ABSTRACT

THOMAS, ANDREA SUTTON. Perceptions, Attitudes, and Values of Females Participating in Nontraditional Career and Technical Education Programs in North Carolina Community Colleges: A Q-Methodology. (Under the direction of Dr. James E. Bartlett, II).

The purpose of this study was to identify the perceptions of females participating in nontraditional career and technical education (CTE) programs within the North Carolina Community College System. Although research has addressed females in CTE programs, the participation of females in community college programs in which they are nontraditional gender has not been well-studied. Instead, much of the previous research focuses on girls in high school programs and females in college STEM programs. The current study utilized Q Methodology to investigate the perceptions of females in male-dominated CTE programs. Participants received a concourse of 50 statements to sort the perceptions of factors that may influence their program participation from “strongly agree” (+4) to “strongly disagree” (-4). The study included 11 total participants from 5 different community colleges in North Carolina. In addition, participants completed a post-sort questionnaire to capture participant demographics as well as to more fully explain their rankings of the highest and lowest statements in the Q sort. The results of this study will determine what groups exist among females in nontraditional CTE community college programs. The results could be helpful in recruiting and retaining female students in these programs, as well as in the training of personnel such as career counselors and instructors who have an influence on current and potential students in these programs.

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Perceptions, Attitudes, and Values of Females Participating in Nontraditional Career and Technical Education Programs in North Carolina Community Colleges: A Q-Methodology

by
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APPROVED BY:

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DEDICATION

This dissertation is dedicated to my three children, Cael, Caroline, and Brynlee. I pray that your futures are filled with more than just a formal education, but wisdom, kindness, and a love of others in your hearts, minds, and spirits.

BIOGRAPHY

Andrea Sutton Thomas was born and raised in Rocky Mount, North Carolina. After graduating high school, she attended the University of North Carolina at Chapel Hill where she graduated with highest honors with a Bachelor of Arts degree in Psychology and a minor in Afro-American Studies. Andrea then continued her studies at UNC-Chapel Hill and completed a Master of Science degree in Rehabilitation Psychology and Counseling. After completing her degree, Andrea worked in a variety of roles in the fields of life care planning, vocational rehabilitation, vocational evaluation, community college recruitment, community college admissions counseling and disability services. Upon beginning her doctoral program, Andrea took time away from full-time employment to concentrate on her studies and raise her children while working part-time as a graduate assistant and assistant editor to a research journal. After completing her doctoral coursework and while working on her dissertation, Andrea also worked as a community college adjunct instructor and private vocational consultant.

Andrea currently lives just outside of Raleigh in the suburb of Garner with her three young children, who are completely clueless about their mom’s doctoral work.

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First and foremost, I would like to acknowledge my parents, Janie and Wayne Sutton. They instilled in me a love of learning and a belief that education can happen at any age and in any place. They have always been supportive of my educational endeavors and encouraged my pursuit of this doctoral degree. In addition, my brother, David Sutton, has provided unrelenting support and encouragement to me through this long process, and for that, I am extremely thankful.

I am certain that I never could have completed this journey without my colleague, partner-in-crime, and best friend, Dr. Carrol Warren. We survived the twice monthly drives to Charlotte for over three years together. She has been my strongest cheerleader to complete this dissertation, even when I was certain I wanted to give up. She does not give up on others easily, and for that, I will forever be thankful.

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CHAPTER 1

INTRODUCTION

Lack of equal representation for women in non-traditional career and technical education programs directly impacts their ability to earn wages, take advantage of economic opportunities, and care for their families (Moughari, Gunn-Wright, & Gault, 2012). According to the National Center for Education Statistics (NCES, 2012), female students make up 61% of the 244,674 community college student enrollment in North Carolina, while men represent only 39% of the enrollments. The trend of female students making up the majority of the community college student population remained steady and the 2019 Equity Report distributed by the N.C. Community College System indicated that 59% of the 224,249 students enrolled in the fall 2017 semester were female (North Carolina Community College System, 2019). Community colleges typically offer courses at a variety of times - day and night, have extended hours or weekend classes, and may offer courses on satellite campuses (Cohen & Brawer, 2008; Townsend & Twombly, 2007). Along with low tuition and the availability of financial aid, these factors make community colleges attractive educational options to many women (Townsend & Twombly, 2007). With the large number of women on community college campuses, one would believe them to be places of equitable educational opportunities (Lester, 2010; Townsend & Twombly, 2007). As the North Carolina Community College System states, its mission "is to open the door to high-quality, accessible educational opportunities that minimize barriers to post-secondary education, maximize student success, develop a globally and multi-culturally competent workforce, and improve the lives and well-being of individuals…" (North Carolina Community College System, 2019). By increasing female participation in male-dominated vocational programs within the community college system, women could be more likely to fulfill the

mission of the community college system, including access to greater opportunities with fewer barriers with the hopes of greater student success.

Nature of Problem

Women have been accepted into community colleges from the beginning of their existence, "institutional leaders developed gender-based terminal curricula such as home economics and secretarial programs for women students" (Townsend & Twombly, 2007, p. 209). However, many women also completed transfer courses with hopes to one day work toward a bachelor's degree. In the 1970s and 1980s, Johnston (1978) and Goetsch and Gulledge (1987) described programs in North Carolina and Virginia to assist in increasing female enrollment in non-traditional programs, such as carpentry, auto repair, air conditioning, heating, and refrigeration repair. Although improved, the trend of gender-based fields of study continues today. Data from Integrated Postsecondary Education Data System (IPEDS) during the 2008-2009 school year reflect that "only fourteen of 35 fields of study (40 percent) identified by [IPEDS], have a proportion of women that is equal to or greater than women's representation in the community college population overall" (Moughari et al., 2012, p.2). These programs include education and health programs, as well as legal, social, and family and consumer sciences. Men, on the other hand, make up "80 percent of the graduates in fields associated with construction, mechanics, precision production trades, transportation, and engineering-related technology" and make up "seventy percent of graduates in engineering, mathematics, and computer science" (Moughari et al., 2012, p.2). Nationwide, "women make up 87 percent of students in traditionally female fields and only 15 percent of those in typically male fields" (National Women's Law Center, 2005). Therefore, women continue to be concentrated in female-

dominated, often service-based, fields and men remain concentrated in male-dominated, more technical, fields.

Problem Statement

If women's participation in nontraditional vocational programs in the community college does not increase, then they may continue to lag behind men in wages, economic self-sufficiency, and global competitiveness (American Association of University Women (AAUW), 2011a; AAUW, 2011b; Moughari et al., 2012). The AAUW states that in order to compete globally, the need for more skilled and educated workers includes the need for women to have access to higher wage occupations, such as those in CTE (AAUW, 2011b). During the recent economic downturn, women lost jobs and men gained jobs, even in occupations that have been traditionally female-based such as health care and education. While men successfully seek retraining to upgrade their skills during poor economic times, the AAUW indicates that "women experience barriers to entering certain high-wage, high skill fields due to biased career counseling and recruiting"(AAUW, 2011b, p.1) and for those that do enter nontraditional programs, they "disproportionately experience sexual harassment and differential treatment in these largely male classrooms" (AAUW, 2011b, p.1). Townsend and Twombly (2007) conclude that "we need studies to determine the current status of efforts to encourage more women students to enroll in non-traditional programs for their gender and the factors that facilitate or impede these efforts" (p. 215). If this issue is not addressed, women will continue to suffer economically, not only affecting themselves, but also their families and the larger global economy.

Purpose Statement

The primary purpose of the current study is to understand why women participate in male-dominated career and technical education programs in North Carolina community colleges. By using Q-Sort Methodology for investigation, the social perceptions of females in male-dominated CTE programs will be studied to more clearly understand the experiences and subjective perspectives of this student population. By looking at the beliefs about these careers, the researcher hopes to increase understanding of factors that could increase the number of female participants in nontraditional vocational programs as well as the barriers that may impede success. The findings from this study could be used to recruit females CTE programs in community colleges and better train front-line personnel in dealing with issues surrounding female participation in nontraditional CTE programs.

Theoretical Framework

The primary theoretical framework that will be used in the current study is human capital theory. According to Sweetland (1996), human capital theory "suggests that individuals and society derive economic benefits from investment in people" (p. 341). In addition, Sweetland further states that research has frequently focused on the role of education as one of the major ways to invest in people. The types of education that could be beneficial are diverse, as are the potential advantages of education. Because many of the results of education are difficult to measure, such as enlightenment and quality of life, the economic factors are frequently studied (Woodhall, 1987). The study of human capital theory is important to education because it informs policy decisions and educational programming (Sweetland, 1996).

For the current research project, human capital theory provides the most appropriate overarching theoretical framework. This researcher will be investigating female enrollment in

nontraditional CTE programs at community colleges. By using the Q-Sort Method, the factors related to participation of both females in male-dominated CTE programs will be studied to more clearly understand the similarities and differences between the groups. Participants will be asked about their social perceptions and beliefs about male-dominated careers and their choices for participating in the program of study with the hopes of better understanding factors that could increase the number of female participants in these programs and barriers that may impede their success. In addition to a number of important factors this investigator hopes to uncover, the perception of a greater economic benefit to enrollment in a nontraditional CTE program is anticipated.

An additional theoretical framework for the current study is social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994). SCCT framework "suggests that career interests develop from self-efficacy beliefs and those beliefs shape outcome expectations, which are influenced by barrier perceptions" (Kelly & Hatcher, 2013, p. 105). SCCT started from an effort to build theory and combined ideas from a number of career theories that were in existence at the time. SCCT is based heavily on the work of Bandura (1986). SCCT utilized three social cognitive factors that were deemed relevant to career development including self-efficacy beliefs, outcome expectations, and goal representations (Lent et al., 1994). While self-efficacy addresses the question "can I do this?", outcome expectations address the question "if I do this, what will happen?" considering the possible consequences when taking a certain action (Lent et al., 1994). SCCT additionally built upon, but is differentiated from, research on social learning theory of career decision making (Krumboltz, Mitchell, & Jones, 1976; Mitchell, 1990) and the self-efficacy theory of career development (Betz, 1981). Lent et al. (1994) specifically address the issue of the role of gender (and race) in the study of career development, stating, "We posit

that the effects of gender and race/ethnicity on career self-efficacy, interests, and goals may be partly mediated by certain experiential and contextual factors, such as opportunity structures and support systems" (p. 114).

It is these factors, or barriers, that the current study aims to investigate. In other words, what factors influence female participation in nontraditional CTE programs in community colleges?

In order to better visualize the use of human capital theory and social cognitive career theory with the current research project, Figure 1 and Figure 2 have been created below. The categories that will be comprised of the various concourse items for the current study will be based on the National Alliance for Partnerships in Equity (NAPE) categories including Education, Career Information, Family, Internal/Individual, and Societal Issues (NAPE, 2009). These categories represent large themes present in the literature that relate to female participation in nontraditional programs/careers, such as self-efficacy, economics, support systems, skills/intelligence, or stereotypes. These groupings will potentially reveal relationships that provide insight into the participation of females in nontraditional CTE careers. Female participation, or the lack thereof, influences CTE training in community colleges, which in turn influences the economy and society – the key link to human capital theory. Barriers in any of the five NAPE categories can directly affect the career development of women, not only in lower levels of self-efficacy and altered outcome expectations, but also in the reflected goals that women set for themselves. As a result, SCCT is directly linked to female participation in nontraditional CTE programs and their ability to achieve economic success.

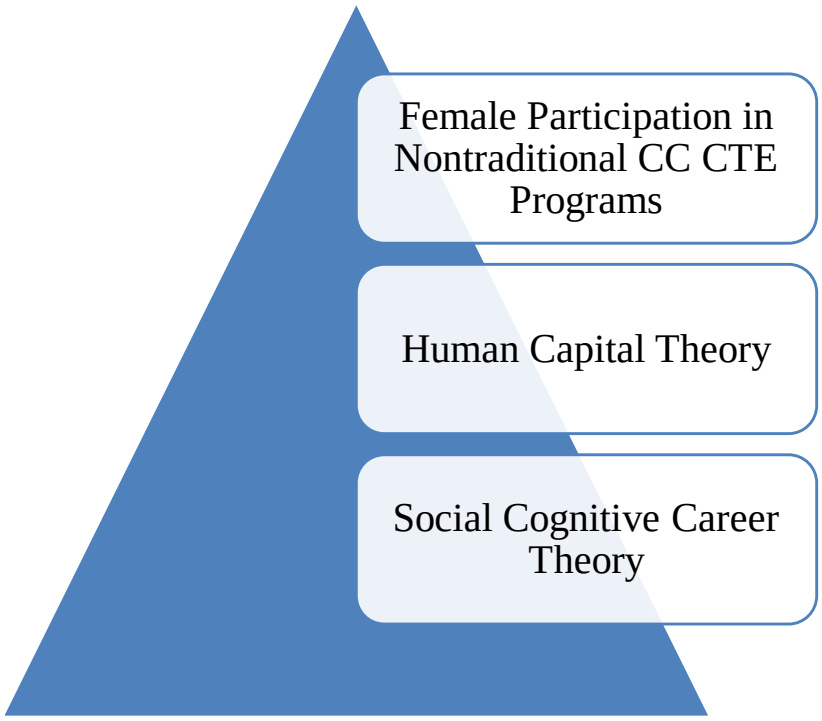

Figure 1. Theoretical Framework Model

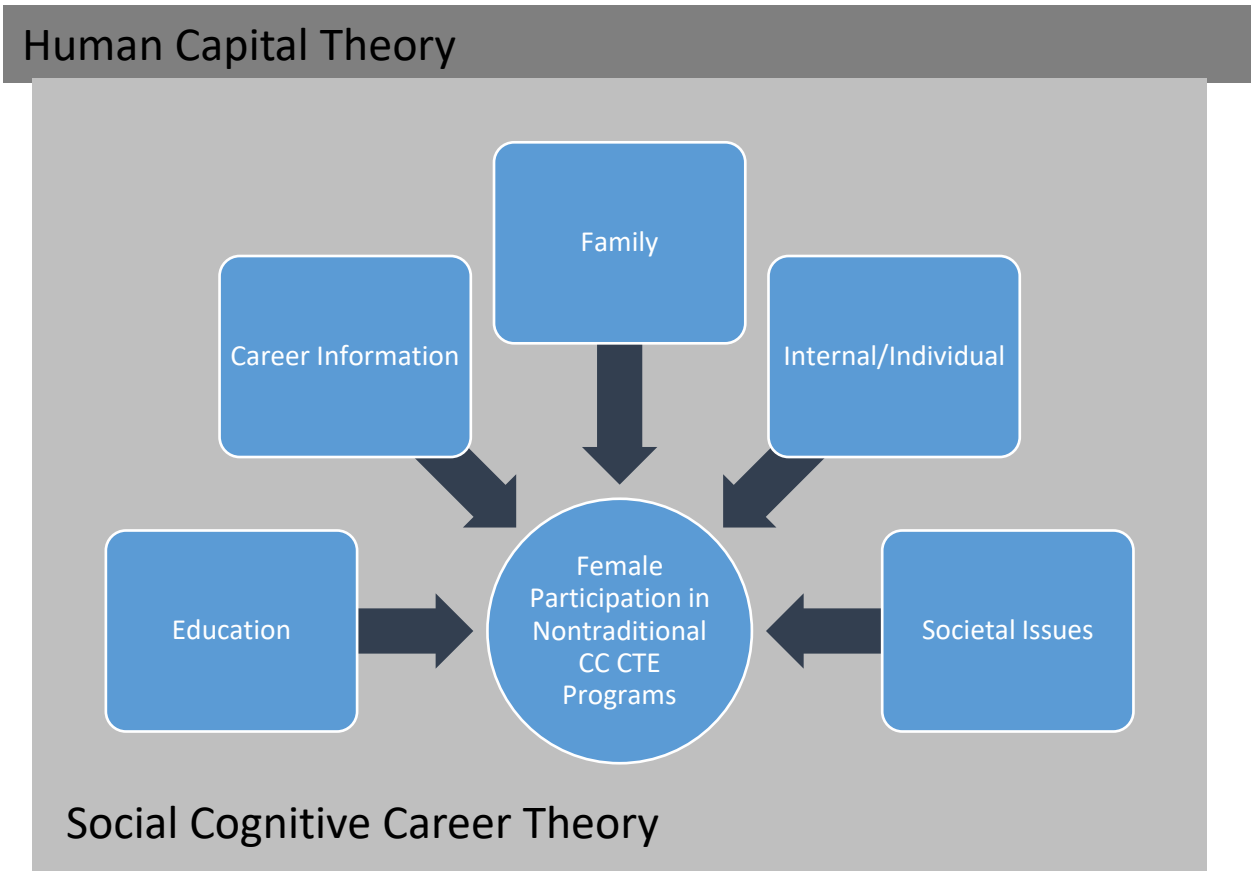

Figure 2. Conceptual Framework

Research Questions

The current study will utilize the Q-Sort Method techniques to investigate the perceptions and attitudes of female adult students in male-dominated CTE programs in the community college. The research questions include the following:

Research Question 1:

What are the items that were similar across all viewpoints?

Research Question 2:

a. *What are females' viewpoints of participating in a male-dominated CTE programs in North Carolina community colleges?*

b. *Why?*

Significance of Study

The significance of this study includes adding to the body of literature in an area that is understudied, providing practical ideas for use in the field, highlighting potentially discriminatory issues, and maintaining the open-door mission of the community college system.

