Virginia Community College?

   2a) How do employment outcomes vary by student demographics (age, race, and sex)?

\textbf{Noncredit Training Approaches}

Students who experience poverty or are close to poverty levels encounter barriers to education and employment. Exposure to even some postsecondary education can elevate students out of poverty (Piketty, 2014). Researchers have illuminated the connection between education and income levels in the United States (Emmons & Ricketts, 2017; Sommer et al., 2018). Compared to more traditional students, post-traditional (first generational, part-time, low income/socioeconomic status) students are more susceptible to lower retention and completion rates (Astin, 1993; Astin & Oseguera, 2004; Engle & O'Brien, 2007; Fentress & Collopy, 2011;
McDonough, 1997; Pascarella & Terenzini, 2005; Tinto, 2006; Walpole, 2007). A robust social network can also help break the generational cycle of poverty (Perna & Titus, 2005).

**Network2Work Design**

Piedmont Virginia Community College implemented Network2Work in 2017 to combat poverty in Charlottesville, Virginia (Piedmont Virginia Community College, n.d.). Piedmont Virginia Community College serves a 65-mile radius, including Charlottesville City and six surrounding counties. The percentage of individuals earning more than the Federal Poverty Level but less than Virginia's essential cost of living is 46% (United Way, 2018). The percentage of individuals earning below the Federal Poverty Level in the college service area ranges from 2.8% to 10% (United Way, 2018). Network2Work connects post-traditional students, defined in Chapter II, with trained volunteer peer connectors from the community to coordinate and connect the student to services, assist with enrollment, and support students through completing FastForward training (Piedmont Virginia Community College, n.d.). I examined whether credential attainment and employment indicators were significantly different for Network2Work students compared with nonNetwork2Work students enrolled in FastForward training at Piedmont Virginia Community College.

The first step in the Network2Work model is training volunteer Peer Connectors to recruit and assist potential students. Peer Connectors are community volunteers trained through Network2Work (Piedmont Virginia Community College, n.d.). Network2Work includes an application and web-based data system for connecting with local employers and inputting employment requirements, knowledge, skills, and abilities for preferred employees. Peer Connectors access these data via the application and work to recruit individuals in the community who meet the job criteria while also struggling with earning wages to support
themselves or their families. Since its inception, Network2Work has served 599 students (Piedmont Virginia Community College, n.d.). The treatment sample was approximately 599 students enrolled in Network2Work from January 2017 to the spring of 2022. Piedmont Virginia Community College is the flagship college for Network2Work, and two other community colleges in Virginia have adopted the Newtork2Work model. These programs were established in 2021 and 2022, including these sites in the research design would not yield a large enough sample size to consider for this research.

**FastForward and Financial Aid**

FastForward is a VCCS program initiated in 2016 to address the shifting labor market and increased demand for qualified workers in Virginia (FastForward, n.d.a). In 2016, the Virginia General Assembly passed House Bill 66, establishing the New Economy Workforce Grant Program funding, FastForward. FastForward is a pay-for-performance model associated with noncredit workforce training leading to a credential in an in-demand field (FastForward, n.d.a). The costs for FastForward are shared between the student, the state, and the community colleges. The community college is fully reimbursed for their portion when the student successfully earns a credential. In this financial model, the cost is split three ways: the student pays one-third of the costs, and the second and third share of the costs are paid by the community college (up to $3,000). When a student successfully completes the FastForward course, the state reimburses the college. When a student earns a credential, the state reimburses the college for two-thirds of the contribution. If a student does not successfully complete the course, the student must reimburse the college for the cost. Eligible students may receive financial aid for FastForward to cover the first-third payment for which they are responsible. There are several financial aid options for students to cover the first-third payment. The financial aid options
analyzed in this study include Financial Assistance for Noncredit Training for Industry Credentials (FANTIC), Re-employ Virginia (REV), Get a Skill, Get a Job, Get Ahead (G3), and Virginia Ready State Aid (VRSA). Students earning wages at or below the federal poverty line are eligible for assistance with each of these programs.

NonNewtork2Work students receiving financial aid were recruited to compare their outcomes with those of Network2Work students. A larger sample would better represent the population for both Network2Work and nonNetwork2Work students. However, a total sample size of over 2000 between each or the groups should be sufficient to indicate the impact Network2Work has on the dependent variables (credential and employment attainment). Figure 3 shows the details of the program design for Network2Work and the VCCS FastForward Program. Both Network2Work students and nonNetwork2Work students enroll in the same FastForward training with the access to similar instructors and curriculum.
The method used for this study was quantitative. I used chi-square and logistic regression to conduct the statistical analysis. In this study, bivariate relationships were investigated for nominal and ordinal variables. A chi-square test of independence is best used when analyzing two categorical variables. Chi-square analysis allowed me to test if the two variables (Network2Work and credential attainment and employment) were correlated. Chi-square analysis helped determine if the two variables were independent of each other, helping to determine the probability of belonging to a specific group (credential attainment; employment) is not affected by the other variable (Network2Work participation) (Bolland et al., 2023; Patton, 1990). This method was appropriate because the variables were categorical (nominal).
Categorical variables have two or more categories (credential = yes, credential = no) and there is no intrinsic ordering to the categories (Bolland et al., 2023; Patton, 1990). The rationale for using quantitative design was to provide a specific numerical answer to the posed Research Questions (Neace et al., 2018; Patton, 1990). A quantitative method is fitting to understand the relationship between the variables of interest (Bricteux et al., 2017; Patton, 1990). According to Patton (1990), a quantitative approach can be used to measure the subjects' reactions with limited questions to facilitate data comparison. Data from VCCS collected from 2017 to 2022 were used in this study. To date, no study has focused on credential attainment and employment for Network2Work students. Emphasis in literature has focused on other variables related to credential attainment or employment.

Chi-squared analysis helped clarify whether Network2Work students differed from nonNetwork2Work students regarding credential attainment and employment outcomes at Piedmont Virginia Community College. Logistic regression was used to describe the relationship between the independent variables (Network2Work, age, race, sex, and fiscal year) and the dependent variables (industry credential attainment and employment). Logistic regression helped to understand how Network2Work participation is associated with the probability of obtaining an industry credential and gaining employment in relation to demographic specifics. This method included binary dependent variables with only two possible values for each variable: credential obtained (1), credential not obtained (0), employed (1), and unemployed (0). This information assisted in gaining a more robust understanding of how Network2Work affects students in their attempt to gain a noncredit industry credential and employment. Based on the literature reviewed pertaining to social capital and support services for post-traditional students, it was hypothesized
that participating in Network2Work may have a positive influence on credential attainment and employment compared to students not participating in Network2Work.

**Variables**

According to Creswell (2002), a quantitative approach helps measure relationships between variables. The quantitative design allows the researcher to construct situations and eliminate the sway from other variables, which helps narrow plausibly further recognized cause-and-effect relations (Creswell, 2002). This analysis included variables that allowed for comparative conclusions about the organizational mechanics and outcomes of the Network2Work approach compared to the nonNetwork2Work approach. Variables, including age, race, and sex, were used to determine potential differences in outcomes between nonNetwork2Work and Network2Work. Additional variables included employment gained in each quarter post training to determine the potential difference in employment gained or lost between the two groups and the point at which those differences occurred.

Examining subjects in the Network2Work group (treatment) with like subjects from the nonNetwork2Work groups (control) helped establish a comparable baseline and minimize confounding variables (Leedy & Ormrod, 2016). Selected demographics (age, race, and sex) were used as categorical variables. Student data were eliminated from the study during analysis if they lacked the demographic variables needed. Data missing from the race, sex, financial aid eligibility (income), and age were removed from consideration. *Ex post facto* variables were used to reduce threats to validity. Students with like variables were matched between treatment and control groups, and outcomes were analyzed using chi-square and logistical regression. The design controlled for variables sex, age, race (as defined by VCCS), employment status pretraining, and low-income status as defined by financial assistance.
According to Byrne (2016), the data collected must be accurate and reliable to validate a quantitative study. The data collected for this study came from the VCCS Workforce Enterprise System (WES), the VCCS workforce student information system, and VCCS. The data from the Virginia Employment Commission matched data received from VCCS. Dependent or outcome variables included industry credential attainment and employment between January 2017 and March 2021. VEC data are matched on a delay approximately 6 months after the end of any given quarter. Therefore, the most recent data set available for this study was from January 2017 through March 2021.

Network2Work student noncredit industry training outcomes (credential attainment and employment) were compared with nonNetwork2Work student noncredit industry training outcomes at Piedmont Virginia Community College. The independent variable was participation in Network2Work (yes or no). The dependent variables included industry credentials and employment attainment or employment loss. For this study, industry certificate or credential attainment represented the measure of credential attainment (yes=obtained or no=did not obtain). Employment attainment represented student employment; employment loss represents loss of employment post training. Employment data were classified by each quarter post training completion. For example, for each fiscal year, employment data were analyzed separately for quarters 1-4. Table 4 illustrates the numerical value of employment variables for each quarter. This design helped to determine if employment was gained after training and when. This design helped to determine if employment was lost at all 1-year post training completion and when.
### Table 4

#### Employment Status

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Quarter 1</td>
<td>Employed=1, Unemployed=0</td>
</tr>
<tr>
<td>Employment Quarter 2</td>
<td>Employed=1, Unemployed=0</td>
</tr>
<tr>
<td>Employment Quarter 3</td>
<td>Employed=1, Unemployed=0</td>
</tr>
<tr>
<td>Employment Quarter 4</td>
<td>Employed=1, Unemployed=0</td>
</tr>
</tbody>
</table>

I examined categorical variables, including (a) sex (male, female, other); (b) race (American Indian/Alaskan Native, Asian, Black/African American, Native Hawaiian or Other Pacific Islander, White); (c) Ethnicity; and (d) age by group. I examined industry sectors for which students received the training using credential codes. These data were obtained from VCCS WES. Students participating in Network2Work made up the treatment group. Students enrolled in FastForward classes and receiving financial aid but not participating in Network2Work made up the control group.

**Independent Variable**

Participation in Network2Work (treatment) was measured based on identified student enrollment in FastForward programming and Network2Work. Network2Work staff provided student identification in Network2Work. NonNetwork2Work students receiving financial aid (control) were identified from students receiving financial aid due to income 200% below federal poverty levels. Network2Work serves underserved, post-traditional students living in or near poverty, as defined by the federal poverty guidelines (U.S. Department of Health and Human Services, 2022a). Network2Work students typically meet one or more eligibility criteria: first-
generation and underrepresented races. However, Network2Work students are all defined as low income, regardless of other eligibility criteria. Some financial aid options for VCCS students require a reported income at or below the federal poverty level. I matched treatment and control groups using outcome data for nonNetwork2Work students receiving financial aid due to income levels below the federal poverty level. I ensured data collected by VCCS for Network2Work students and nonNetwork2Work students met the poverty threshold outlined by the Department of Health and Human Services. VCCS does not collect generational status in financial aid forms. However, data on sex and race are collected. Data were separated into two groups: students participating in Network2Work (treatment group), and students enrolled in a FastForward credential and receiving financial aid due to income levels 200% below the federal poverty level (control group).

The logistic regression analysis included the following independent variables to determine the impact on credential and employment outcomes: Network2Work, age, race, sex, and fiscal year. These independent variables were used to determine the impact these combinations of variables had on credential attainment and employment outcomes. For example, I used logistic regression to determine if Network2Work participation yielded different outcomes for Black males aged 18-24 compared to nonNetwork2Work Black males of similar ages.

**Dependent Variables**

FastForward is designed to train and prepare noncredit workforce students for an industry credential (FastForward, n.d.b). Industry credential attainment was one of two dependent variables for this research. Industry credentials help students gain employment (FastForward, n.d.b; State Council for Higher Education Council, 2021), especially when aligned to in-demand industry sectors connected to FastForward occupational training. Employment attainment is the
second dependent variable for this research. The dichotomous dependent variables were successfully obtaining an industry credential and/or employment in the first year following instruction or credential attainment. According to Kerlinger and Pedhazur (1973), when the dependent variable in an attrition study is dichotomous (credential obtained versus not obtained, employed versus unemployed), logistic regression is appropriate. Logistic regression analysis provided predicted probabilities of credential attainment and employment of the independent variables (IBM Corp., 2020). Logistic regression was used to determine the impact different combinations of independent variables had on the dependent variables.

Data Collection

The primary focus of this study was to determine whether participation in Network2Work would yield statistically different outcomes related to credential attainment and employment compared to nonNetwork2Work FastForward students. A quantitative analysis was conducted using ex post facto data collected by Piedmont Virginia Community College, VCCS, and data matched with the Virginia Employment Commission (VEC). Virginia's Community College System staff collected student data in the Workforce Enterprise System (WES), the student information system for workforce development. Virginia's Community College System staff conducted a data match with VEC data, matching student data with employment data. The student information system WES collects data on admissions, financial aid, demographic information, and academic records (Northern Virginia Community College, 2021). The results from data collected assisted in understanding the role of a social capital approach in influencing noncredit industry training outcomes. I used data collected in the WES system, the VCCS System Office, and by Network2Work (to identify which students in WES participated in Network2Work). I used data collected by VCCS matched with VEC to determine the
employment rates during the fiscal year post training completion. Employment data were matched to students in the treatment and control groups. Data collected included if a student was employed during each quarter of the fiscal year post training. Figure 4 represents a conceptual framework for the effect of the independent variable (Network2Work) on the dependent variables (credential attainment and employment), while controlling for demographic variables. I compared outcome measures, credential attainment and employment (four fiscal quarters post training), between Network2Work students and nonNetwork2Work students. I examined the impact of the Network2Work design on credential attainment and employment for different sexes, races, and age groups. Matching the two student groups as closely as possible based on demographic characteristics allowed me to examine any impact the Network2Work model has on the two dependent variables (credential attainment and employment).
Virginia's Community College System Office administration was asked to provide de-identified student data. Network2Work agreed to provide de-identified student data for Network2Work students. The data set was sent in an encrypted file. I used the Network2Work de-identified students to form the treatment group and the remaining nonNetwork2Work students, receiving financial aid, to form the control group. Each student was assigned a unique identification number. Although all student data were de-identified, I took additional measures to ensure student identity was protected by only analyzing and discussing industry sectors instead of specific credential codes. VCCS data included demographic data, course enrollment and
completion date, and noncredit industry credential attainment dates. VCCS provided employment data through a data match with VEC.

Materials and Instrumentation

According to Byrne (2016), the data collected must be accurate and reliable to validate a quantitative study. The data collected for this study came from the VCCS Workforce Enterprise System (WES), the VCCS workforce student information system, and the VCCS and VEC matched the data. VCCS data analysts de-identified personally identifiable information on the enrolled students prior to providing access to the researcher. Students were assigned a unique number for identification purposes. The Workforce Enterprise System contains the data used for the study, which were obtained from the VCCS System Office data analyst. Data on student credential attainment and employment were included in the data set provided. Students were distinguished between those who participated in Network2Work and nonNetwork2Work students who received financial aid.

