

INCREASING GENDER DIVERSITY

INCREASING GENDER DIVERSITY IN THE SKILLED TRADES WORKFORCE SECTOR:

AN INTERVENTION AT ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE

A disquisition presented to the faculty of the Graduate School of Western Carolina University in
partial fulfillment of the requirements for the degree of Doctor of Education

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run, and not be weary; *and* they shall walk, and not faint” (King James Bible, 2017, Isa 40:31).

Thank you, Lord for carrying me when I could not stand.

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Abstract

INCREASING GENDER DIVERSITY IN THE SKILLED TRADES WORKFORCE SECTOR: AN INTERVENTION AT ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE

Cindy Morrow Messer, M.P.A.

Western Carolina University (May 2022)

Chair: Dr. Kofi Lomotey

Occupational segregation by gender continues with a significant underrepresentation of women in the skilled trades industry. There is a significant workforce shortage in the skilled trades industry locally, regionally, and nationally. Additionally, it is becoming increasingly difficult to recruit qualified skilled trades workers due to the limited pipeline of skilled workers. The number of women entering the skilled trades sector is consistently lower than the number of men, further contributing to the lack of gender diversity in the skilled trades workforce sector. In this improvement initiative, I sought to improve gender diversity and increase the number of female students accessing the skilled trades workforce sector at Asheville-Buncombe Technical Community College (A-B Tech). Industry-led marketing initiatives and marketing practices focused on women in skilled trades careers were used to enhance women's career-related self-efficacy and increase their exposure to skilled trades and awareness of work-based learning opportunities leading to improved gender diversity and an increased number of female students accessing the skilled trades workforce sector. Through a scholar-practitioner lens, I used the Plan-Do-Study-Act (PDSA) cycle to test a change in outreach and recruitment efforts traditionally used by the College. I intended for the intervention to increase gender diversity and create equity in a traditionally male-dominated program area at A-B Tech.

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Western Carolina University's Doctor of Education Degree Program Process

The Doctor of Education (EdD) Degree Program at Western Carolina University (WCU) is a three-year program that requires two years of coursework, and successful completion of an improvement initiative with a written disquisition and oral defense of the disquisition. A disquisition is a dissertation in practice that uses improvement science as a method to enhance practitioners' learning and develop their skills for leadership and change (Perry et al., 2020).

Lomotey (2020) defines a disquisition as:

A formal, problem-based discourse or treatise in which a problem of practice is identified, described, analyzed and addressed in depth, including a discussion of methods and strategies used to bring about change and to assess whether the change is an improvement. (p. 5)

According to Crow et al. (2017) the disquisition “balances employing rigorous research skills, including improvement science approaches, with leadership savvy for tackling critical problems of practice” (p. 479). In working toward addressing the problem of practice within the organization, the disquisition addresses social justice and equity issues (Crow et al., 2017). “The disquisition experience produces a new breed of graduates who have developed a qualitatively new type of scholar-practitioner thinking--empirically-grounded know-how” (Crow et al., 2017, p. 479).

Higher education's expectations of their faculty and researchers differ from the ones held for educational leaders in schools and colleges, and different curricula is necessary to adequately prepare researchers and practitioners (Lomotey, 2020). Because different outcomes are desired for PhD and EdD graduates, skills development for EdD students must align with schools and colleges (Lomotey, 2020). Whereas a research-based dissertation is important albeit the process

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is not designed to prepare students to address problems of practice, WCU recognizes the critical need of preparing educational leaders to address daily workplace issues and become practical problem solvers; therefore, WCU faculty established coursework, “the disquisition and other scholarly activities focused on identifying, exploring and addressing problems of practice” (Lomotey, 2020, p. 2) to fulfill the inadequacy.