Although a growing body of research is being conducted on women in STEM fields at the university level, the participation of women in male-dominated programs in community college CTE programs is rarely studied (Lester, 2010). Additional research into the enrollment of women in nontraditional CTE programs in community colleges has the potential to significantly impact the CTE field. Lester (2010) states:

> Women who brave male-dominated classroom[s] have been largely ignored in the research literature. In order to change male-dominated career and technical education fields into more gender-equitable programs and to promote success among those women who are currently braving the male-dominated classroom and occupations, more research is required…. With more women in male-dominated programs, educators have the opportunity to change the demographics and cultures of many masculine occupations. (p. 64)

Therefore, an increase in female enrollment in male-dominated CTE programs is required before substantial change can occur in occupations in which women have been under-employed.

Not only would additional research assist in increasing female participation in nontraditional CTE programs and careers, but it would also "assist those individuals working in community colleges who come into contact with female students who express an interest or who are having issues being successful in male-dominated academic majors" (Lester, 2010, p. 52). CTE educators must become creative in their recruiting and retention practices and must have

access to information and resources important for females, including available support services such as childcare, emotional support, counseling, basic skills assistance, and job development skills (Gordon, 2008). Educators must "ensure that neither sex discrimination nor bias affects students' attitudes toward, access to, enrollment in, or completion of nontraditional programs that may lead to higher-paying jobs" (Gordon, 2008, p. 131-132). Educators who complete CTE research are vital to bridge the gap for CTE educators in the field regarding practical solutions for increasing female participation in nontraditional programs. The information learned through additional research must be disseminated to the field, in this case community colleges, for effective changes to take place. If community colleges are to remain open door institutions, it is imperative that equal access be provided to all programs, regardless of gender. Maintenance of the open-door policies of community colleges supports the community college mission to minimize challenges and maximize success for all students. As a result, economic self-sufficiency of females could improve and communities could assist in the goal to maintain national global competitiveness.

Limitations

This study is limited by the methodology chosen to address the problems and purpose, which is Q-Sort methodology. Also, this study is limited by participant accuracy, as the sorting process used in Q-Sort can be no more accurate than the participants completing the sorting. The current study is additionally limited by the current definition of *nontraditional programs of study* and *career and technical education*, and by the accurate representation of the study participants to the large population.

Delimitations

This study is delimited to female adult students enrolled in CTE programs in a North Carolina community college. Students in female-dominated vocational programs will be excluded from the study, as are males in male-dominated vocational programs. In addition, only those items that are part of the Q-Sort concourse will be included in the assessment process.

Definition of Terms

The following terms are defined to clarify their meanings in terms of this study:

Career and Technical Education (CTE): Also referred to as vocational education; has the "purpose of training individuals in job-related skills" (Lester, 2010, p. 51); may include community college programs in health care, education, construction, agriculture, and other similar majors.

STEM: Refers to science, technology, engineering, and mathematics majors and careers (Lester, 2010).

Nontraditional Programs of Study: Refers to "occupations or fields of work, including careers in computer science, technology, and other emerging high-skill occupations, for which individuals from one gender comprise less than 25 percent of the individuals employed in each such occupation or work field" (National Alliance for Partnerships in Equity, 2009, p. 8).

Concourse: Refers to "the flow of communicability surrounding any topic" in "the ordinary conversation, commentary, and discourse of everyday life" (Van Exel & De Graaf, 2005, as cited in Brown, 1993). Furthermore, the concourse, as used in Q methodology, further refers to a list of all the statements given to participants about the research topic.

Q-set: Also called the Q-sample, it typically consists of 40 to 50 statements taken from the concourse (Van Exel & De Graaf, 2005). It is based on some type of structured method of choosing which statements to include that represent the full concourse.

P-set: Refers to "a structured sample of respondents who are theoretically relevant to the problem under consideration" (Van Exel & De Graaf, 2005). Q methodology does not require a large number of respondents.

Conclusion

This chapter introduced the current study of female participation in nontraditional CTE programs in North Carolina community colleges. First, the nature of the problem, problem statement, and overall purpose of the research was described. Next, the theoretical framework, two research questions, and significance of the study were explored. Finally, the limitations, delimitations, and definition of terms were presented. The following chapters will cover a literature review of the topic, methods, results, and a discussion.

CHAPTER 2

LITERATURE REVIEW

This review begins with a discussion of the theoretical frameworks utilized to guide this current study and is followed by a review of literature in CTE. Specifically, the literature review includes a brief history of females in CTE in the United States, postsecondary CTE participation by females, females in baccalaureate STEM programs, CTE in secondary education, and barriers to female participation and related interventions. The chapter concludes with a presentation of programs that have been implemented to increase female participation and a summary of factors that affect female participation in nontraditional programs.

Theoretical Framework

Human capital theory is the primary theoretical framework used to guide the investigation of female participation in nontraditional CTE programs in North Carolina community colleges. This primary framework is integrated with social cognitive career theory as a secondary theoretical framework to provide a holistic perspective to not only view the economic impact of women's full participation in these programs but to explore the barriers that impact their participation.

Human Capital Theory

Gary Becker and Theodore Schultz first presented human capital theory in the 1960s and it has been further developed by others (Becker, 1993; Schultz, 1963). Sweetland (1996) provides a thorough review of human capital theory, including its history and basic characteristics. As summarized by Sweetland (1996), although studied for hundreds of years, human capital theory became on official field of study in the early 1960s. During this time, four major foundational studies were completed which became pivotal in the future development of

human capital theory, including those by Jacob Mincer, Solomon Fabrican, Gary Becker, and Theodore Schultz. Becker and Schultz both became well known in the field with many publications, including Becker's famous book on the topic originally written in 1964 which is now in the third edition. According to Sweetland (1996), Becker originally developed a methodology to study differences in income between high school graduates and college graduates that led to a mathematical representation of the rate of return on a college education. Becker stated, "Education and training are the most important investments in human capital" (Becker, 1993, p. 17). Even after adjusting for all of the costs associated with education and considering personal characteristics of the individual, education increases one's income (Becker, 1993).

Swanson and Holton (2001) developed a model of Human Capital Theory that depicts the important components of the theory as well as the primary relationships and components (Figure 3). The first relationship focuses on productivity (outcome) as in direct relationship with education and training, in that by investing in education, the result will be an improvement in learning (Swanson & Holton, 2001). The second relationship reflects on productivity (outcome) as in direct relationship with learning, so that "increased learning does, in fact, result in increased productivity (p. 109). The third and final relationship represents the last component of Human Capital Theory. The ability to earn higher wages (for individuals and businesses) only comes because of greater productivity, which has a direct link to broader community and social changes (Swanson & Holton, 2001). Therefore, the return-on-investment ideals of Human Capital Theory is different from "classical economic theory [that] considers labor as a commodity that can be bought and sold" (p. 109). Instead, human capital, or the "knowledge, expertise and skill one accumulates through education and training" (p. 109), has greater social and economic

benefits that are consistent with the premise that the investment in human beings is the most important of all.

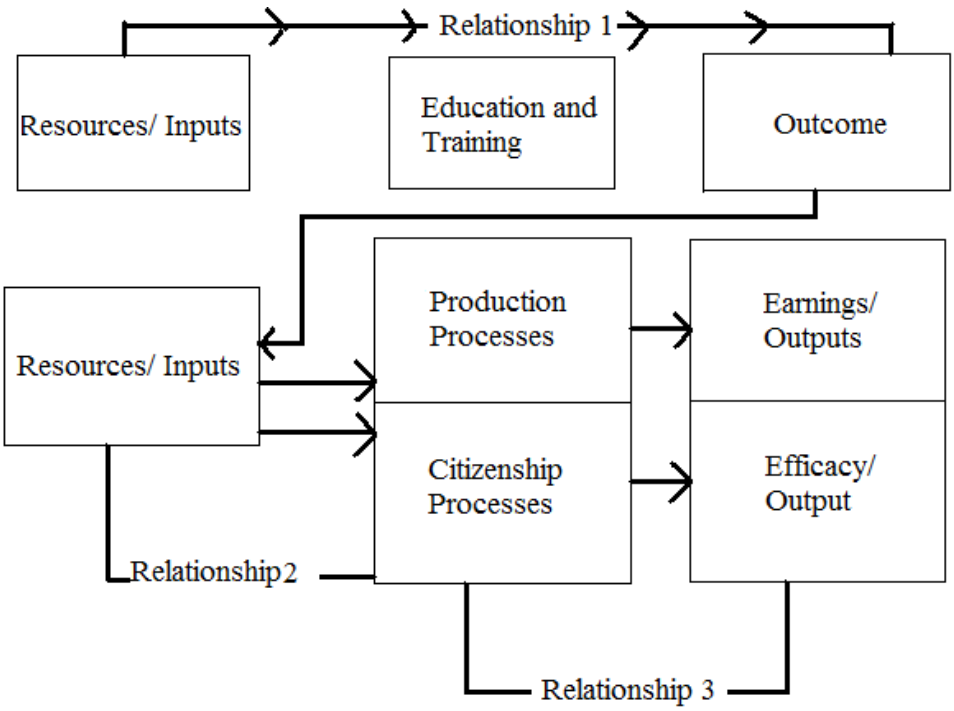

Figure 3. A model of Human Capital Theory depicting main relations in Human Capital Theory and the core assumptions underlying the relationships. Adapted from *Foundations of Human Resource Development*, by R. A. Swanson & E. F. Holton, III, 2001, San Francisco, Berrett-Koehler.

Laanan, Hardy, and Katsinas (2006) describe a research that supports the important position of community colleges in the development of human capital. The authors not only describe how human capital theory applies to community colleges, but also review state-based initiatives to track human capital improvements at the community college level. An important finding related to the current research project was that "some vocational fields that require more technical skills tend to have higher returns as measured by income" (Laanan et al., 2006, p. 858). Grubb (2002) found quite different rates of economic returns for men and women at the community college level, stating

> Evidently, because of substantial gender segregation at this level of the labor market, the effects are substantially different for men and women. Therefore efforts to move women into non-traditional occupations need not only to persuade women to enroll in the appropriate educational programs, but in some cases – as in engineering and computer fields – must also change the employment patterns that lead to women in non-traditional occupations having lower returns than men. (Grubb, 2002, p. 313)

Therefore, Laanan et al.'s and Grubb's findings support the benefit to female participation in nontraditional community college programs and occupations, particularly those in vocational and technical fields. However, without improvements in the current tracking and documentation system, the true return to women (and other community college students) is difficult to ascertain (Laanan et al., 2006). The current data collection system's flaws are serious and do not allow those who create policies, practitioners, and researchers the opportunity to properly measure the effectiveness of community colleges in developing human capital.

As discussed above by Grubb (2002), the economic benefits to women for participation in nontraditional vocational and CTE programs at the community college level is substantial. In addition, the National Coalition for Women and Girls in Education (NCWGE) states that "lowering the barriers to female enrollment in CTE is a key step in reducing the wage gap between male and female workers" (NCWGE, 2012, p. 27). The AAUW similarly affirms that in order to compete globally, the need for more skilled and educated workers includes women who have access to higher wage occupations, such as those in CTE (AAUW, 2011b). Unfortunately, women continue to lack equal representation in programs that could increase their wages and improve their economic opportunities and well-being of their families (Moughari et al., 2012).

Since human capital theory posits that both individuals and societies receive benefits, both economic and social, from investing in people (Becker, 1993; Sweetland, 1996), particularly in the form of education at community colleges (Laanan et al, 2006), then the economic benefit to women (and society as a whole) through increased wages and economic stability aligns with human capital theory. Increasing female participation in nontraditional community college CTE programs, with a potential of increased wages, would provide a higher rate of return on the investment. Not only would the increased rate of return benefit the female student, but it would also benefit the community college, the community, and society through an increased reputation of helping students improve their lives, improved local economic development, and global competitiveness (Laanan et al., 2006).

Social Cognitive Career Theory

Social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994) is a secondary theoretical framework important for investigating female participation in nontraditional career and technical education programs in North Carolina community colleges. Built on Bandura's (1986) work on Social Cognitive Theory (and specifically his ideas of self-efficacy theory and outcome expectations), SCCT suggests that individuals may pursue occupations more strongly, and be more successful, if they have strong beliefs in their ability to perform well in that occupation (Lent et al., 1994). Furthermore, Bandura's idea of outcome expectations apply to social cognitive career theory in that individuals may pursue occupations more strongly if they believe that positive results will arise (Lent et al., 1994). These positive results may include a successful job placement, happiness, or status. These two concepts of self-efficacy and outcome expectations may initially appear to be identical thoughts; however, self-efficacy is influenced to

a greater extent by an individual's belief in themselves to perform well, whereas outcome expectations are beliefs about the hope for positive (external) results to occur.

A more indirect linkage exists between factors of self-efficacy and outcome expectations and their influence on educational and career interest and exploratory activities. For example, Diegelman & Subich (2001), indicate:

> having high self-efficacy and positive outcome expectations for a particular occupation are posited to result in increased interest and exploratory behavior (e.g., declaring an academic major and attending workshops regarding the occupation); these in turn increase the likelihood of choosing the occupation. (p. 394-395)

However, Swanson and Woitke (1997) found that although some individuals exhibited high levels of self-efficacy and interest in a career field, the perception of substantial barriers or negative experiences may cause the individual to avoid the career path without a complete exploration of the possibilities. As suggested by Diegelman and Subich (2001), assisting career counselors in better helping students identify important aspects of careers that they were previously unaware of is a crucial part of changing an individual's outlook of their actions toward a specific goal.

In addition, the importance of having same-gender role models may also greatly affect the career decision-making process for women considering nontraditional careers (Quimby & DeSantis, 2006). SCCT would place career role models in the category of contextual variables, including various other supports and barriers to career decision-making (Lent et al., 1994). Role models, through both in-person and video or written exposure, provide a direct link to an individual in a specific career field and increase a female's likelihood of choosing a similar career (Quimby & DeSantis, 2006). Therefore, not only does the influence of same-gender role

models increase self-efficacy to be successful in a certain career, but it may also have a more direct effect on actual career choice (2006).

It is not just the role of self-efficacy and outcome expectations that is important for the current study, but the role of supports and barriers that is addressed by SCCT. Quimby and O'Brien (2004) outlined the various types of supports and barriers that may impact the career decision-making process and the function of self-efficacy. Career barriers may include the following: multiple role conflicts (i.e. student, mother, wife, daughter, employee), conflicts between children and career demands, lack of confidence, sex discrimination, discouragement from pursuing a nontraditional training program/career, poor preparation, problems with decision-making, and career unhappiness (2004). Similarly, the types of (social) supports that female students may perceive include guidance, reliable alliances, reassurance of worth, attachment, social integration, and opportunities for nurturance (2004). In consideration of these factors, "nontraditional college women who encounter real and perceived barriers in academic settings may experience less confidence in their ability to succeed as a student and to engage in the career decision-making process (p.325). Figure 4 reflects the impact of supports and barriers on the career decision-making process, as well as the complete model of the SCCT (Lent et al., 1994).

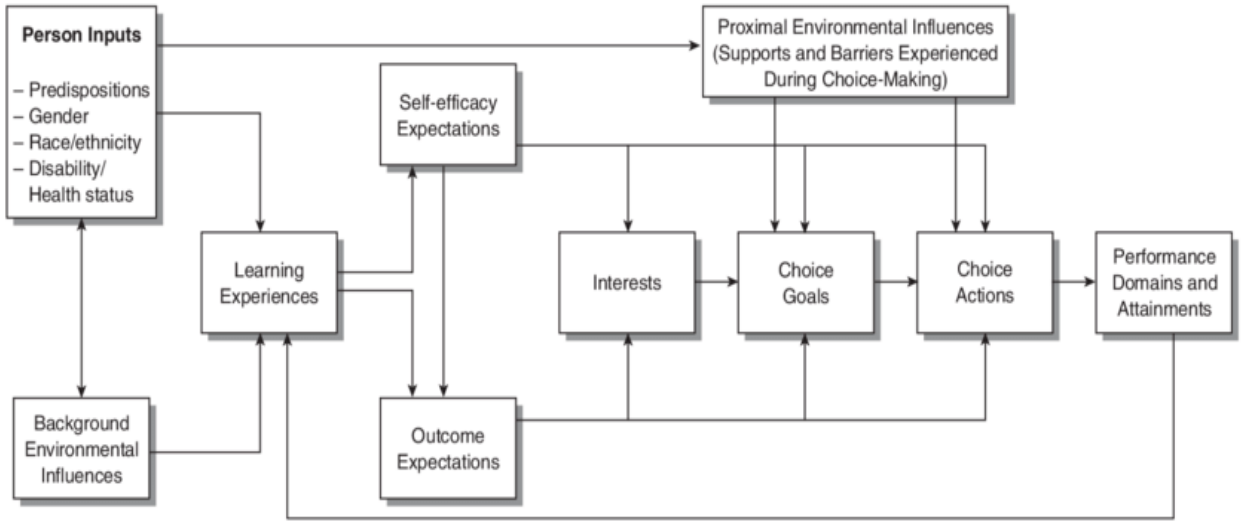

Figure 4. A Simplified View of How Career-related Interests and Choices Develop over Time, According to SCCT SOURCE: Adapted from Lent, R. W., Brown, S. D. and Hackett, G. 1994. " Toward a Unifying Social Cognitive Theory of Career and Academic Interest, Choice, and Performance " [Monograph]. Journal of Vocational Behavior 45:79-122.

If educators can address potential supports and barriers that may be keeping females from pursuing community college education in nontraditional CTE programs, then policies and programs can be utilized to increase female participation in these programs. Programs would ideally aim at increasing self-efficacy of females considering nontraditional CTE programs as well as improving outcome expectations that a career in a nontraditional field would bring.