Population and Sample

The population for this quantitative case study was based on noncredit workforce students enrolled at Piedmont Virginia Community College. The case study was based on noncredit workforce students receiving financial aid (with income level 200% below federal poverty levels) and students participating in Network2Work. The focus was on short-term noncredit industry training for students earning income 200% below the federal poverty levels. I did not gather any information from the Workforce Enterprise System until I received approval from the Old Dominion University of Education Human Subjects Review Committee and the VCCS.
I conducted a quantitative chi-square and logistic regression analysis using noncredit workforce student data for Piedmont Virginia Community College. To better match students with post-traditional characteristics, I selected data samples that only included students enrolled in noncredit industry training, with income levels 200% below the federal poverty level, from fiscal 2017 to fiscal year 2021. The criteria for receiving financial aid helped to narrow the selection of students with demonstrated financial need as the federal poverty guidelines dictate. The financial aid programs identified (FANTIC, VRSA, REV, and G3) allow students to earn up to 200% of the federal poverty level to qualify for noncredit financial assistance. The federal poverty guideline for a household of one person is $13,590 per year. The selected financial aid eligibility allows for two times that amount, $27,180 per year (U.S. Department of Health and Human Services, 2022b). Table 5 shows the details of the FANTIC income eligibility criteria (Northern Virginia Community College, 2022). Network2Work students automatically meet poverty guidelines per Network2Work eligibility. The VCCS staff collects and stores data for students enrolled in noncredit workforce training. Student identifiers were used to identify Network2Work students for the treatment group and nonNetwork2Work students for the control group.
Table 5

Federal Poverty Guidelines for FANTIC Eligibility

<table>
<thead>
<tr>
<th>Persons in Family/Household</th>
<th>Poverty Guidelines</th>
<th>FANTIC 200 Percent of Poverty (Poverty Guideline x 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$13,590</td>
<td>$27,180</td>
</tr>
<tr>
<td>2</td>
<td>$18,310</td>
<td>$36,620</td>
</tr>
<tr>
<td>3</td>
<td>$23,030</td>
<td>$46,060</td>
</tr>
<tr>
<td>4</td>
<td>$27,750</td>
<td>$55,550</td>
</tr>
<tr>
<td>5</td>
<td>$32,470</td>
<td>$64,940</td>
</tr>
<tr>
<td>6</td>
<td>$37,190</td>
<td>$74,380</td>
</tr>
<tr>
<td>7</td>
<td>$41,910</td>
<td>$83,820</td>
</tr>
<tr>
<td>8</td>
<td>46,630</td>
<td>$93,260</td>
</tr>
</tbody>
</table>

Note. Source: FastForward (n.d.a) and U.S. Department of Health and Human Services (2022a)

Quantitative Analysis

The aim of this study was to examine a correlation between select variables and measure their covariations. Therefore, a quantitative approach was the best fit for evaluating the Network2Work program. A quantitative approach allows for a more unbiased review of the impact of Network2Work on post-traditional and/or underserved populations.

Validity of Research Model

Quantitative research must have an overall purpose, explaining, predicting, or controlling phenomena through numerical data (Gay, 1996). According to Gay (1996), quantitative research should be testable and clearly stated hypotheses. Quantitative research should be structured in advance with standardized numerical measurement. A quantitative approach with detailed data
can narrow the focus and control for conditions, helping provide reliable and transferable results (Gay, 1996; Vogt, 2012).

I employed an *ex post facto* design, which involved identifying events that had already occurred (or conditions that are already present) and then collecting data to investigate whether there was a relationship between these factors and subsequent characteristics and behaviors such as credential attainment and employment. A numerical outcome from student data was used, excluding individual participant feedback (Allen, 2017; Creswell, 2002). Although this approach cannot be used to determine true causality, it may help provide predictions or inferences about potential outcomes for Network2Work programming (Vogt, 2012).

A randomized controlled study was not ideal due to an unethical approach to denying opportunity to students who desire it or manipulating a control group (Creswell, 2009). I examined existing data; therefore, a quasi-experimental design was more appropriate. A quasi-experimental design is appropriate when randomizing treatment and control groups is impossible (Creswell, 2009; Leedy & Ormrod, 2016). Because the data had already been collected, a randomized controlled study was not feasible.

Categorical variables, such as sex, age, race, and ethnicity were collected for both the treatment and control groups. To examine the impact of Network2Work programming, I utilized chi-square and logistical regression to test the relationship among the categorical variables to determine if Network2Work (independent variable) impacts credential and employment attainment (dependent variables). Students with similar profiles (demographic, low-income status via financial aid eligibility, age, race, sex) were selected from both treatment and control groups. Credential attainment and employment outcomes were regressed to estimate the probability that Network2Work impacted student outcomes in those areas.
VCCS data and Network2Work data were used for this study. All noncredit Virginia Community College student applications upload into WES. This application creates a student record. Piedmont Virginia Community College provided identifiers to identify Network2Work students in WES. Notably, Network2Work enrollment may be significantly lower than nonNetwork2Work FANTIC eligible for FastForward enrollments, potentially creating a larger control group.

**Statistical Analysis Procedures**

Chi-square analysis was used to compare the bivariate relationship between categorical variables. Binary logistic regression was used to predict the categorical dependent variable. The predicted impact of Network2Work on credential attainment and/or employment was categorical (yes, no). Logistic regression was used to calculate the probability of the binary event occurring (credential attainment, employment) (Gopo, 2022). For example, whether student participation in Network2Work was influential in determining the likelihood of obtaining an industry credential and becoming employed. Demographic data (age, race, and sex) were included as categorical variables for further analysis of the dependent variable outcomes.

This quantitative analysis method included frequency, percentage, mean, standard deviation, chi-square, and logistic regression. This analysis was measured on a dichotomous scale. There were only two responses for each dependent variable: industry credential attained (1), industry credential not attained (0), employed (1), and not employed (0). This scale met the assumption for logistic regression (Gopo, 2022). Another assumption for logistic regression analysis is that there are one or more independent variables, which must be continuous or categorical (Gopo, 2022). For this study the independent variable was a nominal categorical
variable: participation in Network2work student=1, nonNetwork2Work student=0. Categorical variables, including age, race, and sex, were also categorical (Gopo, 2022).

I analyzed the treatment group students based on age, race, and sex to the control group students and compared their credential and employment attainment rates. I further analyzed industry sectors to determine if employment attainment rates were greater in a particular industry sector among different demographic characteristics. The binary indicators assigned to both groups are shown in Table 6 and the binary indicator assigned covariates is shown in Table 7.

Table 6

Binary Indicators for Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Binary Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>0</td>
</tr>
<tr>
<td>Treatment Group</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 7 Binary Indicator for Covariates

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Binary Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>Non-binary</td>
<td>2</td>
</tr>
<tr>
<td>White</td>
<td>0</td>
</tr>
<tr>
<td>Black/African American</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic/Latinx</td>
<td>2</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>3</td>
</tr>
<tr>
<td>Asian</td>
<td>4</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>5</td>
</tr>
<tr>
<td>Age Group 18-24</td>
<td>0</td>
</tr>
<tr>
<td>Age Group 25-34</td>
<td>1</td>
</tr>
<tr>
<td>Age Group 35-44</td>
<td>2</td>
</tr>
<tr>
<td>Age Group 45-54</td>
<td>3</td>
</tr>
<tr>
<td>Age Group 55+</td>
<td>4</td>
</tr>
</tbody>
</table>

I used chi-square and logistic regression to conduct a predictive analysis to test the relationship among the categorical variables. This analysis created odds ratios between categorical variables credential attainment (yes=1, no =0) and employed (yes=1, no =0) to determine how Network2Work affected the groups. The alpha level (significance) was set at .05 (Thoemmes, 2012). I used logistic regression analysis to predict the probability of success from Network2Work (independent variable) on credential attainment and employment (dependent variables; Leedy & Ormrod, 2016).
Student data from VCCS included demographic data (sex, race, age), enrollment status, course completion, and credential attainment. Students were given a numerical identifier to maintain privacy and limit bias. Because the dependent variable was dichotomous, logistic regression coefficients were used to estimate odds ratios for each independent variable in the model.

Limitations

Data between 2017 and 2021 were examined for this study. The data collection period was a limitation of this study, given the size of the cohorts. The credentialing cohorts offered at each college also limited the study. Not all the colleges included in the study simultaneously offered the same credential industry training programs throughout the study. The case management system was driven by staff and student input; the variation of that input coupled with the potential risk for error or omission of demographic data may have eliminated some students from analysis, limiting the number of subjects in any given cohort. Other factors limiting the study were external factors such as financial aid and support. The assumption that post-traditional or underserved students lacked a social capital support system would be inaccurate, as some students may have strong cultural and social networks that have not been linked to educational advancement and employment. There was no way to measure the level of support nonNetwork2Work students have during their enrollment. However, all students in both treatment and control had access to the same support services offered at VCCS colleges, coaching, advising, and student support. In this study, chi-square and logistical regression were used, which could not provide explanations for the results regarding the impact, positive or negative, of Network2Work as a programming model.
Some nuances of Network2Work, student supports, financial aid resources, soft skills training, work readiness, and employment connections were similar to most FastForward programs at Virginia’s Community Colleges. However, not all levels of students’ services were the same, which may have accounted for limitations in student success. WES entries were performed at each college, but data entry may not have been consistent across institutions. Outside factors may have also contributed to student outcomes. Family support, financial pressures, work schedules, support from outside entities, and health and wellness may have impacted student outcomes. This study was limited by the inability to collect these extraneous variables, which may have contributed to student outcomes (Pascarella et al., 2004). Tracking student dropouts was challenging to obtain and reasons for dropping out are not typically recorded in WES. Therefore, it was not possible to determine if failure to complete or obtain a credential was linked to Network2Work or factors outside the training program structure.

Third-party examiners administer credential examinations. The rigor and difficulty of a test vary among testing facilities. For example, a credentialing exam may have a higher pass rate nationally compared to a competitor. This difference could relate to the industry subject matter, length of test, or other testing criteria. Examining credential attainment across various colleges, which utilize different credentialing bodies, could vastly impact credentialing outcomes. Keeping the sample size dedicated to Piedmont Virginia Community College ensured consistency in credentialing bodies across all industry courses.

**Ethical Considerations**

I used data that were collected and coded to protect the identity of any student identifiers in the study. I submitted an Institutional Review Board application for Old Dominion University and Virginia Community College System. Data were obtained electronically via an encrypted
document share. I did not have access to student names or any personal identification information. Data were kept in a secure file only accessible via my personal computer. Students had already completed the FastForward program, and this study did not interfere in their educational progress in any way.

Researcher bias was controlled in part using *ex post facto* data. However, the value an industry credential holds in the job market is an assumption made in the project design, as other characteristics may have contributed to employment gains for students. According to Shuttleworth (2008), the researcher is considered an instrument in data collection. My previous position with the VCCS involved the direction of workforce programs and partnerships. My responsibilities included providing technical assistance and leadership to workforce programs in the state of Virginia as well as establishing partnerships with industry partners and community stakeholders. My role supported the VCCS goal, providing students with a culture of care, responding to student needs, and supporting their academic success. This work aligned with the efforts of Network2Work, serving underserved populations in Virginia by coordinating education, training, and connections to employment. My experience contributed to my personal theory of change, expanding connections and services for students, in a manner that resonated with their needs and goals, leading to educational and economic prosperity for both the student and their community. This theory of change echoed the foundation of Network2Work. The deep employer connections and immersive student support were the components of Network2Work, which I found most salient and beneficial.

**Summary**

Piedmont Virginia Community College offers nonNetwork2Work FastForward training programs. Using chi-square and logistic regression to determine the likelihood of future
outcomes based on *ex post facto* data provided the probability that Network2Work impacts credential attainment and employment for students in a Network2Work style program design. Data are mediated through the human instrument; however, this researcher entered or retrieved the data from VCCS.

The VCCS System Office staff provided data. This researcher opted to conduct quantitative analysis to demonstrate student outcomes. According to Tight (2022), when some members of the population are systematically excluded from the data sample, sampling bias may occur. This research design excluded students who did not meet the financial assistance eligibility criteria to better align with post-traditional student characteristics. However, this design may have led to the exclusion of students with barriers to completion outside low-income status. Credential exams may also contain bias, disproportionately affecting students of color (Jencks & Phillips, 1998), which is examined in data analysis. In this study, I examined the impact the Network2Work model may have on student outcomes. A focus on student outcomes aligned with the VCCS goals and strategic plan may have had an impact on policy related to workforce development programming. I examined the relationship between the independent variable, Network2Work, and the dependent variables, student outcomes (credential attainment and employment) by comparing student outcome data from Piedmont Virginia Community College for students enrolled in FastForward programming from 2017 to 2022. I matched two student groups (Network2Work students and nonNetwork2Work students) based on demographics and compared student outcomes to determine if the Network2Work approach has an impact on student success (credential attainment and employment). Credential attainment and employment may benefit students, helping them to earn family-sustaining wages, ultimately elevating them out of poverty.
CHAPTER IV
FINDINGS

The quantitative methodology was a causal-comparative design. The study was *ex post facto* because the students were not randomly assigned into Network2Work for nonNetwork2Work programs. Causal-comparative research involves preexisting groups, allowing the researcher to examine differences based on nonexperimental variables (Schenker & Rumrill, 2004). In this study, I sought to examine the impact the Network2Work program had on students for noncredit industry credential attainment and employment. The data source was Virginia’s Community College System (2021, 2022). The data set included the following data for each fiscal year examined: students' demographic data, noncredit industry credential attainment, age, race, ethnicity, sex, and employment data (collected and matched to student records from the VEC). The data source included a de-identified student number and corresponding demographic data related to the independent variables.

Chi-squared and binary logistic regression analysis was used to test the hypothesis. A p-value of .05 significance level was set for the statistical analysis to determine statistical significance. Chi-squared and logistic regression analysis allowed for the examination of both Research Questions. In Chapter 4, the data collected, and data analysis are presented, as well as the findings from the analysis. The chapter also includes a conclusion highlighting key statistical data and significance.

The study focused on up to 2509 adult students (eligible or receiving financial aid) enrolled in FastForward programs at Piedmont, Virginia Community College, in Charlottesville, Virginia, from 2017 to 2021. The independent variable was Network2Work enrollment, age, race, and sex. Noncredit industry credential attainment and employment were the nominal
dependent variables. The following Research Questions and hypotheses were used in this quantitative investigation:

1. Is there a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College?

   1a. How do credential attainment rates vary by student demographics (age, race, and sex)?

   \[ H_1: \text{There is a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College.} \]

2. Is there a significant difference in employment outcomes between Network2Work students versus similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College?

   2a. How do employment rates vary by student demographics (age, race, and sex)?

   \[ H_2: \text{There is a significant difference in employment attainment for Network2Work students compared to similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College.} \]

**Data Analysis**

The data source provided a de-identified student code, enrollment data, course completion, industry training enrollment, credential attainment, and employment attainment (employment loss or timing of employment) by quarters for each fiscal year. The data source also provided student demographics, age, race, sex, and ethnicity. Students were categorized into two groups: Network2Work (1) and nonNetwork2Work (0).
A quantitative method was fitting to understand the relationship between the variables of interest (Bricteux et al., 2017; Patton, 1990). According to Patton (1990), a quantitative approach can measure subjects’ reactions with limited questions to facilitate data comparison. In this study, data from VCCS were used, which were collected from 2017 to 2022. The researcher compared the bivariate relationships between the two variables. The variables used for analysis were nominal and ordinal. A chi-square test of independence is best used when analyzing two categorical variables. It allowed the researcher to test if the two variables (Network2Work, credential attainment, and employment) were related (Schenker & Rumrill, 2004). Logistic regression analysis was used to better understand how Network2Work participation was associated with the probability of obtaining an industry credential and gaining employment in relation to demographic specifics. This method included binary dependent variables with only two possible values (credential obtained (1), credential not obtained (0), employed (1), unemployed (0).

**Chi-squared Test**

Two types of data analyses were performed: chi-square text and Phi coefficient. The chi-square test was used to compare observed and expected results (Schenker & Rumrill, 2004). The Phi coefficient was also performed to determine the size of any noticed correlations. Chi-square analysis allowed the researcher to determine if a difference between observed and expected data is due to chance or a true relationship between the variables. In other words, it was applied to answer two questions: was credential attainment due to student participation in Network2Work and was student employment a result of student participation in Network2Work? The chi-square analysis, Mann-Whitney U test (e.g., Mann-Whitney-Wilcoxon, Wilcoxon rank-sum test, or Wilcoxon-Mann-Whitney test) was also used as a nonparametric test of the null hypothesis.
Phi Coefficient is a measure of the association between two binary variables (Wiedmaier, 2017). The chi-square coefficient depends on the strength of the relationship and sample size. By dividing chi-square by n, the sample size, and taking the square root, Phi eliminates the sample size. Similar to the correlation’s coefficient, the Phi coefficient value can be between 0 and 1 variables (Wiedmaier, 2017). A coefficient value closer to zero (0) indicates that the variables are independent. The larger the coefficient, the closer the variables are to forming a pattern and are considered dependent (1) (Wiedmaier, 2017).