The EdD program at WCU “is a doctoral program with a capstone experience focused on addressing problems of practice experienced by school, community college, 4-year college and university leaders” (Lomotey, 2020, p. 5). Through the use of improvement science methods, the University’s goal is to prepare “educational leaders to identify, assess and solve problems of practice that they experience every day in their workplace” (Lomotey, 2020, p. 5). This process “helps to prepare individuals who will continue to serve as leaders in education” (Lomotey, 2020, p. 5). Not only does it equip educational leaders with a skillset that is useful to enhance their knowledge and leadership while serving in their current position, it also better positions them for advancement in their career. Furthermore, it provides them the ability to serve as a mentor to others who may be interested in pursuing the EdD.

Throughout the disquisition process, the scholar-practitioner focuses on an institutional problem and works in collaboration with a team of professional experts and key stakeholders to identify and implement improvement strategies that will address the problem and result in positive change within the institution, while benefiting students, the community, region, state and beyond (Lomotey, 2020).

Realizing the need to implement changes to encourage women to join the skilled trades and lead to a more gender balanced workforce, I strived to address the problem through the lens of a scholar-practitioner. A scholar-practitioner is a leader and participant in the improvement

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initiative (Drake & Heath, 2010). As the disquisitioner, I am the scholar who analyzes the improvement process; as the practitioner, I serve as the team facilitator for the improvement initiative. As a leader practicing in this dual role, I can effectively institute change and increase gender diversity in a program area within the College that is a systemic problem.

Introduction and Problem Statement

What gender comes to mind when you think about construction workers, carpenters, drafters, welders, heating/ventilation/air conditioning (HVAC) technicians, machine operators, electricians, masons, engineers, plumbers, cabinet makers/mill workers, automotive technicians, heavy equipment operators, landscapers, farmers, truck drivers, barbers, engineers, graphic designers, lab technicians, and chefs? All together, these are referred to as skilled tradesmen, occupational tradesmen, and craftsmen – all of which have the male gender connotation. It is rare that these skilled trades occupations are depicted as skilled tradespeople, tradespeople, or craftspeople. Skilled tradeswomen, tradeswomen, or craftswomen terminology are basically non-existent in today's world because these careers are represented and perceived as male-dominated. Skilled trades include occupations in construction and manufacturing; therefore, I will use the terms synonymously.

Occupational segregation by gender continues with the significant underrepresentation of women in the skilled trades industry. According to Sugerma (2019), “women represent less than 3 percent of the skilled trades workforce” (p. 2). There is a significant workforce shortage in the skilled trades industry locally, regionally, and nationally. Additionally, it is becoming increasingly difficult to recruit qualified skilled trades workers due to the limited pipeline of skilled workers. The number of women entering the skilled trades sector is consistently lower than the number of men, further contributing to the lack of gender diversity in the skilled trades workforce sector. De Lea (2019) notes that skilled trades workers are in demand and the current shortage topped sector concerns that year. Such labor shortage is responsible for a multitude of issues that greatly impact the skilled trades industry, A-B Tech, and the economy.

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Cavalcanti and Tavares (2016) suggest that gender disparities in the workforce lead to a gender gap in employment, which decreases female representation in the workforce. This is a social justice issue that needs to be remedied. Women deserve equal access to traditionally male-dominated skilled trades positions and the consumers deserve to have products designed and created from a female perspective that gives more attention to detail than do their male counterparts. Women also deserve the same access to an industry where workers make above average pay and can progress to higher positions. Increasing the number of women in industry inspires other women to pursue the same path and creates an organizational culture of diversity. Research by Smith et al. (2018) suggests that women are more compassionate and organized than men. Dearborn (2019) explains that including women in the workforce enhances collaboration in an organization and helps create inclusive teams, which can greatly increase the organization's cultural and financial growth.

Gender diversity is not just a matter of social justice, it is about economics. It is my hope that this research will ultimately lead to a more gender balanced representation in the skilled trades workforce and society will recognize and accept that men and women working in the skilled trades industry will be referred to as skilled tradespeople or skilled trades workers, rather than having gender specific titles and occupations. Increasing skilled trades career opportunities for women will reduce sexism and gender discrimination that exists in a male-dominated workforce.