History of CTE in Community Colleges

In order to understand the issues surrounding female participation in nontraditional CTE programs, it is first imperative to understand development and role of career and technical education within the community college system. The initial goal of the Vocational Education Act of 1984, often referred to as the (Carl D.) Perkins Act of 1984 was to supply the skills, both academic and technical, that would be necessary for success in an economy driven by skills. Therefore, the Perkins Act is meant to focus on CTE programs that will help students prepare for

vocational occupations as well as other postsecondary training (Lester, 2010). The most recent version of the Perkins Act, Perkins V passed in 2018, would authorize $1.229 billion for fiscal year 2019 and gradually increase this authorization level to $1.318 billion in fiscal year 2024 (Perkins Collaborative Resource Network, 2019). The funding is utilized in a variety of ways including providing grants to high schools and colleges to improve and develop programs, increase access to CTE programs for special populations, improve curricula, purchase necessary equipment, and provide career and academic counseling services (Lester, 2010).

Community colleges have long provided CTE programs in order to develop the local workforce and remain competitive in the increasingly global labor market. As of 2015, approximately 38% of undergraduate credentials were enrolled in CTE programs, which makes up approximately 75% of the credentials awarded at the sub-baccalaureate, or community college, level (Zhang & Oymak, 2018). Furthermore, approximately 60% of students seeking sub-baccalaureate education in CTE programs do so at public two-year institutions while approximately 20% study at private for-profit institutions (Zhang & Oymak, 2018). Therefore, the community college is the main gateway for education in CTE programs.

As previously stated, one of the purposes of the Perkins Act is to increase access of students who are disadvantaged to receive quality education that will prepare them for the workforce and/or postsecondary education in career and technical education fields. Students who enroll in CTE programs in community colleges are more likely to have demographic characteristics that may include lower socioeconomic status, first generation students, attend part-time, have enrollment delays and interruptions, enroll primarily to develop job skills, be older, receive financial aid, and have significant family responsibilities (Bailey et al., 2004). Although females make up approximately 60% of students in CTE (Zhang & Oymak, 2018),

female enrollment tends to fall into traditional gender norms with women primarily enrolled in fields such as health sciences, child care, office-based jobs, and cosmetology, while males tend to dominate the trades such as welding, auto mechanics, and heavy equipment technology.

History of Females in CTE

Although the vocational education of females increased during the Nineteenth and early Twentieth Centuries, including during World War I and World War II, it was during the Civil War that the education of females increased in importance due their increasing presence in industrial and production occupations (Gordon, 2014). Increasing presence was limited, though, to a limited number of job choices including factory and sewing plant workers, government clerks, domestic servants, teachers, and nurses, and were equally limited in pay (Gordon, 2014). As described by Shaw & Shaw (1987, as cited in Gordon, 2014),

> In the short history of our country, women have been limited in their labor-force participation and in their wage earning potential simply because of their gender. This lack of economic independence has done little to destroy inequitable policies and attitudes in all of society, and, in human capital terms, paints a dismal picture for all women, especially those middle-aged and older. (p. 157-158)

Historically, women have been forced into a few number of occupations, occupations that have lower pay than occupations dominated by males. Even when employed in the same jobs as men, women have historically, and legally, been paid significantly less. This practice began during the Civil War period when the government trained females differently and paid them less for the same jobs, a practice that spread to the private sector (Gordon, 2014).

The passage of a number of legislative acts and amendments heralded in improvements for women in education and the workforce. Beginning with the Smith-Hughes Act of 1917,

training programs in vocational education were purposely different for males and females. The Smith-Hughes Act provided federal funding for men in agriculture and the trades and for women in home economics (Gordon, 2014). Although federal funding for training for females was important, the legislation did little to open doors to a wider variety of career paths for females. No change in this status quo occurred until the passage of the Equal Pay Act of 1963, which "called for the end of discrimination on the basis of sex in payment of wages for equal work" (Gordon, 2014, p. 158). Not until the passage of Title IX of the Education Amendments of 1972 was discrimination in education based on sex officially banned. Title IX stated that "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance" (Gordon, 2014, p. 158). Despite improvements in the legal rights of discrimination against women, Gordon (2014) states that little changed during the 1970s and 1980s for female enrollment in nontraditional CTE programs. Not until the combination of the Educational Amendments of 1976, which provided funding for sex equity programs, and the passage of the Carl D. Perkins Vocational Education Act of 1984, was a greater emphasis put on establishing actual practices to improve gender equity in career and technical education programs.

Career and Technical Education vs. STEM

Research about women in nontraditional programs of study and nontraditional occupations is not new. The majority of research that has been completed on females in nontraditional STEM/CTE programs of study has occurred at the university level (Lester, 2010; Read, 1994), particularly women in STEM baccalaureate programs or higher and women in STEM occupations (Hill, Corbett, & St. Rose, 2010; McIlwee, 1982; Zeldin, 2000). Lester

articulates that the university-level STEM literature is not a perfect reflection of the issues happening at the community college CTE level. They both share many of the same characteristics: “Although these groups may differ in their focus, years of education, and career trajectories, each group – women in STEM and CTE fields – must enter highly masculine classrooms that are often unfriendly and discriminatory toward women” (Lester, 2010, p. 56). As a result, the university-level STEM literature is informative in the lack of specific or in-depth community college CTE literature.

Since much of the literature addresses women studying and working in professional roles such as engineer and scientist that are achieved at the university level, little research is available on women employed in blue-collar occupations (Mazen & Lemkau, 1990). Even when women enrolled in nontraditional community college programs have been investigated, it is often women in STEM programs, not CTE programs (Starobin & Laanan, 2005, 2008; Wang & Wickersham, 2018). As put succinctly by Lester (2010):

> The attention to women in STEM programs in community colleges is crucial to a holistic understanding of how women progress through the educational pipeline however, other groups of women who brave male-dominated disciplines have been largely ignored in the literature (Lester, 2010, p.51).

Similarly, Starobin and Laanan (2005) found that research that focuses on community college women who decide to pursue a STEM degree at the bachelor’s level is scarce, since most research in this area focuses on women pursuing STEM degrees without attending a community college first. Their research, although focused on STEM in the community college and not specifically CTE, support the finding that “the literature on gender and STEM is vast, but comparable studies that focus on CTE are lacking” (Lester, 2010, p. 52).

Hirschy, Bremer, and Castellano (2011) echo the need for additional research about community colleges particularly related to the focus of theorists on four-year institutions when studying student persistence. Further, Hirschy et al. (2011) indicate that not only have theorists focused much attention on students at the university level, but also policy makers traditionally use standards of success like graduation and completion rates that are insignificant indicators of success for community college students. Additionally, studies that have considered the community college experience do not often provide information that is program specific, such as data about CTE programs.

Females in Secondary Education CTE Programs

Additional research has been completed on females in secondary education and their participation in both CTE and STEM (Eardley & Manvell, 2006; Hill et al., 2010; Hyde, 2008), especially with a focus on math and science. Studies in this area are important particularly for preparing girls to enter the pipeline into nontraditional post-secondary education and career fields. However, it does not represent the specific needs of community college students and women enrolling in nontraditional CTE programs.

Much research has been completed on CTE in secondary education, including the many recent reforms and initiatives such as *Tech Prep, School-to-Work,* career academies, career pathways, and career magnets, among others (Castellano, Stringfield, & Stone, 2003; Lynch, 2000). However, more researchers and policymakers are beginning to see value in CTE linkages from secondary to post-secondary and baccalaureate levels, creating smooth transitions for students interested in CTE. Bragg's (2001) description of the new *vocationalism*, a term she uses to describe the evolving role of vocational education to address the skills needed for the current workforce, would be incomplete without the aspect of greater integration of vocational

education into K-16 education and into deeper economic and social facets. This integration includes a simplified structure to vocational education and a focus on career ladders tied to training options (Bragg, 2001). In addition, Bragg (2001) stated:

> integrated academic and vocational curriculum that begins in high school and extends to the two-year college level, such as tech prep, career academies, youth apprenticeships, middle colleges, and other such options, proliferates as a means of creating linked educational and career pathways. (p. 8-9)

Of equal importance is the transition of students from community colleges to four-year institutions and the related development of transfer programs that address these needs and increased occupational placement after completing such applied bachelor's degree programs (2001). As noted by Bragg (2001),

> much of the change in vocational education over the past decade or more has gone unheralded, especially by scholars who minimize the importance of community college education, and the vocational function in particular. (p. 7)

A lack of research regarding both the potential disadvantages of receiving postsecondary CTE training, as well as unsupported findings about the benefits of such training strongly point to the need for "more meaningful results to help distinguish fact from fiction" (Bragg, 2001, p. 13). Bragg (2001) further states that through much of community college history, arguments have been made both for and against vocational education but have rarely had empirical evidence to back the claims. Additional research would reveal the importance of vocational education not only to community colleges but also through the K-16 system and assist in the emergence of new ideas and their application to practice (2001). Despite advancements in recognizing gender inequality the ongoing discussion about schools offering vocational programs offered at the

secondary level or offering access to college level courses ignore gender (Sutton, Bosky, & Muller, 2016).

Barriers and Possible Interventions

A major area of focus in the field of female enrollment in male-dominated programs includes the barriers to female participation (Lester, 2010). Social-psychological barriers include "confidence, perceptions of the usefulness of the science fields, self-efficacy, perceived ability, and resiliency" (Lester, 2010, p. 54). According to Lester (2010), additional barriers include those at the institutional level, such as females being less prepared for STEM prerequisite courses, few female role models, and strong male identification in math and science courses. Male students are often the center of attention in math and science courses, even when females have strong abilities in those subjects. Cultural barriers also effect female participation in STEM courses. Sexist behavior and attitudes by teachers, lower expectations for female students, and the use of primarily male examples all contribute to an atmosphere that is not conducive to success (Lester, 2010).

Lester (2010) highlights additional barriers to female participation that are specific to CTE. Vocational testing and counseling that steer women away from male-dominated programs of study and careers discourage females from pursuing masculine-stereotyped interest areas (Lester, 2010). Stephenson and Burge (1997) found that females "faced resistance and limited financial support from spouses who were not encouraging of their decision to enter career and technical education" (Lester, 2010, p. 55). However, the study also found that women with children were more confident and motivated to complete a CTE program in an effort to provide an economically stable family environment. Once enrolled in a nontraditional CTE program, women continue to experience difficulties including sexism, harassment, and unwelcoming

environments, which make success even more difficult (Lester, 2010). However, "women who do succeed in a male-dominated occupation feel as if they were able to find success in spite of the discrimination, lower expectations, and unfriendly climate" (Lester, 2010, p. 56). As a result, the significant barriers that women face in nontraditional CTE programs are challenging, but the women who achieve their goals are rewarded despite the difficulties.

The barriers to female participation in male-dominated programs can be combated. University-level STEM literature reveals that through the use of social support systems, such as parents, female role models, female faculty members, counselors and advisors, females are much more likely to persist in STEM fields (Lester, 2010; Rayman & Brett, 1995). Read's (1994) research into the role of motivation and career planning assistance in females choosing to pursue a nontraditional program in community colleges revealed similar evidence. Results indicated that "technical college women enrolled in nontraditional training programs rated themselves higher on four components of occupational motivation than their counterparts in traditional and gender balanced training programs" (Read, 1994, p. 254). The four constructs of motivation in the study included career self-efficacy, perceived structure of opportunity, perceived social support, and valence (attractiveness of the career option). The author concluded that the benefit of career counseling services specifically aimed at the needs of women is crucial to the recruitment, retention, and success of females in nontraditional community college programs (Read, 1994).

In a study that combines both CTE and STEM research, Starobin and Laanan (2005) investigate factors related to community college STEM students' self-concept as it relates to achievement in science and math areas. The authors indicate that although much research exists about gender differences at the secondary and university-levels,

> It is important, however, to address the gender differences of students in science, mathematics, and engineering and the extent to which characteristics of students at community colleges are different from the characteristics of students at secondary or 4-year institutions. (Starobin & Laanan, 2005, p. 212)

Although the sample focused on STEM students with a goal of transferring to a university, the variables studied, including background characteristics, high school academic performance, attitude toward science, and self-concept, may have some generalizability to CTE students as well (Starobin & Laanan, 2005). Results indicated that high school academic performance was a "positive contributing factor of predicting students' self-concept" (p. 224), including in the female participants. In addition, female self-concept was influenced by attitudes toward science; an issue the authors suggested could be remedied through support services and interventions.

In a follow-up study, Starobin and Laanan (2008) completed qualitative interviews with females taking STEM courses at community colleges. Each female was taking engineering coursework with the goal of transferring to a four-year institution (Starobin & Laanan, 2008). Findings are similar to those found in other STEM and CTE literature, including the need for additional support, particularly from counselors, advisors, faculty members, and other students; clear information about how to reach their goal; and a need to receive positive messages from faculty members or advisors early on in the process (Starobin & Laanan, 2008). The authors found that if the female students believed in themselves and their ability to complete their coursework successfully, they experienced increased self-confidence and self-esteem in later courses. In addition, many female students indicated they "wished someone had told them earlier that they could study engineering" (Starobin & Laanan, 2008, p. 45). These findings

reveal important implications for improving the recruitment and retention of females in nontraditional programs.

In an AAUW publication, the authors summarize the literature explaining why so few women are in the STEM fields. Researchers found three main themes, including the ideas that men are better than women in math, that females are just not interested in STEM areas, and that workplace issues such as time for family and bias deter women from pursuing male-dominated fields (Hill, Corbett, & St. Rose, 2010). Although the publication is lengthy at over 100 pages and includes chapters about intelligence, stereotypes, the college experience, university faculty, and others, no mention is made of community college students. Some of the recommendations at the university-level though could be beneficial to community college CTE students. They include contacting high schools to recruit females, sending an inclusive message about who makes a good [CTE] student, paying attention to peer culture, offering introductory courses that do not assume previous experience in the subject matter, sponsoring departmental social activities, providing a student lounge, and sponsoring a female-only group for women in a certain program of study. Additional recommendations at the institutional and faculty level include assessing the climate for female faculty in nontraditional programs, creating an atmosphere that supports retention of faculty, providing mentoring for faculty, and implementing policies for work-life balance (Hill et al., 2010). Therefore, as previously mentioned by Lester (2010), although university-level STEM literature is not identical to community college CTE research, much of the information can be useful and informative.

Programs to Increase Female Participation

In response to the low representation of females in many male-dominated CTE programs, community colleges, women trade organizations, and other similar organizations have created innovative ways to increase female participation in nontraditional CTE programs.

The program Chicago Women in Trades (CWIT) has been working for over 25 years to increase the number of females in male-dominated fields. Although initially began to provide support for women working in the trades, CWIT has a mission "to increase the number of women in the skilled trades and other blue collar occupations and to eliminate the barriers that prohibit women from entering and remaining in non-traditional careers" (CWIT, n.d., Mission section). The Chicago-based program is involved in research and policy-making, publishing information, and partnerships with other training and employment entities. Most notably, though, it provides women training to assist them in gaining entry into trade apprenticeship programs, boasting a 70% rate of acceptance into apprenticeships in trades such as carpentry, bricklaying, and machining (CWIT, n.d. Technical Opportunities Program section).

A two million dollar NSF grant to fund a project for the National Institute for Women in Trades, Technology, and Sciences (IWITTS) has demonstrated success by increasing the participation of women in nontraditional community college programs (NCWGE, 2012). Eight community colleges in California participated in the WomenTech Extension Services project, including programs such as computer networking, welding, and automotive technology. College cohorts began in 2007 and 2008 and results indicate that "female enrollment has increased annually in six of the eight colleges" and "at one college, women's retention rose from 81% to 100% in 15 months" (NCWGE, 2012, p. 34). Techniques used by the eight colleges to narrow the gender gap in nontraditional programs included changes in recruiting and counseling

techniques, instructor education and awareness, providing female speakers to discuss careers, implementing surveys to communicate about resources, and providing program-specific tutoring among others (IWITTS, 2014, CalWomenTech Project Community Colleges section).

Cisco Women in Action Network (WAN) is a business-based program that pursues increased participation by females in the area of technology. One of the goals for the Cisco WAN program is to assist in the professional development of female leaders within the organization, but it also seeks to "increase the number of women in the fields of science and technology" (Cisco, 2007, Women's Talent @ Cisco section) worldwide. The company has established partnerships to develop a website for female technology exploration, to develop gender initiatives in the Middle East, and to increase the number of females who complete CISCO certifications (Cisco, 2007). Mentoring, career development, and international awareness are also part of the Cisco WAN initiatives (Cisco, 2007).

The Regional Center for Next Generation Manufacturing (RCNGM) in Connecticut Community Colleges College of Technology in Hartford, Connecticut, was created to fill the gap in the state's need for high-skill technical workers in the manufacturing sector (Costello, 2012). Although the program is not focused solely on female participation, it has created multiple initiatives to address the needs of female students. The scheduling of classes in "chunks" that satisfy certificate or degree requirements enable female students to quickly complete requirements or attend part-time while balancing work and family responsibilities (Costello, 2012). Marketing strategies target underrepresented students and marketing materials also feature females. Many of the female participants in this program are part of the Life Support and Sustainable Living (LSSL) initiative, which matches community college students with students from four-year institutions to work on collaborative, team-based projects. The LSSL initiative

encourages peer mentoring between the matched pair of students and counseling on topics such as time management. RCNGM also invites female professionals in nontraditional careers to a lunch and learn series, encourages female students to network by creating a special Facebook page, and provides childcare for students (Costello, 2012).