It is important to understand the assumptions of chi-squared tests. The chi-squared assumptions that were met included: the data were nominal, with the dependent variable being a 0 for no credential and 0 for not employed. The independent variables were categorical data of Network2Work (1) and nonNetwork2Work (0). A chi-square test of independence was used to analyze two categorical variables. Chi-square was used to determine if the two variables (Network2Work, credential attainment, and employment) were related and to determine if the two variables were independent of one another. This analysis was used to determine if the probability of belonging to a specific group (credential attainment; employment) was affected by the other variable (Network2Work participation) (Schenker & Rumrill, 2004).

**Binary Logistic Regression**

The second statistical test conducted was binary logistic regression. Binary, multinomial, and ordinal constitute the three main logistic regression types. Binary regression includes just two possible outcomes, for example, yes or no. Logistic regression fits a regression model when the response variable is binary (Sprinthall, 2013). The assumption for the logistic regression included no assumption of a linear relationship between Network2Work participation, age, race, and sex to credential attainment and employment. The assumptions for logistic regression were
that the dependent variable was binary (credential obtained=1, credential not obtained = 0, employed=1, unemployed =1) and the dependent variables had only two categories; both categories were exclusive and exhaustive of one another, which validated the assumption.

**Table 8**

**Research Analysis**

<table>
<thead>
<tr>
<th>Research Question/Hypothesis</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>RQ1a</td>
<td>Chi-Square and Logistic Regression</td>
</tr>
<tr>
<td>H1</td>
<td>Chi-Square and Logistic Regression</td>
</tr>
<tr>
<td>RQ2</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>RQ2a</td>
<td>Chi-Square and Logistic Regression</td>
</tr>
<tr>
<td>H2</td>
<td>Chi-Square and Logistic Regression</td>
</tr>
</tbody>
</table>

**Data Reliability**

The Virginia Community College System has had a consistent method to collect data since the inception of the noncredit industry training, FastForward, in 2016. The Virginia Employment Commission data match also remained consistent. Data for all students were collected into the VCCS case management system and Network2Work participants were identified by Piedmont Virginia Community College. Piedmont Virginia Community College independently collected data on Network2Work participants related to enrollment, course completion, credential attainment, and employment. To further ensure that the data from VCCS
were reliable and valid, data were compared from both sources. The researcher contacted VCCS for any clarification on data files to ensure that all demographic data and any other variables were included for consideration.

Demographics

In this study, de-identified student data were collected, including student demographics related to age, race, sex, ethnicity, and industry training. FastForward students in the data sample met one of two criteria; 1) received financial aid (identified in Chapters II and III) based on income levels 200% below the federal poverty level and 2) participated in the Network2Work program, which serves students with incomes 200% below the federal poverty level. Students in this study were enrolled in Piedmont, Virginia Community College FastForward training and were all above the age of 18.

Age

The demographic for the Network2Work student group is illustrated in Figure 5. Eighteen percent of students in this group were between the ages of 18-24, 37% were between the ages 25-34, 25% were between the ages 35-44, 14% were between the ages 45-54, 5% were between the ages 55-64, and 1.5% were 65 years and older. The distribution of students among age groups was similar between the two student groups, with two exceptions. The nonNetwork2Work group served fewer students in the 25-34 age group and more in the 55-64 age group.
Figure 5

Age Data by Student Group

Sex

The demographic data for the two student groups related to the number of males, females, or not reported is illustrated in Figure 6. Forty-two percent of the Network2Work student group self-identified as female, 51% as male, and 7% as not reported. Respectively, the nonNetwork2Work group served fewer females (22%), more males (63%), and more not reported (13%).

Figure 6

Sex by Student Group
**Race and Ethnicity**

The demographic data for the two student groups related to race is illustrated in Figure 7. More students in the Network2Work group self-identified as Black (45%) compared to the nonNetwork2Work student group. The second largest race group served was White (44%). There were significant differences in race demographics between the two groups. Ethnicity was categorized as "Hispanic" (1), not "Hispanic" (0). In the Network2Work student group, 3% of students self-identified as Hispanic compared to 2% in the nonNetwork2Work group.

**Figure 7**

*Race and Ethnicity by Student Group*

---

**Industry**

The researcher collected data on the industry sector chosen for each student group. An industry breakdown between the two groups is illustrated in Figure 8. Very small percentages from either group enrolled in the business, information technology, or education sector. The healthcare industry had the highest percentage of enrollments for
Network2Work (38%). NonNetwork2Work had 17% enrollment in the healthcare industry. Logistics and Transportation had the highest enrollment for nonNetwor2Work students (55%) compared to 41% for nonNetwork2Work students.

**Figure 8**

*Industry Training by Student Group*

<table>
<thead>
<tr>
<th>Industry Training by Student Group</th>
<th>NonNetwork2Work</th>
<th>Network2Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welding &amp; Manufacturing</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Skilled Trades</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Logistics &amp; Transportation</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>Information Technology</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Health Care</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Education</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Business &amp; Customer Service</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Correlations**

Ensuring that each variable served a unique purpose in the model, correlation coefficients were examined for all variables included in the linear regression models to determine their relationship. A few statistically significant correlations were observed among the variables examined. Table 9 shows the correlations between each variable. No significant relationship was found between Network2Work and credential attainment (n=2509, \( p = .14 \)) and employment attainment and Network2Work (n=2509, \( p = .73 \)). The demographic variables race, sex, and age had mixed relationships with credential attainment and employment attainment.
Consistent with the literature showing lower rates of credential attainment for minorities, there was no significant relationship between Network2Work and Black (n=662, p=.69) or White (n=1107, p=.43) student credential attainment outcomes. The sample size for other races was not significant enough to run the analysis (other races' sample sizes were between .07-11% of the total sample). When comparing race and sex within the Network2Work student group, White males had strong credential attainment outcomes whereas Black Females had the lowest probability of credential attainment (n=432, p=.0002). There was no significant relationship between Network2Work and Black (n=662, p=.06) or White students (n=1107, p=.65) and employment attainment. There was no significant relationship between race, sex, and employment attainment in the Network2Work student group (n=432, p=.80). Each combination of race and sex (Black Female, Black Male, White Female, and White Male) had almost equal employment attainment rates. However, there was a significant relationship between race, sex, and nonNetwork2Work student group (n=1292, p=.003), with Black females having a higher probability of employment.

There was no significant relationship between Network2Work and Black students’ employment loss (n=-519, p=.81). There was a closer relationship between White students and employment loss, indicating that White Network2Work students experienced job loss at a higher rate than White nonNetwork2Work students (n=799, p=.058). Analysis related to the first quarter of employment showed no significant difference between the two groups Table 9 shows the correlations between each variable.
Table 9 Critical Values of the Chi-Square Distributions with d Degrees of Freedom – Credential Attainment

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network2Work by Credential (n=2509)</td>
<td>1</td>
<td>2.22</td>
<td>.14</td>
</tr>
<tr>
<td>Network2Work by Employment Attainment (n=2509)</td>
<td>1</td>
<td>.11</td>
<td>.74</td>
</tr>
<tr>
<td>Network2Work by Employment Loss (n=1752)*</td>
<td>1</td>
<td>6.2</td>
<td>.01</td>
</tr>
<tr>
<td>Network2Work by First Quarter Employed (n=1752)</td>
<td>3</td>
<td>11</td>
<td>.01</td>
</tr>
<tr>
<td>Black Students N2W by Credential Attainment (n=662)</td>
<td>1</td>
<td>.15</td>
<td>.69</td>
</tr>
<tr>
<td>Black Students N2W by Employed (n=662)</td>
<td>1</td>
<td>3.4</td>
<td>.06</td>
</tr>
<tr>
<td>Black Students N2W by Employment Loss (n=519)***</td>
<td>1</td>
<td>.05</td>
<td>.81</td>
</tr>
<tr>
<td>Black Students N2W by First Quarter Employed (n=519)***</td>
<td>3</td>
<td>3.6</td>
<td>.31</td>
</tr>
<tr>
<td>White Students N2W by Credential Attainment (n=1107)</td>
<td>1</td>
<td>.61</td>
<td>.43</td>
</tr>
<tr>
<td>White Students N2W by Employed (n=1107)</td>
<td>1</td>
<td>.19</td>
<td>.65</td>
</tr>
<tr>
<td>White Student N2W by Employment Loss (n=799)****</td>
<td>1</td>
<td>3.4</td>
<td>.06</td>
</tr>
<tr>
<td>White Student N2W First Quarter Employed (n=799)****</td>
<td>3</td>
<td>4.1</td>
<td>.25</td>
</tr>
</tbody>
</table>

Note. *p<.05, **30% of data were missing, ***22% of data were missing, ****28% of data were missing.

Does Network2Work Influence Credential Attainment?

Chi-square models were used to examine whether Network2Work participation influenced the likelihood of credential attainment. To address the sub-question (a) related to the influence of student demographics on credential attainment, chi-square analysis and binary logistic regression models were used with new variables incorporated in each analysis. Before executing the chi-square and binary logistic regression models, necessary assumptions were considered.
Network2Work Influence on Credential Attainment

The first Research Question was used to examine the relationship between Network2Work and credential attainment. This relationship was analyzed using the Chi-Square Model 1 and did not yield a statistically significant result, \( x^2(1) = 2.224, (n=2,509, p=.13) \), suggesting that the model was able to distinguish between students who obtained a credential and those who did not and that there was insignificant difference in credential attainment rates between the two groups. Figure 9 shows almost an equal relationship between Network2Work, and credential attainment (66%) compared to nonNetwork2Work students (63%) and credential attainment. This result indicated that students obtained credentials at almost equal rates regardless of Network2work participation.

The Phi coefficient was used to analyze the strength of the association. The significance level indicated how much confidence one should have in the results obtained, and Phi (\( \phi \)) indicated the strength of the association between the variables being tested (Pallant, 2020). The approximate significance and the Phi should coincide; when the significance level is high, the strength of the association should be high (Pallant, 2020). Table 10 shows the strength of the association between Network2Work students and nonNetwork2Work students on credential attainment. The Phi coefficient for Network2Work students and nonNetwork2Work students was 0.29. The significance level was more than .05, resulting in the failure to reject the null hypothesis that there was no statistical significance between Network2Work students and nonNetwork2Work students' credential attainment rates.
Table 10

Strength of Association for Network2Work Students and NonNetwork2Work Students on Credential Attainment

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi (Φ)</td>
<td>.0297</td>
<td>.14</td>
</tr>
<tr>
<td>n of Valid Students</td>
<td>2509</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *p* < .05

Figure 9

Credential Attainment Between Student Groups

![Credential Attainment between Student Groups](image)

Credential Attainment by Fiscal Year

To determine if credential attainment rates changed over time, the researcher conducted a chi-square analysis to determine the relationship between the student groups for each fiscal year. Data include fiscal years 2017 to 2021. Table 11 shows the change in credential attainment rates over time for each student group. The student groups significantly differed in the fiscal year 2017 credential attainment rates. The Network2Work student group yielded a 50.7% credential
attainment rate compared to 65.8% for the nonNetwork2Work student group. There was a negative relationship between Network2Work and credential attainment in the fiscal year 2017.

There was no statistically significant relationship between Network2Work and credential attainment for fiscal years 2018-2020. There was a statistically significant relationship between Network2Work and credential attainment for the fiscal year 2021 (n=467, p=.03). In the fiscal year 2021, 72% of Network2Work students received a credential compared to 62% of nonNetwork2Work students. Figure 10 shows the credential rates between the two student groups over time, fiscal years 2017-2021.

### Table 11

*Critical Values of the Chi-Square Distribution with d Degrees of Freedom - Credential Attainment by Fiscal Year*

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year 2017 (n=465)</td>
<td>1</td>
<td>5.32</td>
<td>.02</td>
</tr>
<tr>
<td>Fiscal Year 2018 (n=428)</td>
<td>1</td>
<td>2.18</td>
<td>.13</td>
</tr>
<tr>
<td>Fiscal Year 2019 (n=627)</td>
<td>1</td>
<td>.39</td>
<td>.53</td>
</tr>
<tr>
<td>Fiscal Year 2020 (n=521)</td>
<td>1</td>
<td>.50</td>
<td>.47</td>
</tr>
<tr>
<td>Fiscal Year 2021 (n=467)</td>
<td>1</td>
<td>4.33</td>
<td>.03</td>
</tr>
</tbody>
</table>

*Note. *p*<.05
Network2Work Influence on Credential Attainment, Considering Age, Race, Sex, and Ethnicity

Research Question 1 sub-question a) examined whether Network2Work, age, race, sex, and ethnicity had a relationship with credential attainment. Logistic regression was used to demonstrate the odds of credential attainment considering the variables. Proc logistics fit the logistic regression model, using "credential" as the response variable and "Network2Work, Age, and Race" as the predictor variables. Logistic regression was used to predict the probability that the response value would take on a value of 1. Logistic Regression Model 1 was used to examine this relationship between variables (Table 9). The results in Table 13 demonstrate the odds ratio for each variable and that there is an association between exposure to Network2Work and credential attainment. Participation in Network2Work slightly improved the odds of earning a credential ($p < .001$, Odds Ratio 1.3). Older individuals had slightly greater odds of earning a credential. Black students had lower odds of earning a credential compared to White students. Students of unknown race had lower odds of earning a credential than White students.
The Analysis of Maximum Likelihood Estimates is illustrated in Table 12. This model was used to estimate success probabilities using model parameters. This procedure allowed the model to analyze the variables affecting the outcome of the dichotomous response variable, credential attainment. Table 12 shows the coefficients for Network2Work, age, and race (Asian, Black, Mixed, and not reported). The sample size for ethnicity was not large enough to yield statistical significance. The negative Maximum Likelihood Estimate for race comparisons indicated that the observed proportions were below the chance level. The corresponding $p$-value in the output also indicated how effective each predictor variable was at predicting the probability of gaining a credential.

### Table 12

**Logistic Regression Model I: Analysis of Maximum Likelihood Estimates (Age, Race, Sex, Ethnicity)**

<table>
<thead>
<tr>
<th>Parameter**</th>
<th>df</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr&gt;ChiSq*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>0.57</td>
<td>.15</td>
<td>15.34</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>N2W</td>
<td>1</td>
<td>0.25</td>
<td>0.10</td>
<td>6.0</td>
<td>0.01</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.007</td>
<td>0.003</td>
<td>4.73</td>
<td>0.03</td>
</tr>
<tr>
<td>Race Asian</td>
<td>1</td>
<td>-0.11</td>
<td>0.23</td>
<td>0.24</td>
<td>0.62</td>
</tr>
<tr>
<td>Race Black</td>
<td>5</td>
<td>-0.80</td>
<td>0.11</td>
<td>57.04</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Race Mixed</td>
<td>1</td>
<td>-0.41</td>
<td>0.27</td>
<td>2.31</td>
<td>0.13</td>
</tr>
<tr>
<td>Race Not Reported</td>
<td>1</td>
<td>-0.43</td>
<td>0.11</td>
<td>16.74</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

*Note.* $p<.05$, **Ethnicity did not yield a large enough sample to predict credential attainment.
Table 13

Odds Ratio Estimate, Credential Attainment

<table>
<thead>
<tr>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Wald Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2W</td>
<td>1.28</td>
<td>1.1</td>
</tr>
<tr>
<td>Age</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Race Asian vs. White</td>
<td>0.90</td>
<td>0.56</td>
</tr>
<tr>
<td>Race Black vs White</td>
<td>0.45</td>
<td>0.36</td>
</tr>
<tr>
<td>Race Mixed vs White</td>
<td>0.67</td>
<td>0.34</td>
</tr>
<tr>
<td>Race Not Reported vs White</td>
<td>0.65</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Credential Attainment by Race

Chi-square analysis determined the relationship between Network2Work, race, and credential attainment. This model included an analysis comparing credential attainment rates between Blacks and Whites for both student groups and for the entire sample (both student groups combined). The sample sizes for other races were too small for significant analysis. There was a significant relationship between race and credential attainment. White students attained a higher credential rate than Black students (n=1,744, p<.001). There was no statistically significant relationship between Network2Work and Black students obtaining a credential (n=662, p=.69) and between Network2Work and White students obtaining a credential (n=1,107, p=.43). Black and White Network2Work students obtained credential at approximately the same rate as nonNetwork2Work students. Figure 11 shows credential rates between Black and White students for both student groups. Table 14 shows the critical values of the Chi-Square distribution with degrees of freedom and credential attainment by race.
Table 14

Critical Values of the Chi-Square Distribution with d Degrees of Freedom – Credential Attainment by Race

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black v White students</td>
<td>1</td>
<td>56.68</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Black N2W v. nonN2W</td>
<td>1</td>
<td>0.15</td>
<td>.70</td>
</tr>
<tr>
<td>White N2W v. nonN2W</td>
<td>1</td>
<td>.62</td>
<td>.43</td>
</tr>
</tbody>
</table>

Note. *p<.05

Figure 11

Credential Attainment Rates by Race for Both Student Groups

Credential Attainment by Race and Sex

Chi-square models were used to examine whether Network2Work participation, race, and sex influenced the likelihood of credential attainment. To address the sub-question (a) related to
the influence of student demographics on credential attainment, chi-square analysis, and binary logistic regression models were used with new variables incorporated in each analysis. There was no significant relationship between Network2Work, race, sex, and credential attainment. Table 15 shows the critical values of the Chi-square distribution.