Women are essential; they are on the frontlines working as nurses, teachers, social workers, restaurant workers, etc. However, in the wake of the COVID-19 pandemic, inequalities of women surfaced as women typically bear the brunt of crises – often losing their jobs to default to caregiver and homemaker (Yilek, 2021). The pandemic has brought us to a crossroads, and

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this intervention created a new shared vision for an equitable workforce by prioritizing women's access to skilled trades programs. When women are encouraged, empowered, and inspired by other women – and men, the benefits are experienced throughout the organization, and within the community. Women have a long history of fighting barriers to employment, which is intensified when they consider careers that are traditionally male-dominated. It is past time for organizations to address social justice issues, recognize and expose gender inequalities faced by women, and provide opportunities for diversity, inclusion, and equal access for women.

According to Yilek (2021), more women than men lost their jobs because of COVID-19, which forced women back into their home life, defaulting into nurturing status and serving as caregivers – the traditional stereotypes some women have been battling to escape. Yilek (2021) notes that the pandemic continues to take a toll on women employees and between February 2020 and February 2021, there were nearly 1.5 million fewer women with school-aged children in the workforce. Some of the women left the workforce out of necessity to care for their children when daycare facilities closed and to home school their children when remote learning was enacted, or to care for sick or elderly family members. The pandemic has caused many individuals, of both genders, to reevaluate their careers and job prospects and recovering from the pandemic provides the ideal opportunity for educational institutions, like A-B Tech, to capitalize on improvement strategies that help women access skilled trades programs at the same rate as men. A more gender balanced workforce ensures that women uphold their essential status and are not devalued and seen as “less than.” Addressing this social justice issue creates a gender-just future and helps women not only to survive but to thrive. Having more women in A-B Tech's skilled trades programs broadens the talent pool that businesses and industries choose from, provides for different points of view, and increases creativity and innovation in the

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College. Having an equal balance of women and men in the workforce helps ensure that both genders are hired at comparable rates, compensated equally, and provided the same working opportunities and the same advancement opportunities.

As the demand for skilled tradespeople increases, the number of women seeking to fulfil this demand remains dismal. Women are not accessing skilled trades careers as aggressively as they were during World War I and World War II when women were desperately needed to fill the vacancies when men were sent overseas. During the “Rosie the Riveter” campaign, more than 310,000 women were recruited to work in the aerospace industry alone (McDermott, 2018). Although a temporary solution to increasing the number of women in the skilled trades workforce, the awareness campaign highlighting Rosie the Riveter and the inspirational words, “We Can Do It!” achieved the short-term goal of women contributing to the workforce.

The underrepresentation of women in skilled trades remains bleak. According to the United States Bureau of Labor Statistics (USBLS, 2019), more than 7,000,000 workers are employed in skilled trades throughout the country and women only account for 3% of that labor force in an industry that is expected to grow by 12% over the next decade. Research shows that discrimination is a factor that causes a shortage of women in skilled trades due to young women in high school being guided into careers that are in line with traditional gender stereotypes rather than being encouraged to seek career options in skilled trades (National Women’s Law Center, 2014). Also, career development counselors generally guide students toward 4-year colleges and universities rather than community colleges or trade schools.

The shortage of women in skilled trades has caused North Carolina Construction Contractors to further experience a labor shortage that is especially acute in North Carolina (NC) (Buckshon, 2018). Figure 1 depicts 2018 NC workforce survey results showing the percentage of