Factors that Impact Female Participation

The National Alliance for Partnerships in Equity published an extensive document investigating the root causes and improvement strategies related to nontraditional career preparation (National Alliance for Partnerships in Equity, 2009). Results provided groupings of root causes for lack of equity, broken down into the following five categories: education, career information, family, internal/individual, and societal issues. The following list provides the five main categories and the related subcategories (NAPE, 2009):

Education

- Academic Proficiency
- Access to and Participation in Math, Science, and Technology
- Curriculum
- Instructional Strategies
- Classroom and School Climate
- Support Services

Career Information

- Materials and Practices; Assessment, Interest Inventories, and Marketing and Recruitment
- Early Intervention
- Characteristics of an Occupation: Job Satisfaction/Career-Family Balance/Occupational Perception/Wage Potential

Family

- Family Characteristics

Internal/Individual

- Self-Efficacy
- Attribution
- Stereotype Threat

Societal Issues

- Media (negative)
- Media (positive)
- Peers
- Role Models/Mentoring
- Collaboration

Figure 5. Nontraditional Career Preparation: Root Causes & Strategies (National Alliance for Partnerships in Equity, 2009)

Each of the five categories represents areas in which certain groups of individuals have the most influence or impact. For example, educators and administrators can affect the first category, Education, most, and the second category, Career Information, can be impacted most by career guidance professions. While the categories are listed separately, they often overlap and have linkages that may blur the ability to make strict distinctions between them. The groupings listed,

many of which were also discussed in the above literature review, will form the categories used in the methodology for the current research project, to be discussed in greater detail in Chapter 3.

Summary

To summarize this section, the consensus appears to be that community colleges need additional research. Because of little research on community colleges, the amount of information available on female enrollment in nontraditional CTE programs is minimal. When females are studied with regard to nontraditional programs of study and occupations, it typically centers on university-level education, professional occupations, or K-12 programs. Fortunately, researchers and practitioners are beginning to see the important role that community colleges play in the CTE link between secondary education and baccalaureate degrees and are making efforts to bridge the gap between institutions. Research indicates that women interested in pursuing education in a nontraditional CTE or STEM area often face tremendous barriers. These barriers are typically social-psychological, institutional, or cultural in nature and may include issues such as confidence, self-efficacy, resiliency, availability of prerequisites for women, lack of female role models, heavy classroom focus on the male experience, sexism, harassment, misguided vocational testing and counseling, and lack of family support (Lester, 2010; Rayman & Brett, 1995; Stephenson & Burge, 1997). Nonetheless, research has indicated that barriers can be overcome, particularly with the use of social support systems, female role models and faculty, advisors, other students, financial support, counseling created for women in nontraditional programs, and other similar supports (Hill, 2010; Read, 1994; Starobin & Laanan, 2008). Many barriers and causes inhibit the full and equal participation of females in nontraditional CTE programs. With additional research and the related practical applications, the door can remain open for women in the community college system wanting an equal footing in the global

economy. Despite the implications that can be learned from research on STEM students at the university-level, specific research that samples community college CTE students is necessary so that solutions specific to females in the community college environment can be uncovered and implemented.

CHAPTER 3

METHODS

This study utilized Q methodology to answer the questions what are the viewpoints of females that are current students in male dominated career and technical education programs regarding their participation in nontraditional CTE program at a community college. The chapter begins with a discussion of Q Methodology, including the background of the research methodology, and provides justification for using the methodology to answer the research questions. Then, the methods chapter provides details of the research design, development of the questions (q-set and concourse), participant selection (p-set), instrumentation development (directions, sorting materials, and post sort survey), data collection (q-sorting and post-sorting survey), and data analysis will be discussed.

Q Methodology Background

Q methodology is a research methodology that uses both quantitative and qualitative techniques to investigate the subjectivity in any given situation (Brown, 1996). Although often thought to be more quantitative in nature due to its relationship with factor analysis, William Stephenson, the creator of Q methodology, was interested in "life as lived from the standpoint of the person living it" (Brown, 1996, p. 561). Because this personal, subjective aspect of quantitative research is often difficult to measure, the qualitative aspects of this technique are crucial. As stated by Shemmings (2006),

> At its simplest level, QM [Q Methodology] is a research tool capable of augmenting existing qualitative analytic techniques aimed at identifying patterns and themes in interview transcripts, field notes or naturalistic observation. Although QM deploys factor analysis, the mathematics of which is complex, it is a remarkably 'user-friendly' method

> and requires no knowledge of mathematics to interpret the data obtained. (Shemmings, 2006, p. 2)

Therefore, Q methodology provides a more positivist approach to a qualitative process of investigating the subjectivity of human experiences (Thomas & Watson, 2002).

The quantitative aspect of Q methodology is primarily completed when participants are asked to rank a set of statements written on cards based on their own subjective experiences. The statements provided on the cards, either actual physical cards given in person or virtual cards, are referred to as the "concourse" and should be representative of the topic being studied (Kampen & Tamas, 2014). The qualitative aspect of Q methodology occurs during the post-sort questionnaire in which participants are asked to explain why they sorted the cards into the highest and lowest areas. As a result, the individual perspectives of the participants can be compared and contrasted, both quantitatively and qualitatively, to provide a thorough picture of their subjective perceptions of the given topic (Bartlett & DeWeese, 2015).

Research Design

This study used Q-Methodology to collect viewpoints of female community college students in male-dominated careers about their participation in nontraditional CTE programs in North Carolina community colleges. The study is guided by the following research questions:

Research Question 1:

What are the items that were similar across all viewpoints?

Research Question 2:

a. *What are females' viewpoints of participating in a male-dominated CTE programs in North Carolina community colleges?*
b. *Why?*

Q Methodology Steps

The following steps utilized in performing Q methodology outline the guidelines for the instrumentation, sample, administration, analysis and interpretation (Van Exel & De Graaf, 2005) (Figure 6).

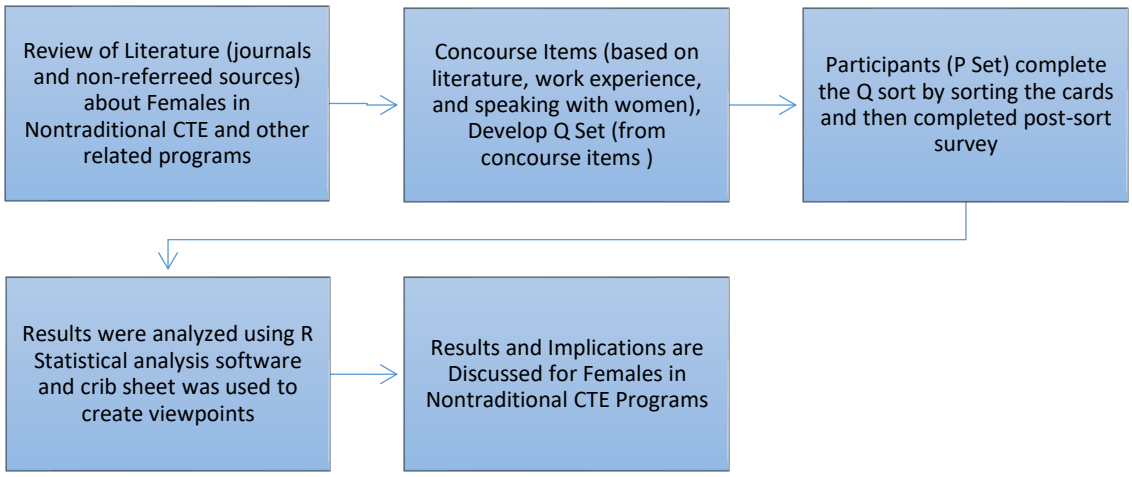

Figure 6. Research design for Q study measuring perceptions of female students in nontraditional community college CTE programs

Step 1: Define the concourse. The first step in performing Q methodology involves developing the concourse. As described by Van Exel and De Graaf (2005), the concourse includes a list of statements created by the researcher about the research topic. Statements may be derived from a variety of sources including participant observation, media, newspapers, magazines, and books and may include opinions from professionals and non-professionals. The statements should "adequately represent the spectrum of opinions on a given topic" (Thomas & Watson, 2002, p. 142). In the current study, the researcher collected statements about (female) participation in nontraditional CTE programs through an exhaustive literature review. Once these statements were collected, they were categorized into broader thematic groups, based primarily on the NAPE framework to include the following: education, career information,

family, internal/individual, and societal issues. The result provided 55 initial statements about female participation in nontraditional CTE programs in community colleges (Appendix A).

Step 2: Develop the Q-Set. The second step involves developing the Q-set, or Q-sample, which is the process of narrowing down the concourse into the list of final statements that will be given to respondents. Van Exel and De Graaf (2005) recommend 40 to 50 statements though not necessarily a requirement. The number of statements produced in the beginning may be 2-3 times more than the final number of statements used for the actual Q-sort with "the aim being to achieve optimum balance, clarity, appropriateness, simplicity and applicability" (Cross, 2005). For the current study, once all statements were grouped by topic, editing of the statements was able to be completed. As described by DeWeese (2012), "any statement that was ambiguous or lacked scholarly support was removed from the sort [and] statements that were similar or redundant were merged together" (p. 56-57). Statements that are unclear or redundant may be reworded or completely discarded during the editing process (Shemmings, 2006). For the current study, a group of individuals familiar with community college CTE programs viewed the initial concourse. These individuals assisted in determining any statements that needed to be edited or removed from the Q-Set. As a result, 50 appropriate and relevant statements remained (Appendix B).

Step 3: Select the P-Set. The P-Set is comprised of the respondents to the Q-Set (Van Exel & De Graaf, 2005), also known as the participants. The P-Set is described as a "structured sample of respondents who are theoretically relevant to the problem under consideration" (Van Exel & De Graaf, 2005). In other words, the individuals are familiar with the topic, have a clear opinion about it, and are therefore not random. In addition the P-Set is not usually comprised of a large group of people with the goal "to have four or five persons defining each anticipated

viewpoint, which are often two to four, and rarely more than six" (Van Exel & De Graaf, 2005, p. 6). For the current research study, the P-Set was comprised of female students who, at the time of the data collection, were studying in male-dominated CTE programs in community colleges. Due to the small number of females in male-dominated CTE programs, a limited number of participants was available. Brown (1980) states that a large sample size is not required because "instead of a large number of people receiving a small number of test items, now a small number of people are receiving a large number of tests" (DeWeese, 2012, p. 47-48). This technique is quite different than traditional quantitative methodologies in that persons, instead of tests, are being correlated (Brown, 1980; DeWeese, 2012). All students were enrolled within the North Carolina Community College System. While the insight of college instructors and administrators, as well as female-dominated CTE students would also provide rich information, it is outside of the scope of the current study.

Step 4: Q-Sorting. The actual Q-sorting procedure is the next step in the process, which is "simply a convenient means of facilitating the (evaluations and) rankings of the participants" (Watts & Stenner, 2005, p. 77). The process involves the rank-ordering of statements that typically range from 'very like me' to 'very unlike me' or 'strongly agree' to 'strongly disagree' or some other similar continuum (Van Exel & De Graaf, 2005, Appendix D). Figure 7 depicts the general appearance of the rated concourse items for the current study.

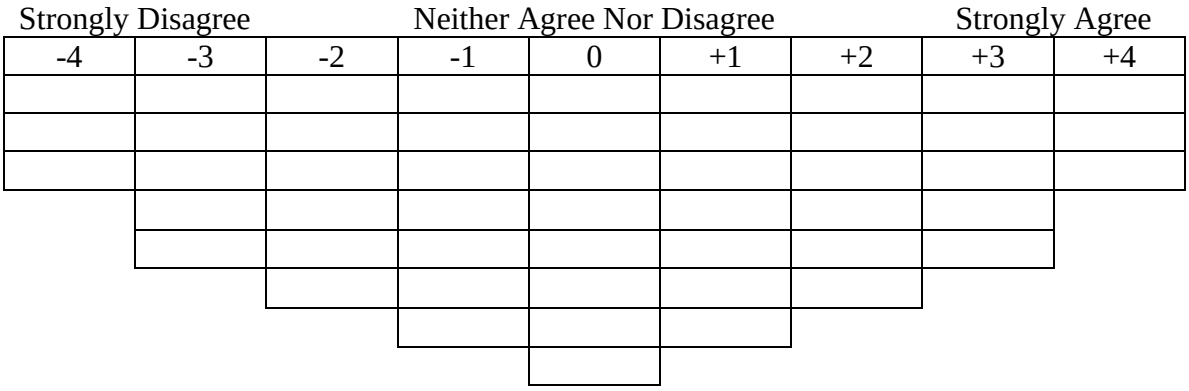

Figure 7. Q sort grid for current study.

Although online Q-sorting techniques exist, the current study utilized more traditional Q-sorting techniques in which participants were given small, randomly numbered business-sized cards. Each card had one of the final statements printed on it and the randomly selected numbers enabled the researcher to match the number from the participants Q-sort to the actual statement later. Initially, participants were provided with detailed instructions for completing the Q-sort (see Appendix C). "When administering the Q-sort, participants are often given a sheet with specific sorting instructions called a *condition of instruction* and an answer sheet to record the rank ordering" (Brown, 1993). For the current research study, participants were provided with a "Q-Sort Guideline" that explained the process of sorting the statements pertaining to their participation in nontraditional CTE programs in community colleges. The bulk of the instructions included dividing the statements into three separate piles: statements she generally agreed with, statements she generally disagreed with and statements about which she was unsure or neutral (Shemmings, 2006; Van Exel & De Graaf, 2005). Once this initial step was completed, the respondents were then asked to further sort the statements in each pile, such as 'most true for me' or 'least true for me' from the first category to 'most untrue for me' or 'least

untrue for me' from the second pile (Shemmings, 2006; Van Exel & De Graaf, 2005). As a result,

> The respondents compare each Q-sample to each of the others and arrive at a true comparative judgment on where to place each item based on self-reference rather than external factors. This self-referent response may then be termed accurate from the respondent's perspective regardless of whether the 'universal pool' of Q-samples was represented. The sorter will have made the best choices possible within the options available. (Thomas & Watson, 2002, p.142-143)

Responses typically follow a quasi-normal distribution with kurtosis often changing depending on the controversial nature of the topic being researched (Thomas & Watson, 2002; Van Exel & De Graaf, 2005). The participants completed the post-sort questionnaire.

Step 5: Analysis and interpretation. The final step in the Q-sort involved analyzing and interpreting the data obtained from the respondents. First, the correlation matrix of all Q-sorts was computed (Van Exel & DeGraaf, 2005). "Basically, Q-method factor analysis begins with an n x n correlation matrix of the Q-sorts, where n is the number of people who sorted the items" (Thomas & Watson, 2002, p. 143). This reflects the degree of similarity or dissimilarity in viewpoints between the individual Q-sort responders (Van Exel & DeGraaf, 2005). Next, factor analysis was conducted on the correlation matrix to identify shared variance and individual factors that account for the shared variance (Thomas & Watson, 2002; Van Exel & De Graaf, 2005). Thomas and Watson (2002) stated:

> With the Q-sorts as variables, the factors produced represent groupings of people with similar patterns of response during the sorting (e.g., attitudes, opinions, viewpoints), and

> the loading of a particular respondent on a given factors indicates the level of agreement or disagreement (p. 143)

The next step of analysis involved factor rotation with the aim of maintaining the most amount of variance through rotating the original set of factors and determining a final set of factors (DeWeese, 2012; Van Exel & DeGraaf, 2005). "Each resulting final factor represents a group of individual points of view that are highly correlated with each other and uncorrelated with others" (Van Exel & DeGraaf, 2005, p. 9). Rotation allowed the researcher to view the factors from various perspectives and to determine factor scores and differential scores, otherwise known as Z-scores (DeWeese, 2012). This is the final step in the process before interpretation. As described by DeWeese (2012), "a Z-score can be added back to the distribution resulting in a composite Q-sort for each factor" (p. 54). The composite Q-sort, along with difference scores between two factors on a statement, provides the researcher information about the statements that are important in describing a certain factor (Van Exel & DeGraaf, 2005). As equally critical in the interpretation phase is the use of the qualitative remarks from participants on factors that show significance (Van Exel & DeGraaf, 2005; Watts & Stenner, 2005).

Participants in the Study

As previously discussed, participants in the current study included females enrolled in nontraditional CTE programs in North Carolina Community Colleges. After the q-set was created, it is important to make sure the participants sorting the items are appropriate based on the research questions. The purpose of the current study is to understand and describe a subjective experience, therefore, non-probability purposeful sampling was utilized. Sampling can be categorized into two main groups, including probability sampling and non-probability

sampling (Merriam, 2009). Probability sampling has a goal of generalizing results to a larger population, so it is important that the sample accurately represent the population. In non-probability sampling, though, the goal is to find participants who meet certain criteria set by the researcher and who will provide meaningful information. Therefore, non-probability sampling was most appropriate for the current study.

One type of non-probability sampling is purposive (also referred to as purposeful) sampling (Merriam, 2009). Vogt (1999) describes a purposive sample as "a sample composed of subjects selected deliberately (on purpose) by researchers, usually because they think certain characteristics are typical or representative of the population" (p. 227). The current researcher therefore chose a few participants based on their knowledge of the topic and their ability to have a subjective view when presented with the statements.