Table 15

Critical Values of the Chi-Square Distribution with d Degrees of Freedom – Credential Attainment by Race and Sex

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Female</td>
<td>1</td>
<td>0.01</td>
<td>0.92</td>
</tr>
<tr>
<td>Black Male</td>
<td>1</td>
<td>1.04</td>
<td>0.31</td>
</tr>
<tr>
<td>White Female</td>
<td>1</td>
<td>0.63</td>
<td>0.43</td>
</tr>
<tr>
<td>White Male</td>
<td>1</td>
<td>2.45</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Note. *p<.05

Chi-square models were used to examine whether race and sex had a relationship to credential attainment within each student group separately. Within the Network2Work student group, there was a significant relationship between race, sex, and credential attainment (n=432, p=.0002). White males were likelier to receive a credential in the Network2Work student group compared to Black males. Compared to the Network2Work student group, the nonNetwork2Work student group had a significant relationship between race, sex, and credential attainment (n=1,292, p<.001). White females in the nonNetwork2Work student group were more likely to receive a credential compared to White females in the Network2Work student group. Table 16 shows the critical values of the Chi-Square distribution for credential attainment by
race and sex within student groups. Figure 12 shows credential rates by race and sex between the two student groups.

**Table 16**

*Critical Values of the Chi-Square Distribution with d Degrees of Freedom – Credential Attainment by Race and Sex Within Student Groups*

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2W race/sex by cred</td>
<td>3</td>
<td>19.60</td>
<td>0.0002</td>
</tr>
<tr>
<td>noN2W race/sex by cred</td>
<td>3</td>
<td>37.18</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05

**Figure 12**

*Credential Attainment Rates by Race/Sexy Within Student Groups (Blue Represents Network2Work students, Orange Represents NonNetwork2Work Students)*
Logistic regression demonstrated the odds of credential attainment when factoring in race, sex, and Network2Work participation (Table 16). Proc logistics was used to fit the logistic regression model, using "credential" as the response variable and "Network2Work, race, and sex" as the predictor variables. Logistic regression was used to predict the probability that the response value would take on a value of 1. The Analysis of Maximum Likelihood Estimates (Table 16) was used to estimate success probabilities using model parameters. This procedure allowed for the analysis of the variables affecting the outcome of the dichotomous response variable, credential attainment, using the model. Table 16 shows the coefficients for Network2Work, age, race (Black and White), and sex and race combined. The negative Maximum Likelihood Estimate for race and sex/race combined indicated that the observed proportions were below the chance level. The corresponding p-value in the output also indicated how effective each predictor variable was at predicting the probability of gaining a credential.

Results in Table 18 indicate the odds ratio for each variable and the association between exposure to Network2Work, race, sex, and credential attainment. Participation in Network2Work, sex, and race and sex combined did not improve the odds of earning a credential. Controlling for race proved to be significant. Black Network2Work students had lower odds of earning a credential ($p < .0001$).
Table 17

Logistic Regression Model 2: Analysis of Maximum Likelihood Estimates (N2W, Race, Sex, Race/Sex Combined)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>df</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr&gt;ChiSq*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>0.85</td>
<td>0.08</td>
<td>111.46</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>N2W</td>
<td>1</td>
<td>0.10</td>
<td>0.12</td>
<td>0.71</td>
<td>0.40</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>0.02</td>
<td>0.15</td>
<td>0.02</td>
<td>0.89</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>1.20</td>
<td>0.75</td>
<td>2.49</td>
<td>0.11</td>
</tr>
<tr>
<td>RaceComp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>1</td>
<td>-0.67</td>
<td>0.13</td>
<td>26.15</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Sex*RaceComp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female/Black</td>
<td>1</td>
<td>-0.23</td>
<td>0.23</td>
<td>1.06</td>
<td>0.30</td>
</tr>
<tr>
<td>Black/Male</td>
<td>1</td>
<td>-1.42</td>
<td>1.61</td>
<td>0.79</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Note. *p<.05

Table 18 Odds Ratio Estimate, Credential Attainment Network2Work Controlling for Race and Sex

<table>
<thead>
<tr>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Wald Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2W</td>
<td>1.10</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Research Question 1 was used to determine if there was a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College. Chi-square analysis did not produce a significant statistical relationship between Network2Work participation and credential attainment. Sub-question a) was designed to determine if credential attainment rates
varied by selected student demographics, particularly age, sex, and race. Chi-square analysis did not yield a significant relationship between Network2Work participation, age, sex, race, and credential attainment. Logistic regression analysis and odds ratio estimates illustrated that participation in Network2Work did slightly improve the odds of earning a credential. The Hispanic identifier and sex alone were not significant in predicting credential attainment. Older individuals had greater odds of earning a credential whereas Black students in Network2Work had lower odds of earning a credential when compared to White students in Network2Work.

Credential attainment rates varied by individual student demographics for the entire sample. White students earned a credential at higher rates than Black students. White females and males in both student groups earned credentials at higher rates than to Black females and males. However, when comparing the relationship between Network2Work, race, and sex, there was no significant relationship. The credential attainment rate was approximately the same for both student groups. The researcher accepted the null hypothesis for Research Question one and sub-question (a).

**Employment**

The second Research Question was designed to examine employment outcomes. The analysis included employment attained, employment lost, the timing of employment, and length of time employed. A chi-square analysis was conducted to answer Research Question two to determine the difference in employment attainment for the two student groups. The first analysis did not factor in other variables (age, race, or sex). The combined subject group totaled 2509 (n); the Network2Work student group had 599 students, and 1910 students were classified into the nonNetwork2Work student group. The hypothesis for request two was Network2Work students would have a higher employment rate than nonNetwork2Work students.
**Research Question 2.** Is there a significant difference in employment outcomes between Network2Work students versus similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College?

a) How do employment rates vary by student demographics (age, race, and sex)?

**Does Network2Work Influence Employment?**

Chi-square models were used to examine whether Network2Work participation was influential in determining the likelihood of obtaining employment. The analysis included models related to employment attainment, employment loss, the timing of employment, and length of time employed. To address the sub-question (a) related to the influence of student demographics on employment scenarios above, chi-square analysis and binary logistic regression models were used with new variables incorporated in each analysis. Before running the chi-square and binary logistic regression models, necessary assumptions were considered.

**Network2Work Influence on Employment**

The second Research Question was used to examine the relationship between Network2Work and employment. This relationship was analyzed in Chi-Square Model # and did not yield a statistically significant result, $\chi^2(1) = 0.11$, $(n=2,509, p=.74)$, suggesting that the model was able to distinguish between students who obtained employment and those who did not and that there was insignificant difference in employment rates between the two groups. Figure 13 shows an equal relationship between Network2Work, and employment (69%) compared to nonNetwork2Work students (70%) and employment. This result indicated that students attained employment at almost equal rates regardless of Network2work participation.

Table 19 shows the strength of the association between Network2Work students and nonNetwork2Work students on employment attainment. The phi coefficient for Network2Work
students and nonNetwork2Work students was -0.007, suggesting an inverse relationship between variables. The significance level (n=2,509, p=.74) was greater than α <.05, resulting in the failure to reject the null hypothesis; there was no statistical significance between Network2Work students and nonNetwork2Work students' employment attainment.

Table 19

Strength of Association for Network2Work Students and NonNetwork2Work Students on Employment Attainment

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi (Φ)</td>
<td>-0.007</td>
<td>0.74</td>
</tr>
<tr>
<td>n of Valid Students</td>
<td>2509</td>
<td></td>
</tr>
</tbody>
</table>

Note. *p<.05

Figure 13

Employment Attainment Between Student Groups
**Employment by Fiscal Year**

To determine if employment attainment rates changed over time, the researcher conducted a chi-square analysis to determine the relationship between the student groups for each fiscal year. Each fiscal year was broken into four quarters. Chi-square analysis determined the likelihood ratio of a student gaining employment in each quarter in relation to the selected variable, Network2Work. Data include fiscal years 2017 to 2021. Table 20 shows the change in employment attainment rates over time for each student group. There was no statistically significant relationship between Network2Work and employment for fiscal years 2017-2021. Figure 14 shows employment levels between the two student groups over time, fiscal years 2017-2021.

**Table 20**

*Critical Values of the Chi-Square Distribution with d Degrees of Freedom – Employment*

<table>
<thead>
<tr>
<th>Attainment by Fiscal Year</th>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year 2017 (n=466)</td>
<td>1</td>
<td></td>
<td>0.39</td>
<td>0.53</td>
</tr>
<tr>
<td>Fiscal Year 2018 (n=428)</td>
<td>1</td>
<td></td>
<td>0.98</td>
<td>0.32</td>
</tr>
<tr>
<td>Fiscal Year 2019 (n=627)</td>
<td>1</td>
<td></td>
<td>0.75</td>
<td>0.39</td>
</tr>
<tr>
<td>Fiscal Year 2020 (n=521)</td>
<td>1</td>
<td></td>
<td>1.59</td>
<td>0.21</td>
</tr>
<tr>
<td>Fiscal Year 2021 (n=467)</td>
<td>1</td>
<td></td>
<td>0.001</td>
<td>0.97</td>
</tr>
</tbody>
</table>

*Note. *p*<.05
Employment by Fiscal Year Between Student Groups

Employment Loss

Analysis was conducted to determine the relationship between Network2Work and employment loss. The Chi-Square Model did yield a statistically significant result ($\alpha<.05$), $x^2(1) = 6.2$, $(n=1,752, p=.01)$, suggesting that the model was able to distinguish between students who lost employment and those who maintained employment and that there was a significant difference in employment loss rates between the two groups. Figure 15 shows the relationship between Network2Work and employment loss (30%) compared to nonNetwork2Work students (24%) and employment loss.

Table 21 shows the strength of the association between Network2Work students and nonNetwork2Work students on employment loss. The Phi coefficient for Network2Work students and nonNetwork2Work students was 0.06, suggesting a positive relationship between variables. The significance level $(n=1,752, p=.01)$ was less than $\alpha<.05$, resulting in rejecting the null hypothesis; there was a statistical significance between Network2Work students and loss of employment. To determine if employment loss rates changed over time, the researcher conducted
a chi-square analysis to determine the relationship between the student groups for each fiscal year. Data include fiscal years 2017 to 2021. Table 22 shows employment loss rates over time for each student group. There was no statistically significant relationship between Network2Work and credential attainment for fiscal years 2017-2021.

**Figure 15**

*Employment Loss Between Student Groups*

![Employment Loss Between Student Groups]

**Table 21**

*Strength of Association for Network2Work Students and NonNetwork2Work Students on Employment Loss*

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi (Φ)</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>n of Valid Students</td>
<td>1752**</td>
<td></td>
</tr>
</tbody>
</table>

*Note. *p*.05, **758 data entries were incomplete from the total sample*
Table 22

Critical Values of the Chi-Square Distribution with \( d \) Degrees of Freedom – Employment Loss by Fiscal Year

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>( df )</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year 2017 (( n=374 ))</td>
<td>1</td>
<td>0.00</td>
<td>1.0</td>
</tr>
<tr>
<td>Fiscal Year 2018 (( n=310 ))</td>
<td>1</td>
<td>1.53</td>
<td>0.22</td>
</tr>
<tr>
<td>Fiscal Year 2019 (( n=433 ))</td>
<td>1</td>
<td>0.63</td>
<td>0.43</td>
</tr>
<tr>
<td>Fiscal Year 2020 (( n=339 ))</td>
<td>1</td>
<td>0.88</td>
<td>0.35</td>
</tr>
<tr>
<td>Fiscal Year 2021 (( n=296 ))</td>
<td>1</td>
<td>2.19</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Note. *\( p<.05 \)

Timing of Employment

Analysis was conducted to determine the relationship between Network2Work and employment timing (by first quarter employed). The Chi-Square Model did yield a statistically significant result (\( \alpha<.05 \)), \( \chi^2(1) = 10.8, (n=1,752, p=.01) \), suggesting that the model was able to distinguish between the quarter a student was employed and that there was a significant difference in employment by fiscal year between the two groups. Table 23 shows the strength of the association between Network2Work students and nonNetwork2Work students on employment loss. The Phi coefficient for Network2Work students and nonNetwork2Work students was 0.07, suggesting a positive relationship between variables. The significance level \( (n=1,752, p=.01) \) was less than \( \alpha <.05 \), resulting in rejecting the null hypothesis; there was a statistical significance between Network2Work, employment, and fiscal year. There was no
statistically significant relationship between Network2Work and credential attainment for fiscal years 2017-2019 and 2021 (Table 24). There was a statistically significant relationship between Network2Work and employment in 2020 (n=339, \( p = .02 \)).

**Table 23**

_Strength of Association for Network2Work Students and NonNetwork2Work Students on Employment by Fiscal Year_

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi (( \Phi ))</td>
<td>0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>( n ) of Valid Students</td>
<td>1752**</td>
<td></td>
</tr>
</tbody>
</table>

*Note. *\( p < .05 \), **758 data entries were incomplete from the total sample*

**Table 24**

_Critical Values of the Chi-Square Distribution with \( d \) Degrees of Freedom – Employment by Fiscal Year_

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>( df )</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year 2017 (n=374)</td>
<td>1</td>
<td>4.20</td>
<td>0.24</td>
</tr>
<tr>
<td>Fiscal Year 2018 (n=310)</td>
<td>1</td>
<td>1.65</td>
<td>0.65</td>
</tr>
<tr>
<td>Fiscal Year 2019 (n=433)</td>
<td>1</td>
<td>4.14</td>
<td>0.25</td>
</tr>
<tr>
<td>Fiscal Year 2020 (n=339)</td>
<td>1</td>
<td>10.43</td>
<td>0.02</td>
</tr>
<tr>
<td>Fiscal Year 2021 (n=296)</td>
<td>1</td>
<td>6.29</td>
<td>0.09</td>
</tr>
</tbody>
</table>

*Note. *\( p < .05 \)
Network2Work Influence on Employment, Considering Race and Sex

The sub-question for Research Question 2 was designed to examine the influence of select variables (Network2Work, race, and sex) on employment (attainment, loss, and timing). Chi-Square analysis was statistically insignificant and did not yield significant relationships between Network2Work, race, sex, employment attainment, loss, the timing of employment, or the number of quarters employed.

Data were analyzed using the entire sample (combined student groups) to determine the relationship between race (Black, White) and employment. The Chi-Square Model did yield a statistically significant result ($\alpha<.05$), $x^2(1) = 8.98$, ($n=1,744$, $p=.003$), suggesting that there was a significant difference in employment by race overall. Black students in either group were more likely to gain employment compared to White students in either group. There was no significant relationship between Black and White students and employment loss or employment timing for the entire sample.