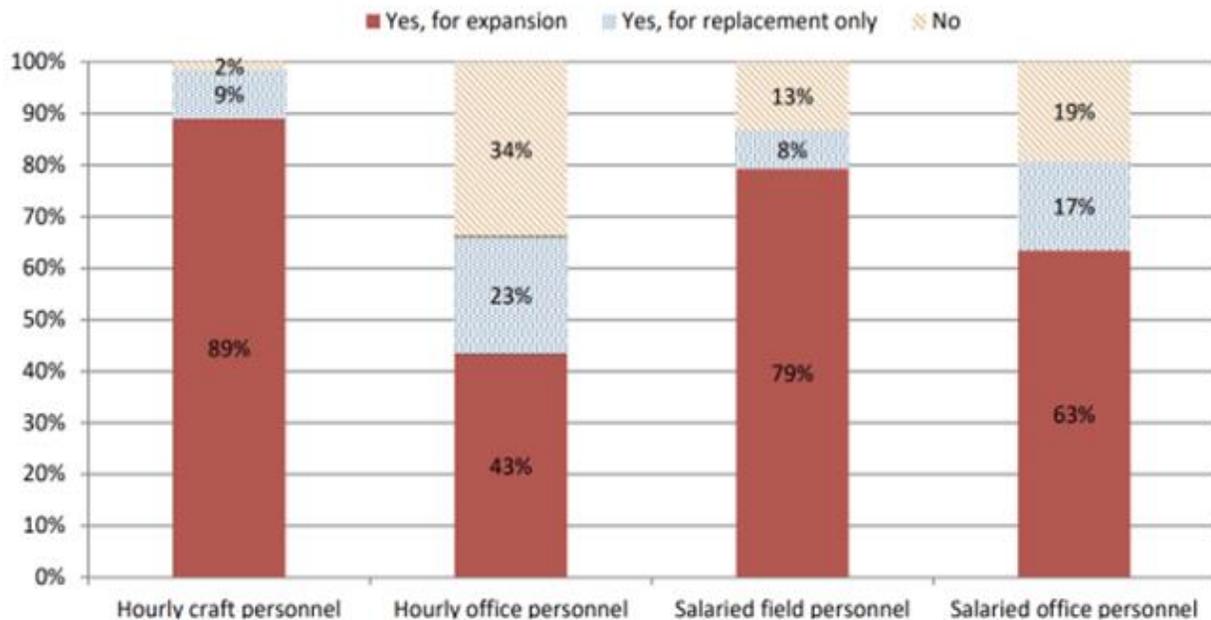
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construction trades workers who were anticipated to be hired in 2019, indicating hourly craft personnel and salaried field personnel to be the highest percentages (89% and 79% respectively). These numbers represent the need for women workers in the skilled trades industry sector. The projected growth of currently male-dominated careers provides opportunities for women to close the gender gap. An unattractive image of construction work and an unforeseen career pathway are two identifiable problems with recruiting for construction trades (Makhene & Thwala, 2009).

Figure 1

2018 North Carolina Workforce Survey Results

. In the next 12 months, do you expect your firm will hire additional or replacement:



Note. In 2018, it was projected that, in 2019, a significant amount of skilled trades workforce would be needed in NC.

The significant shortage of women in skilled trades is experienced in several geographical areas within the U. S., including the area where A-B Tech is located. In NC, only 4% of the skilled trades workforce are women (USBLS, 2019). Women are only 16% of the

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skilled trades workforce working in the four-county workforce development area, Mountain Area Workforce Development Region that is comprised of Buncombe, Henderson, Madison, and Transylvania County (USBLS, 2019). Additionally, women are only 11% of the employees working in skilled trades in A-B Tech's two-county local service area that includes Buncombe County and Madison County (USBLS, 2019).

The shortage of women in the skilled trades workforce is not unique to the United States (US). Hong Kong is facing similar issues within its construction industry with an aging workforce, shortage of young skilled workers, and negative perception of the industry (Ho, 2016). In Australia, construction is an important industry. According to Francis and Prosser (2013), "it is the fourth largest industry" in the country (p. 59). Transforming the perception of the skilled trades industry and overcoming the negative image of a blue collar, male-dominated workplace is immensely challenging. Career counselors' misconceptions about the skilled trades industry is damaging to recruitment efforts and often deter people from exploring skilled trades as a legitimate career option (Francis & Prosser, 2013).