Data Collection

Once the North Carolina State University's Institutional Review Board (IRB) approved the study, data collection was able to begin. To collect data for the Q-sorts, participants were recruited from North Carolina community colleges, with a strict focus on CTE programs that were nontraditional for females. Once participants were identified and elected to participate, they were provided with the instructions for completing the Q-sort as well as the Q-sort statements and open-ended questions. The open-ended questions helped provide additional information about the card sort as well as obtain basic demographic information (Appendix E), including age, gender, program of study, years of education, marital status, number of children, and employment status.

Data Analysis

Once the rankings were completed by the entire P-set, data analysis is the next step. R Statistical Analysis Software was utilized to complete the data analysis portion of this study. R software allowed data to be entered for completion of factor analysis and to identify related groups, as well as to further investigate the rankings and more simply analyze the data compared to the use of other available statistical software programs.

Factor Analysis. The first step of conducting factor analysis was to explore a number of solutions starting with a four-factor solution. According to Watts and Stener (2005) it is suggested to start with this and then explore other solutions. After the four factor solution, the researcher examined the Eigen values, the number of individuals that loaded on each factor, the percent of variance explained, and the reliability measure. The four factor solutions had only 1 person loading on the fourth factor. The three-factor solution was examined next. With this solution, there were nine individuals that loaded, the Eigen value was 2.1 and percent of variance was 73%. These intercorrelations were then explored for the three-factor solution and the factor loadings, statement factor scores, discriminating statements for each of the factors as well as consensus statements across factors were calculated. A crib sheet was the created to examine the themes in the factors.

Consensus Items. Statements that do not distinguish between any set of factors are called consensus items (Watts & Stenner, 2012). These items help identify viewpoints that are similar across all factor groups. In other words, consensus items are beliefs or perspectives that are shared between all of the participants. As a result, consensus items are important when considering the overall conclusions and directions for future research.

Distinguishing Statements. Concourse items that emerged as distinguishing for each factor are called distinguishing statements and are important for analysis and discussion (Watts & Stenner, 2012). Not only should a researcher be interested in the highest and lowest rated concourse items, but it is also important to consider the statements that broader picture of what distinguishes each factor from the others.

Summary

The purpose of this chapter was to introduce Q Methodology, or Q-Sorting, and the steps involved to utilize this research methodology in a research protocol. The current study investigated adult female students in nontraditional career and technical education programs in North Carolina community colleges. Purposeful sampling was utilized and participants used a traditional hands-on Q-sorting technique to rank Q-sort statements and complete open-ended and demographic questions.

CHAPTER 4

DATA ANALYSIS

Introduction

This chapter presents the results from the data analysis of the Q-sort to answer the research questions proposed. Eleven female community college students, who at the time of the data collection were actively enrolled in a nontraditional career and technical education program, completed the Q-sort. Participants sorted a concourse of 50 statements based on a variety of topics related to female participation in nontraditional CTE programs. The purpose of the study was to understand why women participate in male-dominated career and technical education programs in North Carolina community colleges. Q-Sort Methodology allowed for investigation of the social perceptions of females in male-dominated CTE programs to clearly understand their viewpoints. The goal of the current Q study was to address the following research questions:

Research Question 1:

What are the items that were similar across all viewpoints?

Research Question 2:

a. What are females' viewpoints of participating in a male-dominated CTE program in North Carolina community colleges?
b. Why?

Once approval was gained through the North Carolina State University Institutional Review Board as well as each community college involved in the Q study, participants were invited to participate via email. The actual Q-sorting took place in person, allowing participants to divide the statement cards into the actual piles instead of completing it online.

This chapter presents a summary of the data collection and analysis process, the demographics of the sampled population, correlations between sorts, descriptions of the factor analysis, factor rotation, factor loadings and factor arrays, defining statements, consensus statements, and distinguishing statements.

Data Collection and Analysis

The current study collected data from 11 participants who were asked to rank 60 concourse items. All of the concourse items were statements about female perceptions regarding their participation in a nontraditional CTE program in a North Carolina community college. Once participants completed the sorting process, the Q sorts were compared and analyzed using factor analysis. Factor analysis revealed several groups, or factors, that collectively characterize the perspectives of the individuals within that group. The groups, or factors, that were formed were then further analyzed to look at similarities and differences within and between the groups. In addition, participants completed post-sort questionnaires that asked about basic demographics as well as reasons for their sorting choices. This data was also analyzed for significance.

P Set Demographics

The purpose of this Q study was to investigate the factors that influence female participation in male-dominated CTE programs in North Carolina community colleges. Eleven participants who completed the Q sort in addition to supplemental questions about the sort and demographic information. Due to the nature of the research purpose, all of the participants were female. In addition, all of the participants were currently enrolled in a North Carolina community college male-dominated CTE program (Table 1). Several of the programs only had one participant, including Diesel Technology (9.1%), Construction Equipment Systems Technology (9.1%), and Machining Technology (9.1). All of the other programs had 2

participants each, including Industrial Systems Technology (18.2%), Welding Technology (18.2%), Automotive Systems Technology (18.2%), and Air Conditioning, Heating, and Refrigeration Technology (18.2%).

Table 1

Number and Percent of Participants by Program of Study and Factor

Program of Study	Number	Percentage	Factor
Diesel Technology	1	9.1%	1
Construction Equipment Systems Technology	1	9.1%	3
Industrial Systems Technology	2	18.2%	1, 3
Welding Technology	2	18.2%	2, n/a
Automotive Systems Technology	2	18.2%	1,2
Air Conditioning, Heating, and Refrigeration Technology	2	18.2%	1,2
Machining Technology	1	9.1%	n/a

The age of the participants varied from 19 years old to 35 years old, with the average age being 26.45 (sd=4.98). The participants' marital status included 6 (54.5%) single, 3 (27.3%) divorced, 1 (9.1%) separated, and 1 (9.1%) married (Table 2).

Table 2

Marital Status of Participants

Group	Number	Percentage	Factor
Single	6	54.5%	1, 1, 1, 2, 2, 3
Divorced	3	27.3%	2, 3, n/a
Separated	1	9.1%	n/a
Married	1	9.1%	1

The participants also reported number of children as well as employment status. The number of children ranged from 0 (*n*=4, 45.5%) children to 3 children (*n*=1, 9.1%) (Table 3). It is important to note that two participants had children that were not biologically their own but for whom they

had obtained custody. Regarding employment status, the majority of participants were employed part-time (54.5%), while four were unemployed (36.4%), and only one (9.1%) was employed on a full-time basis (Table 4).

Table 3

Number and Percent of Children of Participants

Number of Children	Number of Participants	Percentage	Factor
0	5	45.5%	1,1, 2, 2, 3
1	2	18.2%	3
2	3	27.3%	1, 1, 2, n/a
3	1	9.1%	n/a

Table 4

Employment Status of Participants

Employment Status	Number	Percentage	Factor
Unemployed	4	36.4%	1, 1, 1, 3
Employed Part-time	6	54.5%	1, 2, 2, 2, 3, n/a
Employed Full-time	1	9.1%	n/a

The demographic information gathered provides an overview of the population that participated in the Q sort, which is helpful for analyzing the differences and similarities within the group.

Correlations between Sorts

The first step in Q sort analysis is the completion of a correlation matrix. The correlation statistic represents "the degree of agreement between two sets of scores [which have been gathered] from the same individuals" (Watts & Stenner, 2012, p.8). A high level of agreement between two sets of scores would be represented by +1.00, while a high level of disagreement between two sets of scores would be represented by -1.00 (Bartlett & DeWeese, 2015). The full

correlation matrix for this study is located in Table 5 and represents the level of agreement between sorts.

Table 5

Correlation Matrix of all Sorts

Sort	1	2	3	4	5	6	7	8	9	10	11
1	--	.35	.68	.56	.66	.32	.50	.22	.48	.64	.62
2		--	.36	.64	.48	.43	.54	.25	.56	.45	.39
3			--	.51	.57	.31	.52	.14	.47	.56	.50
4				--	.54	.60	.58	.42	.52	.58	.65
5					--	.48	.51	.32	.19	.51	.65
6						--	.61	.37	.31	.43	.58
7							--	.53	.52	.45	.60
8								--	.37	.19	.42
9									--	.46	.32
10										--	.50
11											--

Note: Correlation is significant at the.01 level

The correlation data reveals that the highest correlation value was .68, which occurred between Participant 1, a 28-year-old single Diesel Technology student who had two children and worked part-time, and Participant 3, a 24-year-old single Industrial Systems Technology student who had no children and was unemployed. The participants both loaded onto Factor 1, which is labeled Confident Contributing Contenders. These individuals feel that they are confident in their abilities, want to contribute to society through their work, and already have skills necessary to be successful in CTE. The next highest correlation value of .66 was found between Participants 1 and 5. As previously mentioned, Participant 1 was a 28-year-old single Diesel Technology student who had two children and worked part-time. Participant 5 was a 27-year-old married Automotive Technology Systems student who had 1 child and was unemployed. The participants also both loaded onto Factor 1, which as described above was labeled Confident Contributing Contenders.

The lowest correlation value (.14) was found between Participant 3 and Participant 8. Participant 3, again, was a 24-year-old single Industrial Systems Technology student who had no children and was unemployed. Participant 8 was a 30-year-old divorced Welding Technology student with 2 children who worked part-time. As stated above, Participant 3 loaded onto Factor 1 ("Confident Contributing Contenders") while Participant 8 loaded into Factor 2 ("Gender Influence"). The next lowest correlation (.19) was between Participant 8 and Participant 10. Again, participant 8 was a 30-year-old divorced Welding Technology student with two children who worked part-time. Participant 10 was a 19-year-old single Heating, Ventilation, and Air Conditioning Technology student with no children who was unemployed. As stated above, Participant 8 loaded into Factor 2, labeled Gender Influence, while Participant 10 loaded into Factor 1, labeled Confident Contributing Contenders. Participant 4 and Participant 11 did not significant load into a factor.

In addition to looking at the full correlation matrix above, the factor correlation matrix can also be useful to observe the agreement between factors. As values approach +1.00, the factors have a high level of agreement and as values approach -1.00, the factors have a lower level of agreement (Bartlett & DeWeese, 2015). Table 6 shows the correlation factor matrix for the three-factor solution. Factors 1 and 3 had the highest level of agreement (.52), while Factors 1 and 2 had the lowest level of agreement (.49).

Table 6

Correlation between factor z-scores

	Factor 1	Factor 2	Factor 3
Factor 1	1	0.49	0.52
Factor 2	0.49	1	0.51
Factor 3	0.52	0.51	1

Factor Analysis and Rotation

Factor analysis is utilized to extract correlations between persons as opposed to correlations between tests or variables in Q methodology (Watts & Stenner, 2012). The purpose of factor analysis is to determine the appropriate number of factors that appropriately represent the various groups in the study. The data collected for this study were analyzed with R Statistical Analysis Software. The eigenvalue (EV), calculated by summing the squared loadings of all the Q sorts on a factor, helps to discern the appropriate number of factors (Watts & Stenner, 2012). Nonetheless, the determination of how many factors to use is not always an exact process, as the researcher must make the final decision about which factor solution is the best fit.

Initially, the analysis began with a 4-factor solution, with an EV of 1.5. However, only one participant loaded onto the fourth factor. The analysis was completed again, resulting in a 3-factor solution with an EV of 2.1. As a result, the 3-factor solution was deemed the most appropriate fit and accounted for 73% of the variance. Varimax rotation was utilized in order to maximize the variance of all the factors.

Table 7

Factor characteristics

Factor	Participants Loaded	Eigenvalues	Variance	Reliability	SE of Factor Scores
1	4	2.9	35	0.92	0.28
2	3	2.4	22	0.89	0.33
3	2	1.9	18	0.89	0.33
4	1	1.5	14	0.80	0.45
Total Variance			89		

Table 8

Factor characteristics

Factor	Participants Loaded	Eigenvalues	Variance	Reliability	SE of Factor Scores
1	4	3.3	30	0.94	0.24
2	3	2.6	24	0.92	0.28
3	2	2.1	19	0.89	0.33
Total Variance			73		

Factor Loadings

As explained by McKeown & Thomas (2013), factor loadings "indicate the extent to which each Q sort is similar or dissimilar to the composite factor array for that type" (p. 53). Table 9 indicates which factors were "flagged" and therefore significant to show variability between the factors for each Q sort. Table 10 shows the actual factor loadings.

Table 9

Flagged Factor Loadings of Subject Responses

	Factor 1	Factor 2	Factor 3
P1	TRUE	FALSE	FALSE
P2	FALSE	FALSE	TRUE
P3	TRUE	FALSE	FALSE
P4	FALSE	FALSE	FALSE
P5	TRUE	FALSE	FALSE
P6	FALSE	TRUE	FALSE
P7	FALSE	TRUE	FALSE
P8	FALSE	TRUE	FALSE
P9	FALSE	FALSE	TRUE
P10	TRUE	FALSE	FALSE
P11	FALSE	FALSE	FALSE

Note: Participant 4 and Participant 11 loaded significant across more than one factor and are not included in further analysis.

Table 10

Factor Loadings of Subject Responses

	Factor 1	Factor 2	Factor 3
P1	**0.8358**	0.1447	0.2571
P2	0.2647	0.3336	**0.6737**
P3	**0.7829**	0.0553	0.3331
P4	0.4804	0.5180	0.4648
P5	**0.7516**	0.4474	-0.0187
P6	0.3318	**0.7272**	0.1450
P7	0.3495	**0.6504**	0.4213
P8	-0.0725	**0.7929**	0.2316
P9	0.1935	0.1584	**0.8927**
P10	**0.6931**	0.1378	0.3968
P11	0.6187	0.6202	0.0505

Note: Participant 4 and Participant 11 loaded significant across more than one factor and is not included in further analysis.

The thorough analysis of the factor loadings, the three factors that emerged include the following: Confident Contributing Contenders, Gender Influence, Parental-Influenced Gamers. In order to more fully describe each factor, distinguishing statements, the highest and lowest ranked items, and post-survey questionnaire responses were further analyzed.

Factor Arrays

As described earlier, participants in this study were asked to sort and rank statements regarding female participation in nontraditional CTE programs in North Carolina community colleges. The rankings were completed using whole numbers from +4 (strongly agree) to -4 (strongly disagree). The use of whole numbers is also beneficial when reporting factor arrays, as it provides an easier way to compare and contrast attributes of each statement as well as each group or factor (Bartlett & DeWeese, 2015). Bartlett and DeWeese (2015) further describe, "Within Q analysis, factor scores on the factor array are another term for a *z* score of a given Q statement and is comprised of all the scores given to that specific statement by each participant

taking part in the study" (p. 79). Table 11 shows the factor arrays for each factor. The factor arrays assisted in the creation of themes to represent each of the 50 statements and all 4 factors.

Table 11

Factor Arrays

Number	Statement	Factor 1	Factor 2	Factor 3
S23	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.	4	4	3
S36	I feel confident in my ability to be successful in this program of study.	4	4	1
S37	My hard work and personal motivation are reasons I chose this program of study.	4	4	3
S2	I enjoy math and/or science.	3	0	3
S8	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	3	3	3
S17	Sexist attitudes or behaviors are not tolerated by my instructors.	3	0	-2
S27	My parents support and encourage my participation in this program of study.	3	2	3
S30	My father (or other male family member) heavily influenced my participation in this program of study.	3	3	1
S7	It is important for teachers and instructors to make math/science/technology learning fun and interesting.	2	1	1
S15	While in this program of study, I have had a male instructor.	2	1	1
S26	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	2	1	1
S28	My parents were the most influential individuals in my decision to pursue this program of study.	2	0	4
S29	My mother (or other female family member) heavily influenced my participation in this program of study.	2	2	2
S39	I already had the skills needed for this program of study and later developed an interest.	2	-2	-2
S22	The high quality and status of a career in this field was a major reason I chose this program of study.	1	-1	0
S31	My spouse/significant other heavily influenced my participation in this program of study.	1	-4	0

Table 11 (continued).

S32	My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.	1	-2	2
S34	My father has worked in a career or technical education field.	1	3	-1
S40	If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.	1	2	4
S44	Females in this program of study achieve success equally to that of men.	1	0	0
S45	Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc.) influenced my decision to pursue this program of study.	1	-1	0
S4	I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.	0	-3	-2
S5	Math/science/technology camps would have been very beneficial in middle or high school.	0	0	-1
S16	While in this program of study, I have had a female instructor.	0	-3	-3
S19	A career counselor/guidance counselor/advisor encouraged me to pursue this program of study.	0	-2	-2
S41	If I succeed in this program of study, it will be because I was born with an innate ability.	0	-1	-3
S47	It was important that my friends supported my decision to participate in this program of study.	-3	2	1
S48	It would be helpful in there were more females in this program of study.	0	3	0
S50	Having a role model/mentor of the same gender would be helpful to my success in this program of study.	0	2	-1
S3	When taking a test that requires hands-on activities, I would do better in a room full of other female students.	-1	-1	0
S9	If the college offered support services such as child care, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.	-1	1	0
S10	An orientation that discusses the time and energy required to complete this program would be beneficial.	-1	1	-2
S18	I was completely unaware of this program of study until very recently.	-1	-3	-1

Table 11 (continued).