**Employment by Race**

Chi-square analysis determined the relationship between Network2Work, race, and employment. There was not a significant relationship between race and employment. Analysis was insignificant for Network2Work, race (Black, $p=.06$ or White, $p=.66$), and employment. Black students participating in Network2Work ($n=662$) obtained employment at a rate of 74% compared to 81% for nonNetwork2Work Black students. Table 25 shows the critical values of the Chi-Square distribution with degrees of freedom and employment attainment by race.
Table 25

Critical Values of the Chi-Square Distribution with \( d \) Degrees of Freedom – Employment Attainment by Race

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>( Df )</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black v White students</td>
<td>1</td>
<td>8.98</td>
<td>0.003</td>
</tr>
<tr>
<td>Black N2W v. nonN2W</td>
<td>1</td>
<td>3.44</td>
<td>0.06</td>
</tr>
<tr>
<td>White N2W v. nonN2W</td>
<td>1</td>
<td>0.19</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Note. *\( p < .05 \)

Network2Work, Race, Sex, and Employment

Chi-square analysis did not yield a statistically significant result predicting employment based on race and sex. There was no significant relationship between Network2Work participation, sex, race, and employment attainment. The two student groups resulted in similar employment rates for each race and sex combination. Table 26 shows the critical values of the chi-square distribution with \( d \) degrees of freedom- employment Attainment by Network2Work, race, and sex.
Table 26

Critical Values of the Chi-Square Distribution with d Degrees of Freedom – Employment Attainment, Network2Work, Race, and Sex

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Females</td>
<td>1</td>
<td>2.76</td>
<td>0.10</td>
</tr>
<tr>
<td>Black Males</td>
<td>1</td>
<td>1.65</td>
<td>0.19</td>
</tr>
<tr>
<td>White Females</td>
<td>1</td>
<td>0.10</td>
<td>0.80</td>
</tr>
<tr>
<td>White Males</td>
<td>1</td>
<td>0.07</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Note. *p<.05

Within the Network2Work student group, chi-square analysis did not yield a statistically significant result predicting employment based on race and sex. The likelihood of employment was not impacted by any combination of sex (female, male) and race (Black, White) (n=432, p=.80). Within the nonNetwork2Work student group, chi-square analysis yielded a statistically significant result predicting employment based on race and sex. The likelihood of employment was impacted by the combination of sex (female, male) and race (Black, White), n=1,292, p=.003. Black female FastForward students not participating in Network2Work were more likely to gain employment. Figure 16 shows employed by student group, race, and sex.
Employment by Student Group, Race, and Sex (N2W Indicates Network2Work Group)

Network2Work, Race, and Employment Loss

Chi-square analysis result was not statistically significant for Network2Work, race (Black or White), and employment loss. Twenty-four percent of Black students participating in Network2Work (n=519, \( p=.81 \)) lost employment compared to 23\% of Black nonNetwork2Work students. Thirty percent of White students participating in Network2Work (n=799, \( p=.06 \)) lost employment compared to 22\% of White nonNetwork2Work.

Network2Work, Race, and Timing of Employment

Chi-square analysis was used to determine the relationship and likelihood of employment in a specific quarter post training. The analysis did not yield a statistically significant relationship between race, Network2Work, and quarter employed post-training. Table 27 shows the critical values of the chi-square distribution with \( d \) degrees of freedom, first quarter employed, race, and Network2Work.
Logistic Regression - Employment

Research Question 2 sub-question a) was used to examine whether Network2Work, age, race, and sex, had a relationship on employment predictability. Logistic regression demonstrated the odds of employment considering these variables. Proc logistics was used to fit the logistic regression model, using "employment" as the response variable and “Network2Work, Age, Sex, and Race” as the predictor variables. Logistic regression was used to predict the probability that the response value would take on a value of 1. Logistic Regression Model 2 was used to examine this relationship between variables (Table 9). The results in Table 28 show the odds ratio for each variable and the association between exposure to Network2Work and employment. Participation in Network2Work was not a significant predictor of attaining employment (n=2,509, \( p = .18 \)). The odds of employment were even between the two student groups (\( p = .18 \), Odds Ratio 1.0). Older individuals had slightly lower odds of earning a becoming employed, but not significant. Black students had greater odds of finding a job compared to White students. Females had greater odds of finding employment than males, and those with not reported sex had

### Table 27

**Critical Values of the Chi-Square Distribution with \( d \) Degrees of Freedom – First Quarter**

<table>
<thead>
<tr>
<th>Working, Race, and Network2Work</th>
<th>Chi-Square</th>
<th>df</th>
<th>Value</th>
<th>Probability*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Students</td>
<td>1</td>
<td>3.57</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>White Students</td>
<td>1</td>
<td>4.14</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>White Females</td>
<td>1</td>
<td>0.10</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>White Males</td>
<td>1</td>
<td>0.07</td>
<td>0.80</td>
<td></td>
</tr>
</tbody>
</table>

*Note. *\( p < .05 \)
lower odds of finding employment than males. Students with race not reported selected had lower odds of finding work than White students, and the odds of attaining work decreased over time. Network2Work students also had increased odds of losing their jobs during the first year (n=2,905, \( p = .04 \)).

The Analysis of Maximum Likelihood Estimates is illustrated in Table 28. This model was used to estimate success probabilities using model parameters. This procedure allowed the model to analyze the variables affecting the outcome of the dichotomous response variable, employment attainment. Table 29 shows the coefficients for Network2Work, age, fiscal year, and race (Asian, Black, Mixed, and Not Reported). The sample size for ethnicity was not large enough to yield statistical significance.

Table 28

*Logistic Regression Model 2: Analysis of Maximum Likelihood Estimates (Age, Race, Sex, Ethnicity)*

<table>
<thead>
<tr>
<th>Parameter**</th>
<th>df</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr&gt;ChiSq*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>454.8</td>
<td>69.65</td>
<td>42.63</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>N2W</td>
<td>1</td>
<td>-0.14</td>
<td>0.11</td>
<td>1.78</td>
<td>0.18</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>-0.008</td>
<td>0.003</td>
<td>5.43</td>
<td>0.019</td>
</tr>
<tr>
<td>Sex Female</td>
<td>1</td>
<td>0.23</td>
<td>0.11</td>
<td>4.43</td>
<td>0.035</td>
</tr>
<tr>
<td>Sex Not Reported</td>
<td>1</td>
<td>-0.82</td>
<td>0.16</td>
<td>26.38</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Race Asian</td>
<td>1</td>
<td>-0.16</td>
<td>0.24</td>
<td>0.49</td>
<td>0.48</td>
</tr>
<tr>
<td>Race Black</td>
<td>1</td>
<td>0.29</td>
<td>0.12</td>
<td>5.71</td>
<td>0.02</td>
</tr>
<tr>
<td>Race Mixed</td>
<td>1</td>
<td>0.10</td>
<td>0.34</td>
<td>0.09</td>
<td>0.76</td>
</tr>
</tbody>
</table>
Table 28 (continued)

<table>
<thead>
<tr>
<th>Race</th>
<th>Not Reported</th>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Wald Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td></td>
<td>1</td>
<td>0.75</td>
<td>0.35</td>
</tr>
<tr>
<td>Fiscal Year</td>
<td></td>
<td>1</td>
<td>-0.22</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Note. *p<.05, **Ethnicity did not yield a large enough sample to predict credential attainment

Table 29

Odds Ratio Estimate - Employment

<table>
<thead>
<tr>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Wald Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2W</td>
<td>0.90</td>
<td>0.69</td>
</tr>
<tr>
<td>Age</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Sex F vs. M</td>
<td>1.26</td>
<td>1.01</td>
</tr>
<tr>
<td>Sex U vs. M</td>
<td>0.44</td>
<td>0.32</td>
</tr>
<tr>
<td>Race Asian v White</td>
<td>0.85</td>
<td>0.53</td>
</tr>
<tr>
<td>Race Black v White</td>
<td>1.34</td>
<td>1.10</td>
</tr>
<tr>
<td>Race Mixed v White</td>
<td>1.10</td>
<td>0.57</td>
</tr>
<tr>
<td>Race Not Reported v White</td>
<td>0.70</td>
<td>0.54</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.11</td>
<td>105</td>
</tr>
<tr>
<td>Fiscal Year</td>
<td>0.78</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Logistic Regression - Employment Loss

Logistic regression was used to demonstrate the odds of employment loss considering these variables. Proc logistics was used to fit the logistic regression model, using "employment loss" as the response variable and "Network2Work, Age, Sex, and Race" as the predictor...
variables. Logistic regression was used to predict the probability that the response value would take on a value of 1. Logistic Regression Model 3 examined this relationship between variables (Table 9). Results in Table 31 demonstrate the odds ratio for each variable. Results demonstrated the association between exposure to Network2Work and employment loss. Participation in Network2Work was a significant predictor of employment loss, $\alpha<.05$, ($n=2,509$, $p=.04$).

The Analysis of Maximum Likelihood Estimates is illustrated in Table 30. This model was used to estimate success probabilities using model parameters. This procedure allowed the model to analyze the variables affecting the outcome of the dichotomous response variable, employment loss. Table 30 shows the coefficients for Network2Work, age, fiscal year, and race (Asian, Black, Mixed, and Not Reported); the sample size for ethnicity was not large enough to yield statistical significance.

<table>
<thead>
<tr>
<th>Parameter**</th>
<th>df</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr&gt;ChiSq*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>-597.8</td>
<td>85.62</td>
<td>48.75</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>N2W</td>
<td>1</td>
<td>0.26</td>
<td>0.13</td>
<td>4.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>-0.009</td>
<td>0.005</td>
<td>3.6</td>
<td>0.06</td>
</tr>
<tr>
<td>Race Asian</td>
<td>1</td>
<td>0.39</td>
<td>0.28</td>
<td>1.85</td>
<td>.017</td>
</tr>
<tr>
<td>Race Black</td>
<td>1</td>
<td>-0.10</td>
<td>0.14</td>
<td>0.41</td>
<td>0.52</td>
</tr>
<tr>
<td>Race Mixed</td>
<td>1</td>
<td>-0.006</td>
<td>0.33</td>
<td>0.0003</td>
<td>0.98</td>
</tr>
<tr>
<td>Race Not Reported</td>
<td>1</td>
<td>0.48</td>
<td>.014</td>
<td>11.17</td>
<td>0.0008</td>
</tr>
<tr>
<td>Fiscal Year</td>
<td>1</td>
<td>0.30</td>
<td>0.04</td>
<td>48.59</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Note. *p<.05, **Ethnicity did not yield a large enough sample to predict credential attainment
Table 31

*Odds Ratio Estimate – Employment Loss*

<table>
<thead>
<tr>
<th>Effect</th>
<th>Point Estimate</th>
<th>95% Wald Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2W</td>
<td>1.3</td>
<td>1.00</td>
</tr>
<tr>
<td>Age</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Race Asian v White</td>
<td>1.47</td>
<td>0.84</td>
</tr>
<tr>
<td>Race Black v White</td>
<td>0.91</td>
<td>0.69</td>
</tr>
<tr>
<td>Race Mixed v White</td>
<td>1.0</td>
<td>0.51</td>
</tr>
<tr>
<td>Race Unknow v. White</td>
<td>1.61</td>
<td>1.22</td>
</tr>
<tr>
<td>Fiscal Year</td>
<td>1.34</td>
<td>1.24</td>
</tr>
</tbody>
</table>

*Odds of Obtaining Employment in the First-Year Post-training*

Logistic regression was used to demonstrate the odds of obtaining employment in the first-year post-training considering these variables. Proc logistics was used to fit the logistic regression model, using "employment gained year one" as the response variable and "Network2Work, Age, Sex, and Race" as the predictor variables. Logistic regression was used to predict the probability that the response value would take on a value of 1. Logistic Regression Model 4 was used to examine this relationship between variables (Table 9). The results in Table 31 show the odds ratio for each variable and the association between exposure to Network2Work and employment in year-one post-training. Sex was a significant predictor of employment in year one, $\alpha < .05$, ($n=2,509, p=.001$). Race was also significant when looking at the effect on attaining employment in year one ($n=2,509, p=.007$).
The Analysis of Maximum Likelihood Estimates is illustrated in Table 32. The result illustrates the coefficients for Network2Work, sex (Female, Male, and Not Reported), race, and race combined with sex. Network2Work participation was borderline significant, with a negative estimate indicating negative odds of attaining employment. Females had increased odds of attaining employment in year one. Black students had increased odds of attaining employment.

Table 32

Logistic Regression Model 4: Analysis of Maximum Likelihood Estimates (Network2Work, Age, Race, Sex, Ethnicity, Employment Year One)

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>df</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr&gt;ChiSq*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>0.92</td>
<td>0.08</td>
<td>126.32</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>N2W</td>
<td>1</td>
<td>-0.23</td>
<td>0.13</td>
<td>3.08</td>
<td>0.07</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.33</td>
<td>0.16</td>
<td>4.23</td>
<td>.03</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>-0.84</td>
<td>0.048</td>
<td>3.14</td>
<td>0.07</td>
</tr>
<tr>
<td>Race</td>
<td>1</td>
<td>0.40</td>
<td>0.15</td>
<td>7.2</td>
<td>0.007</td>
</tr>
<tr>
<td>Sex*Race</td>
<td>1</td>
<td>-0.24</td>
<td>0.25</td>
<td>0.91</td>
<td>0.34</td>
</tr>
<tr>
<td>Sex* Race</td>
<td>1</td>
<td>12.19</td>
<td>374.6</td>
<td>0.001</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Note. *p<.05

Summary

Based on the quantitative findings, there were no strong statistically significant relationships between Network2Work participation and the likelihood of credential attainment or employment. Students participating in Network2Work had relatively the same odds of obtaining a credential as the nonNetwork2Work student group. After considering race and sex, Black
Network2Work students had a decreased chance of getting a credential compared to White Network2Work students, which aligned with the overall race impact on credential attainment. When analyzing the entire sample for credentials and race, White students from either group were more likely to obtain a credential. Older Network2Work students had higher odds of credential attainment. Network2Work students were more likely to obtain credentials in fiscal years 2017 and 2021. The difference in credential attainment between Network2Work students and similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College, was not significant.

The quantitative analysis for employment did not yield significant relationships between Network2Work and employment outcomes. After considering race and sex, female and Black Network2Work students were more likely to gain employment with an odds ratio of 1.2 and 1.3, respectively. Network2work participation alone did not yield significant odds of employment attainment overall \((p=.07)\).

Various employment outcomes, loss, and timing of employment were analyzed. For employment loss, the results demonstrated that Network2Work participation significantly impacted employment loss \((p=.01)\). After considering race and sex, White Network2Work students were more likely to experience job loss. Network2Work students were more likely to lose their job \((p=.01)\), and their odds of employment decreased over time with an odds ratio of 0.7. Network2Work students had increased odds of losing their job within the first year with an odds ratio of 1.2. Finally, the timing of employment was analyzed, which showed a little significance between Network2Work and the quarter of employment. Network2Work students were more likely to obtain employment in the first quarter post training \((p=.01)\). Network2Work was not a statistically significant predictor of credential attainment or employment attainment.
Although Network2Work did statistically significantly impact job loss, some specific demographic advantages demonstrated that female and Black Network2work students were more likely to gain employment. The difference in employment outcomes between Network2Work students and similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College was not significant.
CHAPTER V
DISCUSSION

In Virginia, nine percent of individuals live in poverty, which equates to over 822,000 people (U.S. Census Bureau, 2018). For those living in poverty in Virginia, services are available to help ease the burden and trauma of poverty, such as emergency funding. However, eligibility requirements for these services can often exclude a group of individuals earning just a bit too much to meet the poverty threshold (Virginia Department of Social Services, 2022). In Virginia, thirty percent of Virginias are asset limited, income constrained, employed (ALICE) and do not earn enough to care for their families (United Way, 2018). These individuals are employed but struggled to earn a living wage to support their family.

Piedmont Virginia Community College serves a 65-mile radius, including Charlottesville City and six surrounding counties. Over 64,000 families are living in the Charlottesville region. Approximately twenty percent of families in the Charlottesville region live in poverty or identify as ALICE, struggling to earn enough money to sustain essentials like food, shelter, clothing, childcare, and transportation (U.S. Census Bureau, 2019; United Way, 2018). Earning a family-sustaining wage is not an equitable struggle in the region. Thirty-five percent of Black families earn less than $35,000 a year, compared to fourteen percent of White families (United Way, 2018). Connecting to employment with family-sustaining wages often requires additional education or training.