S21	The high potential salary of a career in this field was the main reason I chose this program of study.	-1	-3	-3
S24	A major reason I chose this program of study is because it has a reputation as being a family-flexible job.	-1	-2	-3
S38	I was initially interested in this program of study and later developed the necessary skills.	-1	0	2
S1	Students should be confident in their math and science skills to participate in this program of study.	-2	1	1
S6	I enjoy playing video games.	-2	-1	4
S20	Participation in an introductory course, camp, or special program sparked my interest in this program of study.	-2	-2	0
S25	Before starting this program, I had no idea what people in this career actually do at work each day.	-2	0	0
S33	My mother has worked in a career or technical education field.	-2	-4	-1
S49	A support group would be helpful to my success in this program of study.	-2	0	-1
S11	I have experienced sexual harassment while participating in this program.	-3	3	2
S12	I have observed sexual harassment while participating in this program.	-3	-1	-2
S13	I have been mistreated or made to feel uncomfortable by instructors because of my gender.	-3	-2	-4
S43	Intelligence to do well in this program of study does not change over time – you either have it or you don't.	-3	-3	-1
S46	I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.	1	-1	0
S14	I have been mistreated or made to feel uncomfortable by classmates because of my gender.	-4	2	-3
S35	My parents strongly believe in "women's work" and "men's work".	-4	-4	-4
S42	I would perform better in a class with all female students.	-4	-1	-4

Defining Characteristics

Table 12 displays the defining characteristics, including composite reliability and standard error of factor scores. Each of the three factors contains certain perceptions similar among the participants in that group. There were four in Factor 1, 3 in Factor 2, and 2 in Factor

3. The composite reliability indicates the likelihood that participants would sort the same way if repeating the Q sort and the factors would be identical. Factor A had the strongest composite reliability at .94, although the other factors also had high reliability with .92 for Factor 2 and .89 for Factor 3.

Table 12

Defining Characteristics with Composite Reliability and Standard Error of Factor Scores

Characteristics	Factor 1	Factor 2	Factor 3
Number of Defining Variables	4	3	2
Composite Reliability	.94	.92	.89
Standard Error of Factor Scores	.24	.28	.33

Consensus Statements

To answer research question 1, "what items were rated similarly by viewpoint" Table 13 provides a list of all items that were rated similarly across the viewpoints. There are certain statements that are overwhelmingly shared by all of the participants and do not significantly distinguish between any of the factors (Klooster, Visser & Menno, 2008). In the current research study, 13 of the 50 total statements were identified as consensus statements and are presented in Table 13, along with the corresponding factor array rankings.

The statements "My hard work and personal motivation are reasons I chose this program of study" (S37) as well as "I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others" (S8) were the highest ranked consensus items. Therefore, it can be concluded that females in nontraditional vocational programs feel strongly that their hard work and internal motivation were valuable influences for

choosing their program of study. In addition, they enjoy learning in a collaborate community setting.

Two statements had a more neutral ranking. Statement 5 (S5) states "Math/science/technology campus would have been very beneficial in middle or high school" and Statement 44 states "Females in this program of study achieve success equally to that of men." Therefore, all participants felt that neither of these two statements made a significant impact on their participation in a nontraditional CTE program.

The two statements with the lowest rankings include Statement 35 (S35) which states, "My parents strongly believe in "women's work" and "men's work" as well as Statement 12 (S12) which states, "I have observed sexual harassment while participating in this program." These low rankings suggest that the participants did not grow up in homes with strictly held traditional gender roles. In addition, the participants agreed that they had not observed sexual harassment while in their program of study. It is unclear if this last statement could be related to the lack of other female classmates (in order to observe harassment happening to somebody else) or to other unknown factors. It should be noted that this statement is different from indicating that the participant herself had or had not personally experienced sexual harassment.

Table 13

Items with Consensus Across Viewpoints

Number	Statement	Factor 1	Factor 2	Factor 3
Highly Rated Items				
S37	My hard work and personal motivation are reasons I chose this program of study.	4	4	3
S8	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	3	3	3

Table 13 (continued).

S27	My parents support and encourage my participation in this program of study.	3	2	3
Neutral Items				
S7	It is important for teachers and instructors to make math/science/technology learning fun and interesting.	2	1	1
S15	While in this program of study, I have had a male instructor.	2	1	1
S26	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	2	1	1
S29	My mother (or other female family member) heavily influenced my participation in this program of study.	2	2	2
S44	Females in this program of study achieve success equally to that of men.	1	0	0
S5	Math/science/technology camps would have been very beneficial in middle or high school.	0	0	-1
S3	When taking a test that requires hands-on activities, I would do better in a room full of other female students.	-1	-1	0
Low Rated Items				
S12	I have observed sexual harassment while participating in this program.	-3	-1	-2
S47	It was important that my friends supported my decision to participate in this program of study.	-3	2	1
S35	My parents strongly believe in “women’s work” and “men’s work”.	-4	-4	-4

Viewpoints of the Participants by Factors

Distinguishing statements are useful to determine which of the 50 concourse statements are distinctive to each of the three factors. They are useful for further analyzing and defining the factors that were identified.

Factor 1: Confident Contributing Contenders (Confident/No Sexual Harassment/CTE Skills). For Factor 1, four participants accounted for 30% of variance and 44.4% of the P set that loaded into the factor. This factor accounts for the largest number of participants in this study.

Table 14 presents the distinguishing statements for Factor 1. Participants in this factor do not necessarily believe that students need to be confident in math and science to enter this nontraditional CTE program (S1). In addition, these participants did not report experiencing sexual harassment while in their program of study (S11). They already had an idea of this career field prior to beginning their school work (S25) and already had the skills necessary to complete the program (S39). In addition, the respondents indicated that sexist behavior and attitudes were not tolerated by their instructors (S17). These participants were neutral when sorting about having had a female instructor while in their program (S16), having assistance from a career counselor/advisor (S19), having a father in a CTE field (S34), or being scared to ask for help in class (S46).

When compared to the other factor groups, Factor 1 had the strongest positive or negative response to several statements. The participants in this group indicated that they did not agree that students had to be confident in math or science (S1) and felt that they already had the skills necessary for the program (S39). In addition, they strongly felt that they had not experienced sexual harassment while in the program (S11) and that sexist attitudes or behaviors were not tolerated in the classroom (S17). They also had a strong idea of what a career in their program of choice would entail before starting classes (S25).

Table 14

Distinguishing Statements for Factor 1: Confident Contributing Contenders

Number	Statement	Factor 1	Factor 2	Factor 3
S1	Students should be confident in their math and science skills to participate in this program of study.	-2	1	1
S11	I have experienced sexual harassment while participating in this program.	-3	3	2
S16	While in this program of study, I have had a female instructor.	0	-3	-3
S17	Sexist attitudes or behaviors are not tolerated by my instructors.	3	0	-2
S19	A career counselor/guidance counselor/advisor encouraged me to pursue this program of study.	0	-2	-2
S25	Before starting this program, I had no idea what people in this career actually do at work each day.	-2	0	0
S34	My father has worked in a career or technical education field.	1	3	-1
*S39	I already had the skills needed for this program of study and later developed an interest.	2	-2	-2
S46	I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.	1	-1	0

Table 15 shows the highest and lowest ranked items for Factor 1. The highest ranked items indicate that the female participants primarily chose their program of study in order to help others and contribute back to their community in some way (S23), that they feel confident in their ability to be successful in their respective programs of study (S36), and that their hard work and personal motivations are reasons they chose their program of study (S37). The lowest ranked items for Factor 1 reveal that participants had not been mistreated or made to feel uncomfortable by classmates because of being female (S14), that their parents do not strongly believe in traditional stereotypes roles at home (S35), and that they do not think they would perform better in an all-female learning environment (S42).

Table 15

Highest and lowest ranked items for Factor 1

Rank	Number	Statement
Highest		
4	S23	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.
4	S36	I feel confident in my ability to be successful in this program of study.
4	S37	My hard work and personal motivation are reasons I chose this program of study.
Lowest		
-4	S14	I have been mistreated or made to feel uncomfortable by classmates because of my gender.
-4	S35	My parents strongly believe in "women's work" and "men's work".
-4	S42	I would perform better in a class with all female students.

After the Q-sorts were completed by the participants during the data collection phase, a short post-sort questionnaire was also completed. The purpose of these additional questions was to gather additional participant thoughts and perspectives about their experiences in a nontraditional CTE program in the community college setting. Participants were asked open-ended questions about why they ranked certain statements as high or low. One participant wrote the following as it pertained to the high ranking of Statement 23 regarding choosing the program of study in order to help others and contribute to the community: "I want to be able to give back to the community, help single moms and the elderly." Another participant stated, "I would like to be able to trade services to people who aren't able to pay me." Another participant discussed her confidence (S36) by saying, "The guys in the class are surprised when I know more than they do" while another respondent described herself as the "initiator in class," often asking questions to the instructor for students who were reluctant to ask for clarification. Regarding the lowest

ranked items, one participant stated, “I have definitely not had any of the guys harass me; they have all been perfect southern gentlemen” (S14). Another participant indicated that having all females in class would not be ideal, stating, “Mixture is better so that you can learn how the guys might do it and they can learn how women might do it differently” (S42).

Figure 6 is a model Q sort for Factor 1. It is helpful in visually understanding how the participants in Factor 1 sorted their statements, including distinguishing items and consensus items. In looking at the basic demographics of the individuals in this group, one distinguishing characteristic is that three of the four respondents were single individuals and three of the four respondents were unemployed, with the only working only part-time.

Least Agree								Most Agree
-4	-3	-2	-1	0	1	2	3	4
I would perform better in a class with all female students.	I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.	A support group would be helpful to my success in this program of study.	I was initially interested in this program of study and later developed the necessary skills.	Having a role model/mentor of the same gender would be helpful to my success in this program of study.	Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc) influenced my decision to pursue this program of study.	I already had the skills needed for this program of study and later developed an interest.	My father (or other male family member) heavily influenced my participation in this program of study.	My hard work and personal motivation are reasons I chose this program of study.
My parents strongly believe in "women's work" and "men's work".	Intelligence to do well in this program of study does not change overtime – you either have it or you don't.	My mother has worked in a career or technical education field.	A major reason I chose this program of study is because it has a reputation as being a family-flexible job.	It would be helpful if there were more females in this program of study.	Females in this program of study achieve success equally to that of men.	My mother (or other female family member) heavily influenced my participation in this program of study.	My parents support and encourage my participation in this program of study.	I feel confident in my ability to be successful in this program of study.
I have been mistreated or made to feel uncomfortable by classmates due to my gender.	I have been mistreated or made to feel uncomfortable by instructors because of my gender.	Before starting this program, I had no idea what people in this career actually do at work each day.	The high potential salary of a career in this field was a major reason I chose this program of study.	It was important that my friends supported my decision to participate in this program of study.	If I succeed in this program of study, It will be because of my hard work, not because of some innate ability I was born with.	My parents were the most influential individuals in my decision to pursue this program of study.	Sexist attitudes or behaviors are not tolerated by my instructors.	A major reason I chose this program of study Is because I could help others and contribute back to my community in some way.
	I have observed sexual harassment while participating in this program.	Participation in an introductory course, camp, or special program sparked my interest in this program of study.	I was completely unaware of this program of study until very recently.	If I succeed in this program of study, it will be because I was born with an innate ability.	My father has worked in a career and technical education field.	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	
	I have experienced sexual harassment while participating in this program.	I enjoy playing video games.	An orientation that discusses the time and energy required to complete this program would be beneficial.	A career counselor/ guidance counselor/ advisor encouraged me to pursue this program of study.	My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.	While in this program of study, I have had a male instructor.	I enjoy math and/or science.	
		Students should be confident in their math and science skills to participate in this program of study.	If the college offered support services such as childcare, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.	While in this program of study, I have had a female instructor.	My spouse/significant other heavily influenced my participation in this program.	It is important for teachers and instructors to make math/ science/ technology learning fun and interesting.		
			When taking a test that requires hands-on activities, I would do better in a room full of other female students.	Math/science/ technology camps would have been very beneficial in middle or high school.	The high quality and status of a career in this field was a major reason I chose this program of study.			
				I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.				

Figure 8. Model Sort for Factor One

Note: Distinguishing items are highlighted in red; consensus items are highlighted in green, consensus for all are in blue

Factor 2: Gender Influence. (Father in CTE/Mistreated due to Gender/More Females in CTE/Parents Not Influential). For Factor 2, there were three participants which accounted for 24% of variance and 33.3% of the P set that loaded into the factor.

Table 16 presents the distinguishing statements for Factor 2. Participants in this factor did not agree that a spouse/significant other influenced their participation in their program of study (S31) and they did not have a mother who worked in a CTE field (S33). However, they did indicate that it would be helpful to have more females in their program of study (S48) and would be beneficial to have more female role models in CTE (S50). All of these participants indicated that they had a father who worked in a CTE field (S34), but that their parents did not encourage math/science/technology or hands-on work (S32). Most notably, all of the participants endorsed having been mistreated or made to feel uncomfortable by classmates due to their gender (S14). It is important to note that participants did not endorse the statement indicating that they had observed or experienced sexual harassment. These participants endorsed more neutral perceptions about needing to enjoy math/science to be successful in their program of study (S2), that an orientation would have been beneficial (S10), that their parents were the most influential in helping them decide on their program of study (S28), and that they would perform better in a class with all females (S42).

When compared to the other factor groups, Factor 2 had the strongest positive or negative response to several statements. The participants in this group indicated that they had been mistreated or made to feel uncomfortable by classmates because of their gender (S14) and that their spouse/significant had certainly not influenced their decision to participate in their program of study (S31). In addition, respondents strongly disagreed that their mothers had worked in a CTE field (S33) but felt strongly that it would be beneficial to have more females in their

program of study (S48). One participant, during the post-sort survey, indicated that although she had not experienced sexual harassment herself, “I sometimes feel uncomfortable around all of the guys; they make jokes that aren’t always appropriate for me to hear.” Another participant echoed these sentiments stating, “Sometimes the guys think that I can’t do something in class just because I am a female or that I might need their help with something.” As a result, these respondents felt that having a stronger female presence in their program of study would help the male students have a better understanding for their capabilities.

Table 16

Distinguishing Statements for Factor 2: Gender Influence

Number	Statement	Factor 1	Factor 2	Factor 3
S2	I enjoy math and/or science.	3	0	3
S10	An orientation that discusses the time and energy required to complete this program would be beneficial.	-1	1	-2
S14	I have been mistreated or made to feel uncomfortable by classmates because of my gender.	-4	2	-3
S28	My parents were the most influential individuals in my decision to pursue this program of study.	2	0	4
S31	My spouse/significant other heavily influenced my participation in this program of study.	1	-4	0
S32	My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.	1	-2	2
S33	My mother has worked in a career or technical education field.	-2	-4	-1
S34	My father has worked in a career or technical education field.	1	3	-1
S42	I would perform better in a class with all female students.	-4	-1	-4
S48	It would be helpful in there were more females in this program of study.	0	3	0
S50	Having a role model/mentor of the same gender would be helpful to my success in this program of study.	0	2	-1

Table 17 shows the highest and lowest ranked items for Factor 2. Interestingly, the highest ranked items are identical to those in Factor 1. Again, they indicate that the female participants primarily chose their program of study in order to help others and contribute back to their community in some way (S23), that they feel confident in their ability to be successful in their respective programs of study(S36), and that their hard work and personal motivations are reasons they chose their program of study (S37). The lowest ranked items for Factor 2 reveal that participants were not influenced to participate in their program of study by a spouse/significant other (S31). In addition, participants indicated that their mother had not worked in a career or technical education field (S33) but their parents did not strongly believe in "women's work" and "men's work".

Table 17

Highest and lowest ranked items for Factor 2: Gender Influencers

Rank	Number	Statement
Highest		
4	S23	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.
4	S36	I feel confident in my ability to be successful in this program of study.
4	S37	My hard work and personal motivation are reasons I chose this program of study.
Lowest		
-4	S31	My spouse/significant other heavily influenced my participation in this program of study.
-4	S33	My mother has worked in a career or technical education field.
-4	S35	My parents strongly believe in "women's work" and "men's work".

The post-sort questionnaire, which asked respondents to elaborate on their decisions to choose the highest (+4) and lowest (-4) responses, was also completed. It should be noted that all of the participants who grouped into Factor 2 were single or divorced. They echoed sentiments similar to those in Factor 1 for the highest ranked statements, but their responses regarding the lowest ranked statements were different. One participant indicated that she had been through a

very traumatic divorce and that her ex-husband was strongly against her participation in a male-dominated program (S31), stating, and "He would never allow me to be around a bunch of guys all day at school." In addition, two of the participants described their mothers as being stay-at-home mothers during their childhood, so not only were they not influenced by their mother's employment outside of the home, their mother's lack of employment in a CTE field seemed foreign. Nonetheless, their father's employment in CTE and their mother's status as a stay-at-home mom did not make their homes ones in which "women's work" and "men's work" was endorsed. One participant stated, "We were all expected to help both inside the house and out in the yard – it didn't matter who did what, as long as it got done."

Figure 5 is a model Q sort for Factor 2. It is helpful in visually understanding how the participants in Factor 2 sorted their statements, including distinguishing items and consensus items. In looking at the basic demographics of the individuals in this group, one distinguishing characteristic is that all four respondents were single or divorced individuals.

Least Agree								Most Agree
-4	-3	-2	-1	0	1	2	3	4
My parents strongly believe in "women's work" and "men's work".	Intelligence to do well in this program of study does not change overtime – you either have it or you don't.	I already had the skills needed for this program of study and later developed an interest.	Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc.) influenced my decision to pursue this program of study.	A support group would be helpful to my success in this program of study.	It was important that my friends supported my decision to participate in this program of study.	Having a role model/mentor of the same gender would be helpful to my success in this program of study.	It would be helpful if there were more females in this program of study.	My hard work and personal motivation are reasons I chose this program of study.
My mother has worked in a career or technical education field.	The high potential salary of a career in this field was a major reason I chose this program of study.	My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.	I would perform better in a class with all female students	Females in this program of study achieve success equally to that of men.	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.	My father has worked in a career and technical education field.	I feel confident in my ability to be successful in this program of study.
My spouse/significant other heavily influenced my participation in this program.	I was completely unaware of this program of study until very recently.	A major reason I chose this program of study is because it has a reputation as being a family-flexible job.	If I succeed in this program of study, it will be because I was born with an innate ability.	I was initially interested in this program of study and later developed the necessary skills.	While in this program of study, I have had a male instructor.	If I succeed in this program of study, It will be because of my hard work, not because of some innate ability I was born with.	My father (or other male family member) heavily influenced my participation in this program of study.	A major reason I chose this program of study Is because I could help others and contribute back to my community in some way.
	While in this program of study, I have had a female instructor.	Participation in an introductory course, camp, or special program sparked my interest in this program of study.	The high quality and status of a career in this field was a major reason I chose this program of study.	My parents were the most influential individuals in my decision to pursue this program of study.	An orientation that discusses the time and energy required to complete this program would be beneficial.	My mother (or other female family member) heavily influenced my participation in this program of study.	I have experienced sexual harassment while participating in this program.	
	I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.	A career counselor/ guidance counselor/ advisor encouraged me to pursue this program of study.	I have observed sexual harassment while participating in this program.	Before starting this program, I had no idea what people in this career actually do at work each day.	If the college offered support services such as child care, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.	My parents support and encourage my participation in this program of study.	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	
		I have been mistreated or made to feel uncomfortable by instructors because of my gender.	I enjoy playing video games.	Sexist attitudes or behaviors are not tolerated by my instructors.	It is important for teachers and instructors to make math/ science/ technology learning fun and interesting.	I have been mistreated or made to feel uncomfortable by classmates because of my gender.		
			When taking a test that requires hands-on activities, I would do better in a room full of other female students.	Math/science/ technology camps would have been very beneficial in middle or high school.	Students should be confident in their math and science skills to participate in this program of study.			
				I enjoy math and/or science.				

Figure 9. Model sort for Factor 2: Gender Influence

Note: Distinguishing items are highlighted in red; consensus items are highlighted in green, consensus for all in blue.

Factor 3: Parental-Influenced Gamers. (Video Gamers/Hard Work Creates Success). For Factor 3, two participants accounted for 19% of variance and 22.2% of the P set that loaded into a factor.

Table 18 presents the distinguishing statements for Factor 3. Different from any other factor group, participants in this factor strongly endorsed an enjoyment of video games (S6). In addition, these participants endorsed two different concourse statements that focused on the value of hard work, including strongly agreeing with S40 – "My hard work and personal motivation are reasons I chose this program of study" and strongly disagreeing with S41 – "If I succeed in this program of study, it will be because I was born with an innate ability". These participants endorsed more neutral perceptions about participating in an introductory course/camp/special program to spark their interest in their program of study (S20). They also were neutral about their father (or other male family member) heavily influencing their participation in their program of study (S30), having a father that has worked in a career or technical education field (S34), feeling confident in their ability to be successful in their program of study (S36), and believing that intelligence to do well in this program of study does not change over time (S43).

Table 18

Distinguishing Statements for Factor 3 Parental-Influenced Gamers

Number	Statement	Factor 1	Factor 2	Factor 3
S6	I enjoy playing video games.	-2	-1	4
S20	Participation in an introductory course, camp, or special program sparked my interest in this program of study.	-2	-2	0
S30	My father (or other male family member) heavily influenced my participation in this program of study.	3	3	1
S34	My father has worked in a career or technical education field.	1	3	-1
S36	I feel confident in my ability to be successful in this program of study.	4	4	1
S40	If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.	1	2	4
S41	If I succeed in this program of study, it will be because I was born with an innate ability.	0	-1	-3
S43	Intelligence to do well in this program of study does not change over time – you either have it or you don't.	-3	-3	-1

Table 19 shows the highest and lowest ranked items for Factor 3. The highest ranked items are different from those ranked highest in Factor 1 and Factor 2. They reveal that participants in Factor 3 enjoy playing video games (S6), that their parents were the most influential individuals in their decision to pursue this program of study (S28), and that hard work, not innate ability, would be responsible for their success in their program of study (S40). The lowest ranked items for Factor 3 reveal that participants were not mistreated or made to feel uncomfortable by instructors because of their gender (S13). In addition, they strongly felt that their parents do not believe in "women's work"' and "men's work" (S35) and that they would not perform better in a class with all female students (S42).

Table 19

Highest and lowest ranked items for Factor 3 Parental-Influenced Gamers

Rank	Number	Statement
Highest		
4	S6	I enjoy playing video games.
4	S28	My parents were the most influential individuals in my decision to pursue this program of study.
4	S40	If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.
Lowest		
-4	S13	I have been mistreated or made to feel uncomfortable by instructors because of my gender.
-4	S35	My parents strongly believe in “women’s work” and “men’s work”.
-4	S42	I would perform better in a class with all female students.

The post-sort questionnaire, which asked respondents to elaborate on their decisions to choose the highest (+4) and lowest (-4) responses was also completed. The strong response on this factor for enjoyment of video games was unique and the post-sort questionnaire helped to explain the findings. One participant stated, “I have loved playing video games since I was a little girl; I grew up in a family with all boys, except me, and we played video games all the time.” The other participant indicated that her parents were divorced when she was young and that she often played video games “when my parents needed to get things done around the house.” One of the two participants had also competed in video game competitions and stated, “I often feel like one of the boys.” She also stated, “Playing video games all of these years has really helped my eye-hand coordination.” These two participants also endorsed a strong influence from their parents (not just their mother or father) in their participation in their program of study. One respondent stated,

> My parents are my best friends; I am a homebody and don't have a lot of friends, so I spend a lot of time with my mom and dad. My dad would always let me come help him outside while he was trying to fix our cars and other things around the house.

The other respondent, who despite her parents being divorced from a young age, described a similar situation in which she often discussed important issues with her parents and "trusts them more than anybody".

Figure 6 is a model Q sort for Factor 2. It is helpful in visually understanding how the participants in Factor 3 sorted their statements, including distinguishing items and consensus items.

Least Agree								Most Agree
-4	-3	-2	-1	0	1	2	3	4
I would perform better in a class with all female students.	If I succeed in this program of study, it will be because I was born with an innate ability.	I already had the skills needed for this program of study and later developed an interest.	Having a role model/mentor of the same gender would be helpful to my success in this program of study.	It would be helpful if there were more females in this program of study.	I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.	It was important that my friends supported my decision to participate in this program of study.	My hard work and personal motivation are reasons I chose this program of study.	If I succeed in this program of study, It will be because of my hard work, not because of some innate ability I was born with.
My parents strongly believe in "women's work" and "men's work".	A major reason I chose this program of study is because it has a reputation as being a family-flexible job.	A career counselor/ guidance counselor/ advisor encouraged me to pursue this program of study.	A support group would be helpful to my success in this program of study.	Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc.) influenced my decision to pursue this program of study.	I feel confident in my ability to be successful in this program of study.	I was initially interested in this program of study and later developed the necessary skills.	My parents support and encourage my participation in this program of study.	My parents were the most influential individuals in my decision to pursue this program of study.
I have been mistreated or made to feel uncomfortable by instructors because of my gender.	The high potential salary of a career in this field was a major reason I chose this program of study.	Sexist attitudes or behaviors are not tolerated by my instructors.	Intelligence to do well in this program of study does not change overtime – you either have it or you don't.	Females in this program of study achieve success equally to that of men.	My father (or other male family member) heavily influenced my participation in this program of study.	My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.	I enjoy playing video games.
	While in this program of study, I have had a female instructor.	I have observed sexual harassment while participating in this program.	My father has worked in a career and technical education field.	My spouse/significant other heavily influenced my participation in this program.	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	My mother (or other female family member) heavily influenced my participation in this program of study.	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	
	I have been mistreated or made to feel uncomfortable by classmates because of my gender.	An orientation that discusses the time and energy required to complete this program would be beneficial.	My mother has worked in a career or technical education field.	Before starting this program, I had no idea what people in this career actually do at work each day.	While in this program of study, I have had a male instructor.	I have experienced sexual harassment while participating in this program.	I enjoy math and/or science.	
		I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.	I was completely unaware of this program of study until very recently.	The high quality and status of a career in this field was a major reason I chose this program of study.	It is important for teachers and instructors to make math/ science/ technology learning fun and interesting.			
			Math/science/ technology camps would have been very beneficial in middle or high school.	Participation in an introductory course, camp, or special program sparked my interest in this program of study.	Students should be confident in their math and science skills to participate in this program of study.			
				If the college offered support services such as child care, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.				
				When taking a test that requires hands-on activities, I would do better in a room full of other female students.				

Figure 10. Model sort for Factor 3 Parental-Influenced Gamers
Note: Distinguishing items are highlighted in red; consensus items are highlighted in green, consensus for all in blue.

Summary

Chapter 4 represents the analysis of data collected from 11 female students enrolled in CTE programs in North Carolina community colleges. Nine students were included in the final analysis. A Q-sort was conducted with participants and incorporated an analysis of both quantitative and qualitative data. Factor analysis was completed as well as post-sort questionnaires to assist in the explanation of the participant rankings.

Factor 1, "Confident Contributing Contenders," can be characterized by their confidence to be successful in their program of study and that they already possessed skills necessary for the CTE program of study they had chosen. In addition, this group did not endorse feeling mistreated or harassed due to their gender and did not want an all-female class.

Factor 2, "Gender Influence Group," contains individuals who believe that did not feel that their spouse/significant other had strongly influence their program participation. In addition, they did not come from a family that endorsed "women's work" and "men's work". Although their mother did not work in a CTE field, their father did. They had experienced some mistreatment or discomfort due to their gender while in their program of study and felt that it would be beneficial to have more females in the classrooms.

Factor 3, "Parental-Influenced Gamers," is quite different from the other two groups. They strongly endorsed an interested in playing video games as well as having a strong influence from both parents (not just their mother or father). They also strongly believed in the value of hard work. These participants did not feel that they had been mistreated in their program of study due to their gender, did not come from families that felt strongly in "women's work" and "men's work", and did not want a class with all female students.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS, AND SUMMARY

Introduction

This study was designed to identify factors related to the perceptions of females participating in nontraditional CTE programs within the North Carolina community college system. An initial concourse, or set of statements, regarding female participation in nontraditional CTE programs was developed and revised, resulting in a final number of 50 items. Participants were asked to rank the 50 statements on a continuum between +4 (strongly agree) to -4 (strongly disagree). The statements fit into broader categories, as informed by the relevant literature, including education, career information, family, internal/individual, and societal issues. Although previous research has been conducted on females in nontraditional education programs, this researcher found that the majority of research focused on women in four-year college programs, high school, or women in STEM programs. Little research has focused on women in nontraditional CTE community college programs.

This chapter will discuss the findings of the current study and summarize the unique characteristics of each of the three factors that were identified.

Conclusions

Research Question 1: What are the items that were similar across all viewpoints?

As discussed in Chapter Four, participants agreed on several of the concourse statements indicating a consensus across viewpoints. Table 20 provides a list of all items that were rated similarly across the viewpoints. There are certain statements that are shared overwhelmingly by all of the participants and do not significantly distinguish between any of the factors (Klooster et al., 2008). In the current research study, 13 of the 50 total statements were identified as

consensus statements and are presented in Table 20, along with the corresponding factor array rankings.

The statements “My hard work and personal motivation are reasons I chose this program of study” (S37) as well as “I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others” (S8) were the highest ranked consensus items. Therefore, it can be concluded that females in nontraditional vocational programs feel strongly that their hard work and internal motivation were valuable influences for choosing their program of study. In addition, they enjoy learning in a collaborative community setting.

Two statements had a more neutral ranking. Statement 5 (S5) states “Math/science/technology campus would have been very beneficial in middle or high school” and Statement 44 states, “Females in this program of study achieve success equally to that of men.” Therefore, all participants felt that neither of these two statements made a significant impact on their participation in a nontraditional CTE program.

The two statements with the lowest rankings include Statement 35 (S35) which states, “My parents strongly believe in “women’s work” and “men’s work” as well as Statement 12 (S12) which states, “I have observed sexual harassment while participating in this program.” These low rankings suggest that the participants did not grow up in homes with strictly held traditional gender roles. In addition, the participants agreed that they had not observed sexual harassment while in their program of study. It is unclear if this last statement could be related to the lack of other female classmates (in order to observe harassment happening to somebody else) or to other unknown factors. It should also be noted that this statement is different from

indicating that the participant herself had or had not personally experienced sexual harassment or been made to feel uncomfortable in class due to her gender.

Table 20

Items with Consensus Across Viewpoints

Number	Statement	Factor 1	Factor 2	Factor 3
Highly Rated Items				
S37	My hard work and personal motivation are reasons I chose this program of study.	4	4	3
S8	I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.	3	3	3
S27	My parents support and encourage my participation in this program of study.	3	2	3
Neutral Items				
S7	It is important for teachers and instructors to make math/science/technology learning fun and interesting.	2	1	1
S15	While in this program of study, I have had a male instructor.	2	1	1
S26	I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).	2	1	1
S29	My mother (or other female family member) heavily influenced my participation in this program of study.	2	2	2
S44	Females in this program of study achieve success equally to that of men.	1	0	0
S5	Math/science/technology camps would have been very beneficial in middle or high school.	0	0	-1
S3	When taking a test that requires hands-on activities, I would do better in a room full of other female students.	-1	-1	0
Low Rated Items				
S12	I have observed sexual harassment while participating in this program.	-3	-1	-2
S47	It was important that my friends supported my decision to participate in this program of study.	-3	2	1
S35	My parents strongly believe in “women’s work” and “men’s work”.	-4	-4	-4

Research Question 2: What are females' viewpoints of participating in a male-dominated CTE program in North Carolina community colleges and why?

The analysis of the Q-sort data, including the three-factor solution that was chosen, address the perceptions and attitudes of females in male-dominated CTE programs in North Carolina community colleges. Upon closer analysis, the perceptions vary widely, with some characteristics of factors both overlapping and being quite distinct from the others. The researcher titled each of the individual factors to better represent the perspectives of each group.

Factor 1: Confident Contributing Contenders (Confident/No Sexual Harassment/CTE Skills Females)

Factor 2: Gender Influence Group (Father in CTE/Mistreated due to Gender/More Females in CTE/Parents Not Influential)

Factor 3: Parental-Influenced Gamers (Video Gamers/Hard Work Creates Success)

Chapter 4 provides a more thorough analysis of each of the three factors, including a discussion and matching tables that describe the highest and lowest ranked concourse items and distinguishing statements for each of the three factors.

In order to address the second research question, a factor array was completed to reveal the highest ranked items in the concourse for each of the three factors. These items are presented in Table 21 and were grouped (unknown to the participants) into broader categories. For Factor 1 and Factor 2, the same statements were ranked high (S23/S36/S37). These statements fall into the broader categories of Career Information and Internal/Individual influences on female participation in nontraditional programs. Factor 3 statements that were ranked highest (S6/S28/S40) were grouped into Education, Family, and Internal/Individual categories. Therefore, five out of the nine statements fell into the Internal/Individual category, while two fell

into the Career Information category, and one statement each fell into Education and Family groupings. These results reveal that females in male-dominated CTE programs may be influenced by internal/individual factors such as self-efficacy, confidence, the value of hard work, and personal motivation. It is also noteworthy that both Factor 1 and Factor 2 had high rankings in the Career Information category, by endorsing the statement that, "A major reason I chose this program of study is because I could help others and contribute back to my community in some way" (S23).

Table 21

Highest ranked items for three factors

Factor	Number	Statement
F1: Confident Contributing Contenders	S23	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.
	S36	I feel confident in my ability to be successful in this program of study.
	S37	My hard work and personal motivation are reasons I chose this program of study.
F2: Gender Influence Group	S23	A major reason I chose this program of study is because I could help others and contribute back to my community in some way.
	S36	I feel confident in my ability to be successful in this program of study.
	S37	My hard work and personal motivation are reasons I chose this program of study.
F3: Parental-Influenced Gamers	S6	I enjoy playing video games.
	S28	My parents were the most influential individuals in my decision to pursue this program of study.
	S40	If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.

The completed factor array also identified the lowest rated items from the Q sort. These items are presented in Table 22 and as previously stated, were grouped (unknown to the participants) into broader categories. For Factor 1, the lowest ranked statements (S14/S35/S42) represented three different broader categories, including Education, Family, and

Internal/Individual. The lowest ranked statements for Factor 2 (S31/S33/S35), interestingly, all fell into the Family category. The rankings for Factor 3 were almost identical to those for Factor 1, revealing that the lowest ranked statements fit again into the Education, Family, and Internal/Individual categories. Within the Education group for Factor 3, participants endorsed Statement 13 as the lowest statement ("I have been mistreated or made to feel uncomfortable by instructors because of my gender"), while participants in Factor 1 endorsed Statement 14 as the lowest statement ("I have been mistreated or made to feel uncomfortable by classmates because of my gender"). Therefore, five out of the nine statements of the lowest rankings fell into the Family category while two each fell into the Internal/Individual and Education groups. Results reveal that females in male-dominated CTE programs had a strong perception that they had not been mistreated or made to feel uncomfortable by classmates/instructors, that their spouse/significant did not heavily influence their participation in the program of study, and that their parents did not strongly believe in "women's work" and "men's work". In addition, participants did not agree that they would perform better in a class with all female students.