A core objective of the Workforce Innovation and Opportunity Act (WIOA) is to connect job seekers with skills and credentials leading to employment with family-sustaining wages. The intent is to provide industry with a quality workforce leading to success in a global economy (WIOA, 2014). According to the Workforce Innovation and Opportunity Act, skills
and credentials are critical to the success of the labor market but other factors, such as strong network connections, which are not illuminated in the law, are equally important.

Skills Gap

Improving the economic situation for post-traditional students includes advancing their education and skill set to provide them with labor market skills valued by employers. Acquiring these valuable skills can be difficult for adults struggling to make ends meet. According to the Institute for Higher Education Policy (2010), 35.2 million low-income young adults in the United States earned incomes at 200 percent of the federal poverty level. These adults were more likely to be first-generation minority individuals and classified as ALICE in Virginia (United Way, 2018). Many barriers exist to pursuing postsecondary training for post-traditional students who may be first-generation, low-income, minority, or from other underrepresented groups.

Social Capital and Credentials

Matt Helmer (2013) emphasized that although an industry credential helps get a better job, the credential alone may not be sufficient. Other factors such as a jobseeker's professional and personal network play a role in obtaining a secure economic future. Low-income students tended to be first-generation students lacking social, cultural, and financial capital to complete noncredit training and credential attainment (Lohfink & Paulsen, 2005; McGregor et al., 1991). Building a social network has been shown to help individuals combat some of the operational challenges related to poverty and the acquisition of education and training. Social capital can be a conduit to education, training outcomes, and income opportunities (Gándara & Contreras, 2009). However, individuals under or unemployed may not have sufficient networks or connections related to education and employment to help change their circumstances, lifting them out of poverty.
Network2Work and Social Capital

In 2016, Piedmont Virginia Community College launched a web-based application to address poverty and the workforce skills gap in the Charlottesville region, Virginia. The Network2Work model is a job network application utilizing volunteers to connect students to the skills, training, and resources they need to gain in-demand employment in their area (Piedmont Virginia Community College, 2021). The tool is divided into four essential components: a) peer connections with students, b) education and training, c) support services, and d) employment assistance (Piedmont Virginia Community College, n.d.).

The Network2Work planning phase includes a labor market analysis and the development of relationships with local employers to determine employer needs. Network2Work staff work with the community college to identify in-demand industry credentials leading to jobs in the region. Peer connectors establish relationships with students and use the application to recruit students who may fit the employment and training criteria. Could the Network2Work program help create a bridge lifting underserved students out of poverty, and if so, would other community colleges want to follow suit?

Social relationships serving as a resource leading to the development and accumulation of human capital is the premise of social capital theory. For example, strong social support (family) impacts the educational attainment of individuals (Coleman, 1988). The Increasing College Opportunity for Low-Income Students report found that low-income students disadvantaged with fewer resources for mentorships, college, and employment insight (Executive Office of the President, 2014). Helping this demographic group earn family-sustaining wages by identifying jobs and positioning them to secure and excel at those jobs is the impetus for the N2W program.
Purpose

The purpose of this case study was to determine if the Network2Work model at PVCC affects student outcomes by comparing the model outcomes to nonNetwork2Work noncredit industry training outcomes offered by Piedmont Virginia Community College. Outcome metrics of the independent variable (Network2Work program) were compared while controlling for potential intervening variables (employment, age, race, sex, and first-generation status) to examine the extent to which the program design contributes to credential attainment and employment. For this study, low income, as defined by the United Way, includes individuals or households earning incomes that exclude them from receiving federal assistance, the Federal Poverty level, but are below the basic cost of living (United Way, 2018). The information gained from the dissertation will help leaders determine whether they want to expand or replicate the Network2Work program in other community colleges in Virginia.

Research Questions

To examine the potential impact of the N2W model on noncredit student enrollment, course completion, and industry credential attainment, this study was guided by the following Research Questions:

1. Is there a significant difference in credential attainment for Network2Work students compared to similar nonNetwork2Work students, enrolled in FastForward training, at Piedmont Virginia Community College?

1a. How do credential attainment rates vary by student demographics (age, race, and sex)?
2. Is there a significant difference in employment outcomes between Network2Work students versus similar nonNetwork2Work students enrolled in FastForward training, at Piedmont Virginia Community College?

2a. How do employment rates vary by student demographics (age, race, and sex)?

**Significance**

In community colleges, a major focus is on the number of people who enroll in and successfully complete noncredit workforce training programs (Buckwalter & Maag, 2019; Hanushek & Kimko, 2000; Lam, 2019). A student's earning potential may increase after completing noncredit training. Concerns regarding the rise in poverty since the year 2000 were voiced by the American Association of Community Colleges (AACC) in 2012. Younger generations were shown to have lower levels of education than older generations in the study (AACC, 2022a). A call to action for community colleges was a major focus of the study.

The community benefits from higher tax revenues, and the economy receives support from greater expenditure and consumer spending, all of which are tied to educational improvements. More people being involved in their communities is a great way to build social capital for the future. A global partnership for education (AACC, 2022a; Global Partnership for Education, 2019). Two-thirds of all employment needed postsecondary degrees, according to the American Association of Community Colleges (2022b). There were 4.8 million full-time and 3.1 million part-time undergraduates enrolled in 2-year colleges and universities in the autumn of 2020. The percentage of students from underrepresented groups attending community colleges has been mostly stable since 2008, with some growth seen among Hispanic students beginning in 2012. While the number of Black students enrolled in four-year institutions has increased since 2008 (NCES, 2022). Nearly a third of students enrolled at community colleges in 2016 were
first-generation college goers, and over a quarter of students had dependent children (NCES, 2022). Additionally, post-traditional students may not have the family or community support they need to succeed in school and the workforce (Cataldi et al., 2018). It was discovered that there are monetary obstacles to training for non-traditional students as well. When poverty rates were broken down by race, researchers found that Black and Hispanic people had much higher rates than White people (de Brey et al., 2019; Holzer, 2018).

Short-term, in-demand industrial training is a primary priority in Virginia as part of the state's efforts to strengthen the workforce via education and training. Noncredit workforce program graduates in Virginia in 2020 had an average 31% increase in earnings, according to data collected by the Virginia Community College System. Community colleges in Virginia remain committed to workforce development (Joint Legislative Audit and Review Commission, 2017) as one of their top priorities.

**Methodology**

A quantitative analysis was used in this study to examine the influence Network2Work had on credential attainment and employment outcomes for workforce students enrolled at Piedmont, Virginia Community College. Chi-square analysis was used to test if the two variables (Network2Work; credential attainment and employment) were related to each other and independent of one another, helping to determine the probability of belonging to a specific group is not affected by the other variable (credential attainment; employment, Network2Work participation) (Bolland et al., 2023; Patton, 1990). Chi-squared analysis was used to clarify whether Network2Work students differed from nonNetwork2Work students when examining credential attainment and employment outcomes at Piedmont Virginia Community College. Logistic regression was used to describe the relationship between the independent variable
(Network2Work, age, race, sex, and fiscal year) and the dependent variables (industry credential attainment and employment). Logistic regression obtained the odds ratio of the presence of more than one explanatory variable which helped gain a better understanding of how Network2Work participation is associated with the probability of obtaining an industry credential and gaining employment for the different demographics. Based on the literature reviewed pertaining to social capital and support services for post-traditional students, it was hypothesized that participating in Network2Work may have a positive influence on credential attainment and employment compared to students not participating in Network2Work.

**Variables**

This analysis included variables that allowed for comparative conclusions about the organizational mechanics and outcomes of the Network2Work approach compared to the nonNetwork2Work approach. Variables, including age, race, and sex, were used to determine potential differences in outcomes between nonNetwork2Work and Network2Work outcomes. Other variables included employment gained in each quarter post training, which were used to determine the potential difference in employment gained or lost between the two groups and when those differences may have occurred.

The data collected for this study came from the VCCS Workforce Enterprise System (WES), the VCCS workforce student information system, and VCCS and Virginia Employment Commission matched data received from VCCS. Outcome variables included industry credential attainment and employment between January 2017 and March 2021. VEC data are matched on a delay of approximately 6 months after the end of any given quarter; the most recent data set available for this study was through March 2021.
Network2Work student noncredit industry training outcomes (credential attainment and employment) were compared to nonNetwork2Work student noncredit industry training outcomes at Piedmont Virginia Community College. Employment attainment represents student employment whereas employment loss represents a loss of employment post training. Employment data were broken down by each quarter post training completion.

Findings Summary

The quantitative findings did not display strong statistically significant relationships between Network2Work participation and the likelihood of credential attainment or employment. Students participating in Network2Work had relatively the same odds of obtaining a credential as the nonNetwork2Work student group. After considering race and sex, Black Network2Work students had a decreased chance of getting a credential compared to White Network2Work students, which aligned with the overall impact of race on credential attainment for either group. Older Network2Work students had higher odds of credential attainment. Network2Work students were more likely to obtain credentials in fiscal years 2017 and 2021. Overall, there was not a significant difference in credential attainment between Network2Work students and similar nonNetwork2Work students enrolled in FastForward training at Piedmont, Virginia Community College.

The quantitative analysis for employment did not yield significant relationships between Network2Work and employment outcomes. Overall, Network2Work did not lead to significant odds of employment, however, females and Black Network2Work students were more likely to gain employment with a 1.2 and 1.3 odds ratio, respectively. Network2work participation alone did not yield significant odds of employment attainment ($p=.07$). Employment outcomes, including employment loss and timing of employment, were also analyzed. Network2Work
significantly impacted employment loss, particularly within the first year; White Network2Work students were more likely to experience job loss.

The odds of obtaining employment for Network2Work students also decreased over time. Network2Work students were more likely to obtain employment in the first quarter after completing training, but Network2Work was not a statistically significant predictor of credential attainment or employment attainment. Although Network2Work did impact job loss, female and Black Network2work students were more likely to maintain employment compared to nonNetwork2Work students.

**Findings Related to the Previous Literature**

Network2Work was created in response to high poverty levels in Charlottesville, Virginia. Network2Work established a peer network in the community to help recruit job seekers into occupational training leading to in-demand employment. Network2Work provided supportive services, and connections to resources and employment opportunities. Network2Work coordinated with local employers to help better align students to training and employment. This network served as an institutional network for students, which previous researchers found less successful than other forms of capital (Moschetti & Hudley, 2015).

In 2016, Virginia made workforce credential attainment a priority with the creation of FastForward (State Council for Higher Education Council, 2021). Based on data from the U.S. Department of Labor (2010), credential attainment was a key performance indicator for employment. FastForward was Virginia's response to the skills gap in workforce development for in-demand industries. Students in this study were enrolled in the FastForward program.
Network2Work's Influence on Credential Attainment

Quantitative analysis did not yield a robust positive relationship between Network2Work participation and the likelihood of obtaining a credential. However, this finding contradicts previous research regarding barriers to credential attainment, specifically among post-traditional students (Hanson, 2022; Tripp et al., 2005). Students in this study qualified for financial assistance. Low socioeconomic status is a noted characteristic of post-traditional students. Credential attainment rates for nonNetwork2Work students were 66% compared to 64% for Network2Work students. Hanson (2022) noted an 89% noncompletion rate among post-traditional students, which is higher compared to the 37% noncredential rate for Network2Work students obtained in this study. Although this rate is significantly better than some previous research, credential attainment rates for Network2Work students were not statistically different from the nonNetwork2Work student group. Overall, both student groups combined in this study yielded a credential attainment rate of 64%, which is significantly better than the rate reported in previous research.

In this study, the relationship between age, race, sex, and Network2Work on credential attainment was also examined. The Network2Work design incorporates supportive services and an established network for training and employment, helping female and Black students gain and maintain employment. In previous research, solutions to barriers for post-traditional students have been reported. This study contributes to previous literature by demonstrating that Network2Work had some impact on student outcomes for some post-traditional students by streamlining resources, providing supportive services, and helping students navigate training and employment opportunities. Grossman et al. (2015) noted that successful occupational training and credential attainment yielded higher wages and better employment outcomes for students.
The current study expands on these findings. For older Network2Work students, this research contributes to previous findings demonstrating increased credential and employment outcomes. This study also aligns with previous literature (e.g., Grossman et al., 2015; Hanson, 2022; Tripp et al., 2005) demonstrating that the support provided to older post-traditional students may have helped to reduce barriers to credential attainment.

Previous literature demonstrated that students from lower socioeconomic backgrounds, first-year students, or students from diverse backgrounds had lower higher education retention rates. Black students had a 54% higher dropout rate compared to White peers (Hanson, 2022; Tripp et al., 2005). This study contributes to previous findings demonstrating that credential rates are lower for Black students compared to White students for both treatment and control student groups. However, for the two fiscal years of the current study (2017 and 2021), this study’s findings contradict previous findings demonstrating higher credential rates for Network2Work students, indicating that services provided by Network2Work may have counteracted barriers for students during those years.

The overall relationship between Network2Work and credential attainment was not significant, indicating that student credential outcomes were similar between the two student groups. Network2Work students obtained a credential at relatively the same rate as nonNetwork2Work students; however, there were some differences when examining race, sex, and age, which contradict previous research findings. Based on the literature related to credential attainment and post-traditional students, first-year students, older students, females, and culturally diverse students demonstrated lower credential attainment rates (Carnevale & Smith, 2018; Hanson, 2022; Tripp et al., 2005). Previous researchers illuminated a 46% student success rate for Black students; however, for Black Network2Work students, the student credential
attainment rate was 54%. (Astin & Oseguera, 2004; Chapman et al., 2011). This study contradicted findings from previous studies related to student academic success for Black students. Although Black Network2Work students yielded better outcomes than in previous literature, compared to the nonNetwork2Work student group, there was no statistically significant difference in outcomes, indicated that Network2Work was not the contributing factor to Black student success in this study.

The results from this study demonstrated that older students had increased odds of earning a credential, which is inconsistent with the literature, which indicates the need for further research (Hanson, 2022). Similarly, Black students in this study had lower odds of obtaining a credential than White students, which is consistent with previous research (Hanson, 2022; NCES, 2022). Comparing race and credential attainment for both student groups contributes to findings in previous studies. White students in either student groups had higher credential attainment rates compared to Black students, consistent with findings from previous literature. Within the Network2Work student group, Black and White students obtained credentials at almost an even rate. This research demonstrated no significant relationship between race, sex, and credential attainment. When examining race and sex combined, this study expands on findings from previous studies. Consistent with previous literature, White Network2Work male students had the highest credential attainment rate (76%), followed by White students in either group. Black students in both groups obtained credentials at approximately a 50% attainment rate, with Black males having the highest rate, at almost 60%.

**Network2Work's Influence on Employment**

Low-income workforce students at Piedmont Virginia Community College experienced similar barriers and outcomes consistent with those found in previous literature. Through the lens
of social capital theory, previous researchers demonstrated a connection between social capital and career success (Gabby & Zuckerman, 1998). The current study contradicts these findings when examining student outcomes, indicating that nonNetwork2Work students may have had more social capital or experienced fewer barriers. A 70% employment rate was found for the 2,509 students examined. NonNetwork2Work students and Network2work students gained employment at almost the exact same rate, indicating that the services and social capital created from Network2Work did not have a statistically significant impact on student employment.

Previous studies consistently demonstrated that low socioeconomic students lacked social networking, which impacted their access to education and employment opportunities (Brawner, 2018; Moschetti & Hudley, 2015; Perna & Titus, 2005). This study contributed to findings from previous literature when examining specific variables (age, sex, and race). Social capital generated from Network2Work impacted student employment outcomes for female and Black students. However, for males and other races, this study contradicted the findings of previous studies; Network2Work did not demonstrate statistically significant differences in employment outcomes.

First-generation students lacked significant social networking related to employment. Previous researchers interviewed students and determined that institutional capital (schools, teachers, and administration) was less helpful than financial or family capital (Moschetti & Hudley, 2015). In this study, outcomes in credential attainment or employment showed no significant difference between the student groups, supporting Moschetti and Hudley’s (2015) findings related to institutional capital. Pedulla and Pager (2019) noted no difference in outcomes when examining social capital, race, and employment but noted that the social network's position, its value in the community, had an effect on the outcomes. This study contradicts
Pedulla and Pager’s (2019) findings. Black and female Network2Work students did yield statistically significant employment outcomes compared to the nonNetwork2Work student group, indicating that the social capital and support from Network2work had an impact on their outcomes. For males and other races, this study expands previous literature findings, noting no difference in race, social capital, and employment outcomes. Findings from this study contribute to some previous findings in literature, noting that female Network2Work students had higher odds of becoming employed compared to male Network2Work students. Black Network2Work students had higher odds of becoming employed compared to White Network2Work students.