These results reveal that females in male-dominated CTE programs may be influenced by internal/individual factors such as self-efficacy, confidence, the value of hard work, and personal motivation. It is also noteworthy that both Factor 1 and Factor 2 had high rankings in the Career Information, endorsing the statement that, "A major reason I chose this program of study is because I could help others and contribute back to my community in some way" (S23).

Table 22

Lowest ranked items for three factors

Factor	Number	Statement
F1: Confident Contributing Contenders	S14	I have been mistreated or made to feel uncomfortable by classmates because of my gender.
	S35	My parents strongly believe in “women’s work” and “men’s work”.
	S42	I would perform better in a class with all female students.
F2: Gender Influence Group	S31	My spouse/significant other heavily influenced my participation in this program of study.
	S33	My mother has worked in a career or technical education field.
	S35	My parents strongly believe in “women’s work” and “men’s work”.
F3: Parental-Influenced Gamers	S13	I have been mistreated or made to feel uncomfortable by instructors because of my gender.
	S35	My parents strongly believe in “women’s work” and “men’s work”.
	S42	I would perform better in a class with all female students.

Limitations

This study is limited by the methodology chosen to address the problems and purpose, which is the Q-Sort methodology. Also, this study is limited by participant accuracy, as the sorting process used in Q-Sort can be no more accurate than the participants completing the sorting. The current study is additionally limited by the current accepted definition of nontraditional programs and career and technical education, and by the accurate representation of the study participants to the large population.

In addition, this study is was limited to only the perceptions of female adult students enrolled in CTE programs in a North Carolina community college. Students in female-dominated vocational programs were excluded from the study, as were males in male-dominated vocational programs. In addition, only those items that are part of the Q-Sort concourse will be included in the assessment process. As a result, the limited population, scope of the study, and

decision to utilize a three-factor solution (as opposed to other options) may mean that the results may not be generalizable to a larger population.

Implications for Practice

Implication 1: Recruitment for Female Participation in CTE Programs in Community Colleges. This study supports the idea of widening the scope of recruitment for community college CTE programs to include potential female applicants. Based on the results, females want to have a sense that their program of study will lead to a career that allows for a contribution to the community. In addition, females want to participate in a collaborative learning environment. Therefore, recruitment efforts could target females by focusing less on a competitive learning environment in which graduates will make a high salary, but instead focus on collaboration and giving back (as well as other internal and individual motivators) as ways to attract female students. Females in the current study also indicated that they were confident in their ability to do well in the program/career and felt that they had the personal motivation to work hard and achieve. Their personal comments about why they made their specific card sorting choices revealed that while they may not worry about their success in the program or career, they worry more about being able to manage multiple life roles, manage childcare, pay for education, and find a career that is "family friendly". As a result, recruitment strategies would benefit from a focus on available supports for female students in nontraditional CTE programs, such as childcare opportunities, financial aid, flexible scheduling, or counseling/workshops to learn how to manage their multiple life roles.

In addition, the category of Societal Issues did not rank high or low among the participant rankings. As such, an opportunity exists to utilize positive media images, peers, role models, and mentoring to recruit and retain additional female students into nontraditional CTE programs.

Since these are male-dominated programs and careers, most media images, peers, and available role models are also male. Current female students in these CTE programs could be beneficial in the recruitment efforts. They could assist in recruitment workshops or informational sessions for new and prospective students. Females in nontraditional CTE fields could be represented in marketing brochures and program materials such as brochures and videos. In addition, females currently employed in male-dominated CTE fields that resulted from community college training could be equally useful in demonstrating the success of females in male-dominated CTE fields.

Implication 2: Retaining Females in Nontraditional CTE Community College Programs. Although actively recruiting new female students into nontraditional CTE programs is important, community colleges also need active retention strategies to help students achieve their goals and move toward graduation. Programs that are beneficial for the initial recruitment of females into these programs would also continue to be beneficial for retaining females. Female students want to continue to feel as if they are supported in their program, that they have a collaborative classroom experience, and that their career will allow them to give back to the community. Retention strategies may also include special financial incentives for re-enrollment, drop-in childcare options, same-gender speakers and guest instructors, an early warning system for at-risk students, and specialized learning communities or cohorts (Costello, 2012).

Implication 3: Training and Development of Community College Personnel.

Female students encounter many personnel on the community college campus who influence their career path and educational success. Such personnel could include receptionists, career counselors and advisors, tutors, financial aid personnel, and instructors, among others. The open-door mission of community colleges and the inherent goal of education to provide opportunities for individuals, many of whom experience significant barriers in education and

employment, should motivate community colleges to train their front-line personnel properly. Career counselors and advisors should be trained to be sensitive to the desires of females who may express an interest in nontraditional CTE programs and/or careers. Counselors and advisors may not have a wealth of experience working with students interested in nontraditional programs and as a result, may not encourage such participation or spend time with students in this endeavor. In addition, instructional personnel in male-dominated CTE programs, who are overwhelmingly male themselves, would also benefit from additional training. Instructors could be guided on techniques to make a classroom feel more collaborative and less competitive, how to avoid sexist language or attitudes in the classroom, and how to be knowledgeable about the available resources and supports as well as potential barriers that nontraditional female students may encounter. In addition, all community college personnel should be educated about the specifics of CTE programs and careers in order to support females interested in these programs more fully.

Implication 4: Labor Market Implications for Female CTE Graduates. The results indicate that female CTE students are highly motivated and recognize the value of hard work. This population of students presents an opportunity for community colleges to provide supportive resources connecting these students with post-training employment opportunities. Participants in this program of study did not highly rank role models or mentors as being an influence in their decision to participate in their program of study. It is unclear from the research if the lack of influence from female role models or mentors is because the participants were not interested in locating such relationships or because individuals did not readily exist for role model or mentor relationships. As a result, female students may avoid male-dominated programs of study in the CTE field due to lack of available female role models or mentors. Employers

who hire community college CTE graduates could focus on hiring qualified females and in turn, utilizing these females to mentor potential CTE students in the local community colleges. In addition, and in keeping with the human capital theory, female graduates of male-dominated CTE programs have the potential to earn a competitive wage once placed into competitive employment. The income related to highly skilled employment in CTE fields would prove beneficial to females who often enter CTE programs, many of whom are disadvantaged in one or more ways. These nontraditional CTE programs offer the hope for higher wages and economic freedom than many traditional programs could offer, and as such, would positively affect the local community and global economy.

Recommendations for Future Research

Although the current research study sought to fill a gap in the literature regarding female participation in nontraditional CTE programs in community colleges, future research in this field could add value in various ways. Future studies related to the enrollment of female students in CTE programs in community colleges could focus on viewpoints of male students in relation to female peers, both in male-dominated CTE programs as well as female-dominated CTE programs. For example, the experiences of male students in female-dominated CTE programs such as Cosmetology, Early Childhood Education, or Nursing, would be beneficial. The perceptions of males in traditional (male-dominated) CTE programs such as Welding and Automotive Technology could prove equally insightful. The current study sought the female perspective in this scenario, but male students in these programs could potentially bring forward differing perspectives that could prove beneficial to recruiting and retaining females in these programs. In addition, the perspectives of both male and female faculty who teach in CTE programs would be valuable. The current study focused on the perspectives of females in these

programs at only a small number of community colleges. Future studies could investigate the perspectives of a larger number of students from a larger number of community colleges and CTE programs. Larger numbers of participants at various types of colleges would also allow for greater comparison along other demographics such as college size and location. Of additional interest to this researcher after learning of the participants' backgrounds included topics such as family of origin demographics, military training, reverse transfer status, and hobbies. Future research into the program completion and employment status of females who participate in these programs of study would be useful. Discussion of these topics occurred multiple times on the post-sort questionnaires, although specific data was not collected during the current study to further investigate any significance.

Summary

This study sought to add to the body of literature in an area that is understudied – viewpoints of female students enrolled in male-dominated CTE programs in North Carolina community colleges. Through the completion of a Q sort, participants ranked 50 concourse items from "strongly agree" (+4) to "strongly disagree (-4). The concourse was created from the literature regarding female participation in CTE programs, specifically focused on females in community colleges and females in male-dominated CTE programs. Results utilized a three-factor solution, each of which revealed characteristics unique to the participants in that factor group. Results of this study may be beneficial to researchers interested in learning about the female perspective of community college students who are participating in male-dominated CTE programs.

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APPENDICES

Appendix A

Initial Concourse List

Education

1. Students should be confident in their math skills to participate in this program of study.
2. Students should be confident in their science skills to participate in this program of study.
3. I enjoy math.
4. I enjoy science.
5. When taking a test that requires hands-on activities, I would do better in a room full of other female students.
6. I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.
7. Math/science/technology camps would have been very beneficial in middle or high school.
8. I enjoy playing video games.
9. It is important for teachers and instructors to make math/science/technology learning fun and interesting
10. I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.
11. If the college offered support services such as child care, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.
12. An orientation that discusses the time and energy required to complete this program would be beneficial.
13. I have experienced sexual harassment while participating in this program.
14. I have observed sexual harassment while participating in this program.
15. I have been mistreated or made to feel uncomfortable by instructors because of my gender.
16. I have been mistreated or made to feel uncomfortable by classmates because of my gender.
17. While in this program of study, I have had a male instructor.
18. While in this program of study, I have had a female instructor.
19. Sexist attitudes or behaviors are not tolerated by my instructors.

Career Information

20. I was completely unaware of this program of study until very recently.
21. A career counselor/guidance counselor/advisor encouraged me to pursue this program of study.
22. Participation in an introductory course, camp, or special program sparked my interest in this program of study.
23. The high potential salary of a career in this field was the main reason I chose this program of study.
24. The high quality and status of a career in this field was a major reason I chose this program of study.
25. I was a strong student growing up, but never had interest in math, science, or technology types of careers.
26. A major reason I chose this program of study is because I could help others and contribute back to my community in some way.

27. A major reason I chose this program of study is because it has a reputation as being a family-flexible job.
28. Before starting this program, I had no idea what people in this career actually do at work each day.
29. I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).

Family

30. My parents support and encourage my participation in this program of study.
31. My parents were the most influential individuals in my decision to pursue this program of study.
32. My mother (or other female family member) heavily influenced my participation in this program of study.
33. My father (or other male family member) heavily influenced my participation in this program of study.
34. My spouse/significant other heavily influenced my participation in this program of study.
35. My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.
36. My mother has worked in a career or technical education field.
37. My father has worked in a career or technical education field.
38. My parents strongly believe in "women's work" and "men's work".

Internal/Individual

39. I feel confident in my ability to be successful in this program of study.
40. My hard work and personal motivation are reasons I chose this program of study.
41. I was initially interested in this program of study and later developed the necessary skills.
42. I already had the skills needed for this program of study and later developed an interest.
43. If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.
44. If I fail in this program of study, it will be because of lack of effort, not because I wasn't born with an innate ability in this area.
45. If I succeed in this program of study, it will be because I was born with an innate ability.
46. If I fail in this program of study, it will not be for lack of effort but because I wasn't born with an innate ability in this area.
47. I would perform better in a class with all female students.
48. Intelligence to do well in this program of study does not change over time – you either have it or you don't.
49. Females in this program of study achieve success equally to that of men.

Societal Issues

50. Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc.) influenced my decision to pursue this program of study.
51. I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.

52. It was important that my friends supported my decision to participate in this program of study.
53. It would be helpful in there were more females in this program of study.
54. A support group would be helpful to my success in this program of study.
55. Having a role model/mentor of the same gender would be helpful to my success in this program of study.

Appendix B

Revised Concourse List

Education

1. Students should be confident in their math and science skills to participate in this program of study.
2. I enjoy math and/or science.
3. When taking a test that requires hands-on activities, I would do better in a room full of other female students.
4. I used to lack confidence in my ability to work with my hands and complete hands-on tasks that require visual/spatial skills.
5. Math/science/technology camps would have been very beneficial in middle or high school.
6. I enjoy playing video games.
7. It is important for teachers and instructors to make math/science/technology learning fun and interesting.
8. I prefer to learn in a setting that feels like a community and one in which I feel involved, working collaboratively with others.
9. If the college offered support services such as child care, support groups, transportation, mentoring, and tutoring, my ability to be successful in this program would improve.
10. An orientation that discusses the time and energy required to complete this program would be beneficial.
11. I have experienced sexual harassment while participating in this program.
12. I have observed sexual harassment while participating in this program.
13. I have been mistreated or made to feel uncomfortable by instructors because of my gender.
14. I have been mistreated or made to feel uncomfortable by classmates because of my gender.
15. While in this program of study, I have had a male instructor.
16. While in this program of study, I have had a female instructor.
17. Sexist attitudes or behaviors are not tolerated by my instructors.

Career Information

18. I was completely unaware of this program of study until very recently.
19. A career counselor/guidance counselor/advisor encouraged me to pursue this program of study.
20. Participation in an introductory course, camp, or special program sparked my interest in this program of study.
21. The high potential salary of a career in this field was the main reason I chose this program of study.
22. The high quality and status of a career in this field was a major reason I chose this program of study.
23. A major reason I chose this program of study is because I could help others and contribute back to my community in some way.
24. A major reason I chose this program of study is because it has a reputation as being a family-flexible job.

25. Before starting this program, I had no idea what people in this career actually do at work each day.
26. I feel comfortable negotiating a job offer (pay, benefits, schedule, etc.).

Family

27. My parents support and encourage my participation in this program of study.
28. My parents were the most influential individuals in my decision to pursue this program of study.
29. My mother (or other female family member) heavily influenced my participation in this program of study.
30. My father (or other male family member) heavily influenced my participation in this program of study.
31. My spouse/significant other heavily influenced my participation in this program of study.
32. My parents always encouraged me to work in a field that required math, science, technology, or hands-on work.
33. My mother has worked in a career or technical education field.
34. My father has worked in a career or technical education field.
35. My parents strongly believe in "women's work" and "men's work".

Internal/Individual

36. I feel confident in my ability to be successful in this program of study.
37. My hard work and personal motivation are reasons I chose this program of study.
38. I was initially interested in this program of study and later developed the necessary skills.
39. I already had the skills needed for this program of study and later developed an interest.
40. If I succeed in this program of study, it will be because of my hard work, not because of some innate ability I was born with.
41. If I succeed in this program of study, it will be because I was born with an innate ability.
42. I would perform better in a class with all female students.
43. Intelligence to do well in this program of study does not change over time – you either have it or you don't.
44. Females in this program of study achieve success equally to that of men.

Societal Issues

45. Seeing people from the opposite gender perform this occupation (in person, on TV, in brochures, etc.) influenced my decision to pursue this program of study.
46. I am sometimes scared to ask for help because I don't want to look dumb in front of my classmates.
47. It was important that my friends supported my decision to participate in this program of study.
48. It would be helpful in there were more females in this program of study.
49. A support group would be helpful to my success in this program of study.
50. Having a role model/mentor of the same gender would be helpful to my success in this program of study.

Appendix C

Q-Sort Guidelines

Thank you again for your willingness to participate in this research study. In this process, you will sort the cards on a range from +4 to -4. Statements that you most agree with will be ranked +4 and statements that you most disagree with will be ranked -4. Please sort the cards based on your experiences as a female student in a nontraditional career and technical education program in a North Carolina community college.

Instructions:

1. Lay out all the column titles from -4 to +4 across the top of the table or desk.
2. Begin by reading through all 50 of the paper cards to become familiar with the statements.
3. Please read through the statements for a second time. As you read the statements, organize them into three piles:
    a. **Category 1** (right hand side): Place the cards with the statements of which you agree.
    b. **Category 2** (left hand side): Place the cards with the statements of which you disagree.
    c. **Category 3** (middle): Place the cards that you feel more undecided about or you neither agree nor disagree (neutral) with the statement.
4. Beginning with the pile in Category 1 on the right (agree), place the 2 cards that you most strongly agree with in the far right column in any order.
5. Next, take two cards from Category 2 on the left (disagree), place the 2 cards that you most strongly disagree with in the far left column in any order.
6. Now, returning to the Category 1 pile on the right, choose three statements that represent the next statements with which you most agree and place them in any order under the +3 column.
7. Do the same with the Category 2 pile on the left, but place them under the -3 column.
8. Continue this process of moving towards the middle of the diagram. Once all of the cards are gone from Category 1 and Category 2, you may then begin to place cards from the Category 3 pile.
9. You are free to change your mind during the sorting process and switch items around until you are completely satisfied with your choices.
    a. You should have 3 cards under columns +4 and -4.
    b. You should have 5 cards under columns +3 and -3.
    c. You should have 6 cards under columns +2 and -2.
    d. You should have 7 cards under columns +1 and -1.
    e. You should have 8 cards under column 0.
10. Once you are satisfied with your final sort, please record each card's number onto the diagram in the same design as you sorted the cards.
11. Once you have completed the online sort, you will be asked to answer several questions that will assist the researcher in understanding the choices you made for the cards sorts.

Appendix D

Q-Sort Grid

Strongly Disagree — Neither Agree Nor Disagree — Strongly Agree

-4	-3	-2	-1	0	+1	+2	+3	+4

Appendix E

Participant Demographics

1. Age
2. Gender
3. Program of Study
4. Years of Education
5. Marital Status
6. Number of Children
7. Employment Status
8. In reviewing the highest rated and lowest rated items, could you provide some insight regarding what prompted you to rank your +4 and +3 (strongly agree) and -4 and -3 (strongly disagree) items. Any comments you have regarding the statements, their placement on the grid, or anything else would be welcome.