This study extends previous findings that employer partnerships had an impact on student employment (Economic Modeling Specialist Intl & Wright, 2013). FastForward and Network2Work are structured around strong employer partnerships. The employment rates for both student groups were approximately 70%.

**Network2Work, Timing of Employment, and Employment Loss**

Previous literature indicated that social capital helped to improve employment and employment retention (Perna & Titus, 2005). However, this study also contributed mixed results to previous findings from literature. White Network2Work students lost their job at a higher rate compared to White nonNetwork2Work students but Black students from both student groups did not experience significant employment loss. Black Network2Work students had higher odds of obtaining employment compared to White Network2Work students, but not compared to nonNetwork2Work Black students. This result contributes to existing findings in literature, noting that social capital may contribute to higher rates of employment.

Goldrick-Rab (2010) noted the connection between weak social capital networks and success among disadvantaged communities implying that stronger social capital networks would
be advantageous to underserved communities. The primary focus of previous literature was on the growing socioeconomic divide between underserved communities, with researchers noting the connection between education, minorities, and employment. Post-COVID, Bartik and Hershbein (2016) noted the connection between low education levels, minorities, and the amount of time individuals were out of work. This study contradicts some findings from previous literature. Network2Work students had increased odds of losing their job in their first year of employment. The odds of attaining work for Network2Work students decreased over time. Although older Network2Work students had higher credential attainment rates, they had lower odds of getting a job.

*Employment, Race, and Sex*

Rudimentary findings related to employment and race illustrated that higher education leads to higher earnings and the likelihood of employment (Ma et al., 2016). Examination of post-traditional students, employment attainment, and race/sex did not yield in-depth results. However, this research was consistent with the Pew Research Center findings on post-bachelor’s degrees and employment (Patten, 2016; Santiago & Brown, 2004).

In this research, statistically significant relationships between race, sex, Network2Work, and employment attainment or loss were not demonstrated. When comparing all students, Black students were more likely to gain employment in both student groups, but there was no difference in employment loss between Black and White students. This finding is consistent with Patten's (2016) data, which showed just a one percent difference in employment between Black and White job seekers.

Patten (2016) noted a significant difference in post-bachelor’s degree employment between males and females. This research found no significant relationship between
Network2Work, sex, race, and employment. The two student groups demonstrated similar employment rates, except for Black females. NonNetwork2Work Black females were more likely to gain employment than Network2Work Black Females. Inconsistent with Patten's (2016) research, this study found that although Network2Work was not a significant predictor of attaining employment, Black students had greater odds of finding a job than White students, and females had greater odds than males. Patten's (2016) findings demonstrated significant differences between males and females in post-bachelor’s degree employment.

Contrary to the original hypothesis, Network2Work appeared to have a positive influence on job loss, which contradicts previous literature on social capital and success for post-traditional students. Researchers illustrated the positive impact of social networks in the education system and the benefit for working-class career advancement and opportunities. (Gabby & Zuckerman, 1998; Wellman, 1983). The quantitative findings of this research did not yield strong statistically significant relationships between Network2Work and credential attainment or employment. Some results indicated slight differences for females and Black students; however, overall findings were consistent with literature related to the struggles of postsecondary students. Network2Work student outcomes were similar to nonNetwork2Work student outcomes, except for the likelihood of job loss and decreased odds of employment over time.

**Improvement over Time**

Network2Work was established in 2017, 1 year after FastForward was launched in Virginia. The program design has remained the same since its inception; however, over time Network2Work staff has fine-tuned their approach with job seekers, peer connectors, and industry providers. Network2Work credential outcomes did improve over time, as did recruitment numbers. It was evident that Network2Work made strides in recruitment and
outcomes. This progression contributes to previous findings in literature related to external partnerships, recruitment, and retention. It was clear from previous literature that partnerships between community colleges and industry help to fill skills gaps (Ayers, 2002; Dougherty & Bakia, 2000; Jacobs & Dougherty, 2006), and the Network2Work design amplifies the work being done at Piedmont Virginia Community College.

Pathways to postsecondary education can be a barrier for low socioeconomic students (Patten, 2016; Perna & Titus, 2005); Network2Work is structured to amplify the pathways established with FastForward programming. This study included students at or below the federal poverty threshold. The classification of these underserved students in Virginia is “ALICE,” asset-limited, income constrained, and employed. According to Astin and Oseguera (2004), students, similar to ALICE students, were less likely to enroll and had lower completion rates. Although the credential attainment rates were not significantly different between the two groups, Network2Work did increase enrollment numbers over time. The first year of inception for Network2Work illuminated a negative relationship between Network2Work and credential attainment; students were less likely to receive a credential if participating in Network2Work in 2017. However, outcomes improved over the next 3 years resulting in continual increases in enrollment; enrollments jumped 84% between 2017 and 2018. Alternatively, the nonNetwork2Work group experienced a downward enrollment trend, with an estimated 23% decrease each year except between 2018 and 2019, which had a 62% increase. In 2021, however, the Network2Work student group exceeded credential attainment rates compared to the nonNetwork2Work student group, with a 72% credential rate compared to 62% for nonNetwork2Work students. This progression aligned with findings from previous literature noting stronger outcomes related to established career pathways and employer partnerships.
(Ayers, 2002; Dougherty & Bakia, 2000; Jacobs & Dougherty, 2006; Patten, 2016; Perna & Titus, 2005).

**Unanticipated Findings**

Of note for this study was the unfortunate impact of the COVID-19 pandemic in 2020. This research focused only on FastForward students eligible for or receiving financial aid and entering occupational, often hands-on, training which were heavily impacted by mandated quarantines in Virginia. The enrollments for Network2Work student group enrollments increased in 2020 but decreased for the nonNetwork2Work group. Enrollments for Network2Work enrollments increased by 20% in 2020 but decreased by 26% for the nonNetwork2Work student group. Both student groups experienced decreased enrollment in the fiscal year 2021 by approximately 10%. Contributing to previous findings on social capital impact on barriers for underserved students, the support students received from Network2Work may have impacted the increase in enrollments, and further qualitative research will help to determine the potential relationship related to enrollment (Gabby & Zuckerman, 1998; Tinto, 2006; and Wellman, 1983).

**Conclusion**

The overall conclusion from this study was that there was not sufficient signal strength to determine the significance of numerous, promising, disaggregated observations related to credential attainment or employment. Network2Work involvement is not strongly associated with the achievement of credential or employment. The findings also indicated that Network2Work students had similar credential probabilities to nonNetwork2Work students. After taking race and sex into account, Black Network2Work students had a lower chance of earning a certification. The outcomes from analysis also revealed that Network2Work graduates
were older. Network2Work students earned more certificates in 2017 and 2021. Network2Work and nonNetwork2Work FastForward students at Piedmont, Virginia Community College had equal credential achievement rates. Network2Work did not affect employment outcomes in the quantitative investigation. After factoring race and sex, female and Black Network2Work students had 1.2 and 1.3 odds ratios of employment, respectively. Network2work did not increase employment probability (p=.07). Employment outcomes—loss and timing—were also examined. White Network2Work students lost more jobs in the first year. Network2Work students' job prospects also declined. Network2Work students were more likely to find jobs in the first quarter after training, but it did not predict certification or employment achievement. Female and Black Network2Work students were more likely to keep their jobs. Network2Work and FastForward students at Piedmont, Virginia Community College had similar employment outcomes.

**Implications and Recommendations**

Workforce development programs are critical to a community college's response to their community's economic development needs. Workforce development programs can be a significant first step for first-generation or underserved students' expansion into higher education. However, workforce development is not a stagnant approach; it constantly evolves to keep up with the economic demands and industry needs. Findings from this study impact workforce development in the areas of student credential outcomes, employment, and employment retention through a social capital perspective.
Student Credential Outcomes

One finding of this study was that there was no significant difference in credential attainment between Network2Work students and nonNetwork2Work students enrolled in FastForward programs at Piedmont Virginia Community College. This result suggests that the level of support in FastForward programs alone could be sufficient for underserved populations, facing barriers, to obtain a credential successfully. This result also suggests that further examination of the barriers Network2Work students’ experiences enrollment should be researched, Network2Work students may have demonstrated significant strides yet experiencing similar outcomes to the control group. In this study, Network2Work, age, race, and sex were not found to significantly impact student outcomes. These results build on existing evidence that White students and older students have an advantage in credential attainment over other races (Hanson, 2022; NCES, 2022). This finding suggests that inequities exist in workforce development programs that may be addressed with a more targeted social capital approach to individual student barriers. This finding suggests that student barriers may differ significantly by race, geographic location, and age and program design should take a more diverse, equitable, and inclusive approach to address these barriers. These results should be considered by both community college leaders and practitioners, when replicating student support programs, such as Network2Work. Community College leaders will want to consider these outcomes when designing programs which address diversity, equity, and inclusion and practitioners will want to consider these outcomes when working to address individual student barriers.

Student Employment Outcomes

Previous researchers noted the importance of credentials on employment attainment and future earnings and the barriers for post-traditional students. Researchers using social capital
theory to examine student barriers had mixed results (Hanson, 2022; Klevan et al., 2016; Tripp et al., 2005). The results from this study build on existing evidence of post-traditional student barriers impact employment outcomes.

**Barriers to Student Success and Social Capital**

Network2Work did not prove to be a deterrent to student success, and in most cases, the outcomes were very close to students who still needed to receive Network2Work support. As previously mentioned, the quantitative approach to this study did not provide data on extraneous variables, which may have contributed to student outcomes. In literature, social capital has been defined as a network of support from various sources: financial, family, institutional, and cultural. The results from this study suggest that social capital may have different effects based on its value by the student and the employer. Although previous research has focused on the positive impact social capital has on employability, this study showed that for some students Network2work had a negative impact on employability. However, at the disaggregated level, some promising potential insights were illuminated indicating the need for future research. These findings should be considered when developing workforce programs for underserved populations. Network2Work had an impact on Black and female student employability, these two factors represent underrepresented groups in the community, and these results should be considered when assessing barriers to employment for underserved students in workforce development training programs.

Literature on social capital and non-credit industry training needs to be expanded. Hertz (2006) noted networks' positive impact on student success and that capital outside of family was valuable. However, Chen and Starobin (2019) added that social capital must be built on trust to provide value to the student. A qualitative approach would help to determine the value students
placed on the support received from Network2Work. While students from low socioeconomic backgrounds typically lacked strong social academic networks, their intrinsic motivation proved to be more beneficial to their educational achievements (Brawner, 2018; Parks, 2000; Perna & Titus, 2005). Results from this study build on existing evidence of social capital benefiting educational achievements, specifically for older students, female, and Black students. These results should be considered when community colleges research ways in which different cultures, generations, and gender groups approach noncredit industry training programs.

Social Capital and Industry Perception

The position of social capital networks made a difference in the observed student impacts (Pedulla & Pager, 2019). Partnerships between community colleges and industry were determined to be instrumental in filling the skills gap (Economic Modeling Specialist Intl & Wright, 2013). Network2Work is partners with Piedmont Virginia Community College and, by design, aligns with in-demand jobs in the Charlottesville, Virginia, region. Network2Work works directly with regional employers to assess workforce development needs, skills, knowledge, and abilities required to fulfill jobs in the industry. Network2Work helps to streamline the support to enrollment, completion of training, and employment for job seekers. However, does the industry value this design, and does Network2Work provide the student with the same benefit as other forms of social capital?

The results of this study build on existing evidence that a strong network is connected to employability. Network2Work yielded a 69% employment rate overall compared to 70% for the nonNetwork2Work group, however, for Black and female students Network2Work proved to be a contributor to their employability compared to the nonNetwork2Work Black and female students. These finding suggest that the strong relationships Network2Work created with
employers created social capital which positivity impacted Black and female students. These results build on existing evidence that underserved communities may need social capital support to expand career opportunities.

Results from this study build on existing evidence of the value a sector strategy approach had on workforce development. These results had a clear impact on two diverse student groups (Blacks and females) and should be considered when workforce development programs use a sector strategy approach. The close relationship Network2Work establishes with employers had a positive impact on them and the employability of two diverse student groups. Future research should use a qualitative approach would be best to determine the employer's criteria for employment and their perception of Network2Work and hiring students through the program.

Holzer (2018) noted that the motivation behind employer investment in training is determined by how beneficial and cost-effective they perceive the investment. To better align jobseekers with employment opportunities, Network2Work works to ensure that job seekers have the necessary skills employers for which employers are looking. Collecting data related to those specific resources and qualitative data aligned with student testimonials and employer feedback would help in determining which elements of Network2Work contribute to student success.

Literature links social capital to the distribution of possibilities and career advancement, specifically, social networks in the education system when connected to post-traditional students (Wellman, 1983). Previous researchers have examined how students of color or from different cultures use strengths and experiences to succeed in college. In some cases, cultural capital was just as significant as other forms of social capital (Gándara & Contreras, 2009; Santiago & Brown, 2004; Yosso, 2016). Some results were not statistically significant for all students, however, the findings of this research indicated some benefit for students of color, particularly
women, in credential attainment and employment. Research indicates that our most vulnerable populations come from underserved communities, often communities of color; these findings suggest the need to explore the impact of social capital on post-traditional students in a more in-depth qualitative way to help eliminate inequities in the outcomes. Future research should examine the perceived value Netowrk2Work provides from both a student and industry perspective.

**COVID-19**

In 2020, a worldwide health crisis created monumental changes in workforce development. Quarantine mandates resulted in the loss of employment and job opportunities and a shift in workforce training, impacting employers and job seekers alike. Disadvantaged communities experienced inequity in the labor market due to the growing gaps between degree holders and earnings (Holzer et al., 2021). Skill deficits resulted in fewer opportunities for disadvantaged communities, particularly people of color. According to the literature, COVID-19 exacerbated the skill and employment opportunity divide, mainly reducing employment for low-income females of color (Bartik & Hershbein, 2016; Holzer et al., 2021). COVID-19 led to the displacement of many workers, and underserved communities were out of work longer and returned to lower wages (Bartik & Hershbein, 2016; Holzer et al., 2021). The pandemic highlighted the known gap in skills for in-demand jobs, jobs needing more than a high school diploma but less than a 4-year degree; this illuminated the need for more workforce training.

Automation of jobs also contributes to displaced employees, particularly those without a college degree; advanced degrees allow individuals to adjust quickly to employment loss (Holzer et al., 2021). Researchers agreed that more robust and inclusive workforce programs are needed. Notably, Network2Work was statistically significant on credential attainment in the fiscal year...
2021; based on the literature, community college enrollment fell significantly in 2020 and approximately 850,000 fewer in 2021. Enrollments for older students did increase in 2021, while the 18-24 age group experienced declines in enrollment (Steiger et al., 2023). Compared to the nonNetwork2Work group, the number of students enrolled (students in both groups were enrolled in FastForward and were eligible for financial aid) decreased in fiscal years 20 and 21. Network2Work enrollment numbers increased consistently from 2017 to 2020 but did decline in 2021. These findings suggest that the support Network2Work provides may have impacted enrollment and credential attainment during a time when underserved communities were particularly compromised. These results should be considered when researching the impact social capital may have on workforce development programs, specifically enrollment, completion, and employment. Although Network2Work did not significantly impact student outcomes compared to the nonNetwork2Work student group, it did progress over time in enrollment, credential attainment, and employment outcomes, which builds on existing evidence that social capital benefits may build over time. Future research will help community college leaders make impactful revisions to the program yielding positive outcomes for post-traditional students.

**Future Research**

The findings of the current study present multiple opportunities for future research. Addressing the industry skills gap, inequities among different socioeconomic communities and removing barriers to education and employment require more nuanced study. Several studies have laid the foundation for expanding education and training to create viable, financially stable opportunities for individuals living in or near poverty. Several studies highlighted the need to better align education and training with industry demands and needs. Empirical examination
evaluating solutions to bridging these gaps and operationalizing these findings would benefit community colleges and higher education. Future research should include qualitative analysis, student and staff interviews to determine ways in which social capital from Network2Work may have had an impact on student success not captured in this analysis.

Network2Work is a program designed with a community benefits plan, utilizing community resources and connections, and developing integrated support systems for underserved populations. Network2Work also integrates connections to the industry in a linear approach capturing the exact timing of local employers' needs and skills required. In theory, this additional support should yield results beyond typical community college services. Although the result of the present study did not indicate significant differences, further exploration is needed to understand the real benefit Network2Work has on individual students. Future research analyzed with a mixed methods or qualitative approach would help to advance these data on social capital and its impact on underserved communities. Additional research on non-credit training's impact on underserved communities would help to advance social capital programmatic approaches to workforce development. An expanded approach to studying Network2Work in Virginia would provide more in-depth analysis and critical feedback, which would help provide more robust services to low-income and underserved populations.

These findings of this study also suggest that Network2Work’s approach may have influenced employment outcomes for Black and female students. These results should be considered when replicating Network2Work or creating programs for post-traditional students. Further exploration should therefore be done to calculate the impact of external factors on employment outcomes such as industry sector, soft skills, and individual barriers for each student.
Qualitative Analysis Approach

Future studies should take a qualitative methodological approach to provide a more in-depth perspective on social capital and student outcomes. A qualitative approach, including interviews or focus groups with certain populations would better serve the unanswered questions generated from this research. For example, the impact of a student’s geographic location, age, previous education, family size, cultural influences, and financial burdens should continue to be explored to help community colleges implement a flexible approach to workforce development.

A mixed methods approach building on the qualitative data would be a logical follow-up in the case of this study, as it would allow for a more comprehensive analysis yielding more substantial results to build future community college programs and resources. Collecting more nuanced student data, which can be made possible through the different instruments used in mixed methods, will allow community colleges and service providers, like Network2Work, to explore the differences in outcomes and make significant strides toward better serving underserved populations.

Noncredit Industry Training and Credentials

Previous researchers analyzed the impact of non-credit industry training and its impact on employment opportunities, and the findings were mixed. Workforce development programs are critical to a community college's response to their community's economic development needs. Workforce development programs can be a significant first step for underserved and diverse populations to achieve academic and career success. However, workforce development is not a stagnant approach; it constantly evolves to keep up with the economic demands and industry needs.
Technology advances and the COVID-19 pandemic demonstrated the need for flexibility in order to pivot quickly and meet the changing needs of job seekers and employers. Further researchers should investigate the role of social capital and supportive services provided to students and job seekers entering the workforce. Connecting supportive services and resources to the analysis of enrollment, credential attainment, and employment for post-traditional students would bring a better understanding of the value students associate with services or resources, highlight gaps in the availability of services and assess the on in the workforce. Examining supportive services and social capital program contribution to enrollment and specific credential attainment may be a beneficial focus for future studies. As discussed in the findings, Network2Work students received credentials in several sectors, but this study was limited to FastForward industry training and future research should examine the impact of social capital on a variety of credit and noncredit pathways. Future researchers should analyze student progress outside of industry credentials, for example, licenses, associate degrees, bachelor’s degrees, and beyond. This approach may also be helpful to explore if specific credential paths impact employment outcomes and trends. Aligning occupational training to specific industry demands is critical to successful workforce development.

The labor market changes because of COVID-19 had an impact on jobseekers (Holzer et al., 2021). Examining the challenges related to jobseekers (resources, geography, and social capital) and employers (skills gap, resources, and wages) due to the changing workforce from COVID will help educators better prepare for training and credentialing a qualified and flexible workforce.
Cost-benefit Analysis

Network2Work is a program designed to help create social capital through peer and industry connections. The program encompasses occupational training and supportive services while serving low-income post-traditional students. Factors to explore further include determining cost-benefit analysis, the impact of resources from external stakeholders, geographic location, and community constraints will be critical to replicate these efforts state or nationwide. Results from the present study suggest that support provided from Network2Work was beneficial for certain demographic groups, these results should be considered when determining which factors of Network2Work had the greatest impact and the costs associated with replicating it.

The compartmentalized benefit of each component of the Network2Work program could not be determined in this study. The time and effort to train volunteers, the cost for program staff, and the cost related to supportive services all impact the cost-benefit analysis to determine a quantifiable impact on the students and community. Examination of the administrative processes, program structure, and the probability of successful replication would benefit community college leaders.

Network2Work Expansion

Since its inception in 2017, Network2Work has expanded to additional locations in Virginia. Future examination of these programs, design implementation, student services, and employment outcomes will be beneficial to determine the transferable community impact to other areas of the state. This approach also allows for a more in-depth comparison of geographic locations, helping decipher different barriers for urban and rural community college students.
The findings illustrated continual improvement in Network2Work enrollment; outcomes remained steady with the control student group. Examination of other Network2Work programs will be beneficial in determining outcomes related to enrollment, credential attainment, employment, and wage. Network2Work staff can collect more in-depth student data, which may provide better insight into the program's contribution to student outcomes and employment. A larger mixed methods study, replicating this research on a larger scale, will allow for more capacity to disaggregate key subgroups of students based on age, race, ethnicity, and sex.

**Workforce Development Impact**

A significant component of Network2Work is the alignment with industry demands and available employment. Harnessing the knowledge, skills, and abilities required by employers and aligning those needs to specific occupational training and education is the foundation of Network2Work. Combined with the immersion of peer connectors into the community, Network2Work is designed to help bridge the gaps between job seekers, training, and employment. Future studies on the value these efforts have with employers will be critical in adjusting and improving program design.

To determine the genuine impact Network2Work may have had on student success a qualitative approach to measure the actual starting points between students would be necessary. The absence of these data prevented analysis to determine if nonNetwork2Work students had any advantages compared to the Network2Work students. This analysis will be highly beneficial in determining the assets or barriers of students prior to training which may have impacted completion and employment. Because the student data sample did not include current employment, current wages, or post-employment and wage growth, it was not possible to determine the true impact Network2Work may have had on socioeconomic status. Student data
did not include information related to previous education or training, first-generation status, or any other external social capital a student may have had prior to participating in Network2Work.

These data points will be valuable in determining the true impact on the barriers of post traditional students. The literature (Wellman, 1983; Yosso, 2016) noted the subjectiveness of different forms of social capital and the value of each for both students and employers, a qualitative analysis of Network2Work would help to explore the impact of the peer connector relationship with students. The evolution of workforce development post pandemic and with the advancement of technology will be key factors to consider when assessing the cost benefit analysis of Network2Work on economic development for underserved communities.

**Quantifying Social Capital**

The support and structure of Network2Work aligns with institutional social capital. Network2Work utilizes peers in the community to connect with job seekers connecting them to industry-driven training leading to employment opportunities. In literature, scholars noted that post-traditional students have lower credential attainment rates, lower employment rates, and experience a skills deficit resulting in fewer opportunities over time (Bartik & Hershbein, 2016). Social capital theory indicates the impact external support may have on student outcomes and career advancement (Stanton-Salazar & Dornbusch, 1995). Network2Work provided resources to the individual through peer and industry networks, which align with social capital theory.

Coleman (1988) defined social capital as resources from the individual and collective surroundings that establish networks. Social capital is not just one thing but a variety and combination of contributions. However, collectively these contributions consist of aspects of social structures that may impact action. Coleman noted that social capital is productive and influences achievements that may have yet to be made in its absence. In the present research, the
elements that may have impacted a student's journey before or during training leading to employment could not be quantified.

A qualitative approach to this analysis would yield a more fine-tuned, in-depth view of Network2Work's contribution to the individual's social capital network. This study alludes that Network2Work, defined as institutional support, may not have enormously contributed to student outcomes. This research aligns with previous findings demonstrating no discernible impact on an institutional social capital contribution. Qualitative data related to family support, first-generational status, and other forms of capital would be more beneficial in determining the true impact of the program design (Moschetti & Hudley, 2015; Perna & Titus, 2005; Stanton-Salazar, 1997).

**Data Components and Structure**

Education strongly indicated the potential higher income opportunities (Emmons & Ricketts, 2017; Sommer et al., 2018). Socioeconomic status and affordability impacted outcomes for post-traditional students, failure to complete impacted employment rates, and occupational training and credential attainment demonstrated higher wage and employment outcomes for students (American Council on Education, 2022; Grossman et al., 2015; Hanson, 2022). Network2Work was designed to address some of the barriers for post-traditional students, supporting students through a peer network, supportive services, access to resources, and connections to employment. Researchers confirmed that post-secondary education was a key contributor to positive employment outcomes and illustrated the inequitable barriers post-traditional students face in obtaining post-secondary education experience (Astin, 1993; Astin & Oseguera, 2004; Carnevale et al., 2013; Walpole, 2007).
The FastForward program began in 2016. Network2Work launched in 2017. Prior to the initiation of these programs, data collected on in-demand industry training were limited and inconsistent in Virginia. Data collection for both student groups was limited to the standard data collection for students enrolled at Piedmont Virginia Community College. The absence of outcomes related to industry credential attainment specifically for post-traditional students makes comparing pre- and post-implementation impossible. As workforce programs continue to expand in community colleges, future research on the standardization of data collection would be beneficial to better capture integral student demographics and data on barriers.

**Conclusion**

The findings of this study aligned with previous literature on the importance of continued support to underserved post-traditional students. The continual growth and sustainable outcomes of Network2Work demonstrate the need for more research into the nuances of the value and impact of supportive services on job seekers and employers. Similar to previous studies focused on credentials and employment for post-traditional students, this research demonstrates the need to continue strengthening the connection between job seekers, training, and employment opportunities. This study provided a new angle, a social capital perspective, to examine the role community college and nonprofit programs can play in making these connections. Finally, this research revealed the ongoing challenge of specific data collection and qualitative input to provide a more comprehensive conclusion to support post-traditional students adequately through their journey from higher education to employment.
REFERENCES


https://www.researchgate.net/publication/237481986_Nontraditional_Learners_in_Postsecondary_Education_Emerging_Pathways_to_Access_and_Success


Butterworth, C. (2020, May 07) *Workforce credentials grant program.*

https://www.vccs.edu/blog/workforce-credential-grant-program/


Creswell, J. (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Merrill Prentice Hall


https://doi.org/10.1177/0002716202250216


https://eric.ed.gov/?id=EJ605845


https://doi.org/10.26209/mj1361331

Fry, R. (2021, May 18). First-generation college graduates lag behind their peers on key Economic outcomes. College graduates without a college-educated parent have lower incomes and less wealth, on average, than those with a parent who has a bachelor’s or higher degree. *Pew Research Center.* https://www.pewresearch.org/social-trends/2021/05/18/first-generation-college-graduates-lag-behind-their-peers-on-key-economic-outcomes/


https://link.gale.com/apps/doc/A339018883/AONE?u=anon~ba23bb2c&sid=googleScholar&xid=9a36c884


https://www.globalpartnership.org/data-and-results/education-data


https://doi.org/10.3102/0034654310370163


https://doi.org/10.1257/aer.90.5.1184


https://doi.org/10.1002/ijop.12763


IBM Corp. (2020). *IBM SPSS Statistics for Windows, version 27.0*. IBM Corp.


https://doi.org/10.18297/etd/854


https://www.luminafoundation.org/state/virginia/


https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20after%20covid%2019/mgi_the%20future%20of%20work%20after%20covid-19_report-f.pdf?shouldIndex=false


National Skills Coalition. (2017a, February 8). *New national skills coalition analysis: Middle-skill gap means Colorado employers struggle to fill key jobs.*  


http://dx.doi.org.proxy1.ncu.edu/10.1007/s00766-017-0278-6

https://lis.virginia.gov/cgi-bin/legp604.exe?161+sum+HB66

https://catalog.nvcc.edu/content.php?catoid=10&navoid=772


https://doi.org/10.1086/210268


https://doi.org/10.2307/2649245


https://doi.org/10.1080/00221546.2005.11772296

Piedmont Virginia Community College. (n.d.). *Network2Work@PVCC.*

https://www.pvcc.edu/community-business/network2work


https://doi.org/10.1177/0891242418792090


https://doi.org/10.1016/j.ssresearch.2004.11.003


https://doi.org/10.1177/1043986202018002005


https://explorable.com/case-study-research-design


https://www.acenet.edu/Documents/Post-traditional-Learners.pdf


https://doi.org/10.48550/arXiv.1201.6385


https://www.proquest.com/docview/230698642?parentSessionId=cyRNuy6hndoUkTKk4K99GXUnnrPmff6oukvPuPfgEGJQ%3D


http://hdl.handle.net/10244/270
https://www.bls.gov/cex/tables.htm

https://data.census.gov/cedsci/table?text=dp03&tid=ACSDP5Y2018.DP03&hidePreview=true

U.S. Census Bureau. (2019). U.S. Census Bureau quickfacts; Charlottesville City, Virginia (County). *Census Bureau Quickfacts.*
https://www.census.gov/quickfacts/charlottesvillecityvirginiacounty

https://www.census.gov/topics/income-poverty/poverty/about/history-of-the-poverty-measure.html#:~:text=The%20current%20official%20poverty%20measure,account%20for%20other%20family%20expenses

https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html

U.S. Department of Agriculture, Center for Nutrition Policy, and Promotion. 

U.S. Department of Health and Human Services. (2022a). *Poverty guidelines API.* 


https://www.dss.virginia.gov/benefit/

https://www.vhda.com/BusinessPartners/HCVPAgents/Pages/HCVUtilityAllowanceSchedulesforVA.aspx


https://doi.org/10.1353/rhe.2003.0044

http://dx.doi.org/10.1002/aehe.3303


APPENDICES

APPENDIX A

Request Letter to Use FastForward and FANTIC Data

July 30, 2022

Dr. Catherine Finnegan,

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Richmond, VA 23226

Dr. Finnegan,

I am a PhD student at Old Dominion University in the Community College Leadership Program. I am currently working on my dissertation, a case study of Network2Work at Piedmont Virginia Community College. I aim to determine if the Network2Work model can affect student outcomes by comparing the model outcomes to nonNetwork2Work students enrolled in FastForward programs from 2017 to December 2022.

I respectfully request FastForward and FANTIC data for Piedmont Virginia Community College from January 2017 to December 2022 to include enrollment, completion, credential attainment, and the Virginia Employment Commission data match for employment outcomes. I appreciate your assistance in providing the data necessary to complete my study and hopefully impact community college program for underserved populations in Virginia.

Sincerely,

Cynthia Finley
APPENDIX B

Request Letter to Use Network2Work Student Outcome Data

July 30, 2022

Ridge Schuyler

Dean of Community Self-Sufficiency Programs

501 College Drive

Charlottesville, VA 22902

Ridge Schuyler,

I am a PhD student at Old Dominion University in the Community College Leadership Program. I am currently working on my dissertation, a case study of Network2Work at Piedmont Virginia Community College. I aim to determine if the Network2Work model can affect student outcomes by comparing the model outcomes to nonNetwork2Work students enrolled in FastForward programs from 2017 to December 2022.

I respectfully request data related to Network2Work student outcomes from January 2017 to December 2022 to include enrollment, completion, credential attainment, and employment outcomes for enrolled students. I appreciate your assistance in providing the data necessary to complete my study and hopefully impact community college program for underserved populations in Virginia.

Sincerely,

Cynthia Finley

Cynthia Finley
VITA

Cynthia M. Finley

PROFESSIONAL SUMMARY

A dynamic leader with significant experience in public service. A comprehensive background in education, policy development, implementing evidence-based practices, and bringing innovative solutions to scale.

RELEVANT WORK EXPERIENCE

Interstate Renewable Energy Council, Richmond, VA

Vice President, Workforce & Strategic Innovation (February 2023-present)

Virginia’s Community Colleges System Office Richmond, VA

Director Workforce Programs & Partnerships (May 2017—February 2023)

PEER-REVIEWED PUBLICATIONS


PUBLISHED ARTICLES


PRESENTATIONS

Finley, C (2022, March) Virginia Department of Transportation Annual Conference, Norfolk, VA

Finley, C (2022, March) Broadband Association State Conference, Richmond, VA