History and Current State of the Problem

A variety of courses make up the skilled trades industry sector: carpentry, drafting, welding, HVAC, machining, electrical, masonry, engineering, plumbing, cabinetry/mill working, automotive, heavy equipment, horticulture, culinary, barbering, graphic design, commercial driving, and Occupational Safety and Health Administration (OSHA). Construction is also part of the skilled trades industry sector due to the nature of work in the skilled trades. According to "State Leaders Connecting" (n.d.), construction workers are "people who build and remodel houses, apartments, industrial buildings, warehouses, office buildings, churches, schools and recreational facilities" (para. 2). "State Leaders Connecting" (n.d.) also notes that construction

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trades include “the builders of highways, streets, bridges, tunnels and airports as well as power plants, chemical plants, refineries and mills” (p. 1). The 2019 Associated General Contractors of America Report states that construction firms plan to expand their workforce by 79% to maintain their project commitments. At the same time, 78% of businesses in the construction industry document having difficulty filling salaried and labor positions (DeLea, 2019). Schwartz (2019) reports 300,000 unfilled jobs in the skilled trades industry with an expected need of an additional 747,000 workers by 2026. The labor shortage in the construction industry was predicted more than two decades ago due to contractors’ lack of interest in training (Makhene & Thwala, 2009). This indicates there is a significant amount of work that must be done to increase interest in skilled trades and build an adequate workforce pipeline for this industry sector.

According to Richards (2007), the U.S. ranks skilled trades as one of the most male-dominated industries, regardless of regulatory changes created to provide easier access to this industry sector. As recently as 1985, women were not offered the same exposure and were not allowed to seek employment in skilled trades as men were (Richards, 2007). Generally, a lack of exposure to, and knowledge of, an occupation provides a sense of insecurity for women, causing them not to pursue the opportunity. Studies show that women are uninformed and ill-informed about skilled trades options due to lack of exposure and awareness, limiting their career choices (Richards, 2007). MacDonald (2016) contends that the lack of exposure to female role models, the shortage of female industry representatives conducting presentations to potential students, and the low ratio of women depicted on industry brochures are obstacles that limit women’s participation in skilled trades.

There is no simple solution in addressing this complex issue. According to Sugerman (2019), gender disparity “is deeply rooted in societal stereotypes about women’s abilities and

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preferences, institutionalized discriminatory policy and practices, and implicit bias” (p. 3). There is a need for change and re-evaluation at various levels to ensure equity and social justice.

Several approaches to addressing the issue include “ensuring the career education and workforce development, which continue to funnel female job seekers into traditional female, often low-wage occupations, adopting equitable practices including expanding outreach to women and offering programs to help women prepare to be competitive candidates” (p. 3).

Increasing the number of women in skilled trades would be beneficial to the industry and the economy, would address the shortage of skilled labor, and would help to reimage the negative perception of the industry (Majid et al., 2018). According to Fielden et al. (2010), the construction industry’s negative image, the lack of career knowledge, and sexist attitudes in the male-dominated industry sector, are barriers preventing women’s access to the workforce. Studies show that the lack of awareness and exposure to skilled trades has resulted in women’s lack of interest in skilled trades as a career option. This makes women feel a lack of preparedness, which contributes greatly to their hesitancy in pursuing skilled trades as a career opportunity (Richards, 2007).

There is a shortage of women in the skilled trades workforce sector locally, regionally, and nationally for a variety of reasons. Career and Technical Education (CTE) programs are high school courses that lead directly into community college skilled trades programs. CTE directors and program staff agree that the decline in student enrollment in CTE courses is a major challenge for the skilled trades workforce sector (Fletcher & Gordon, 2017). There continues to be a perception in academia that careers in skilled trades are less lucrative for women than careers in other areas (Waugh, 2018).

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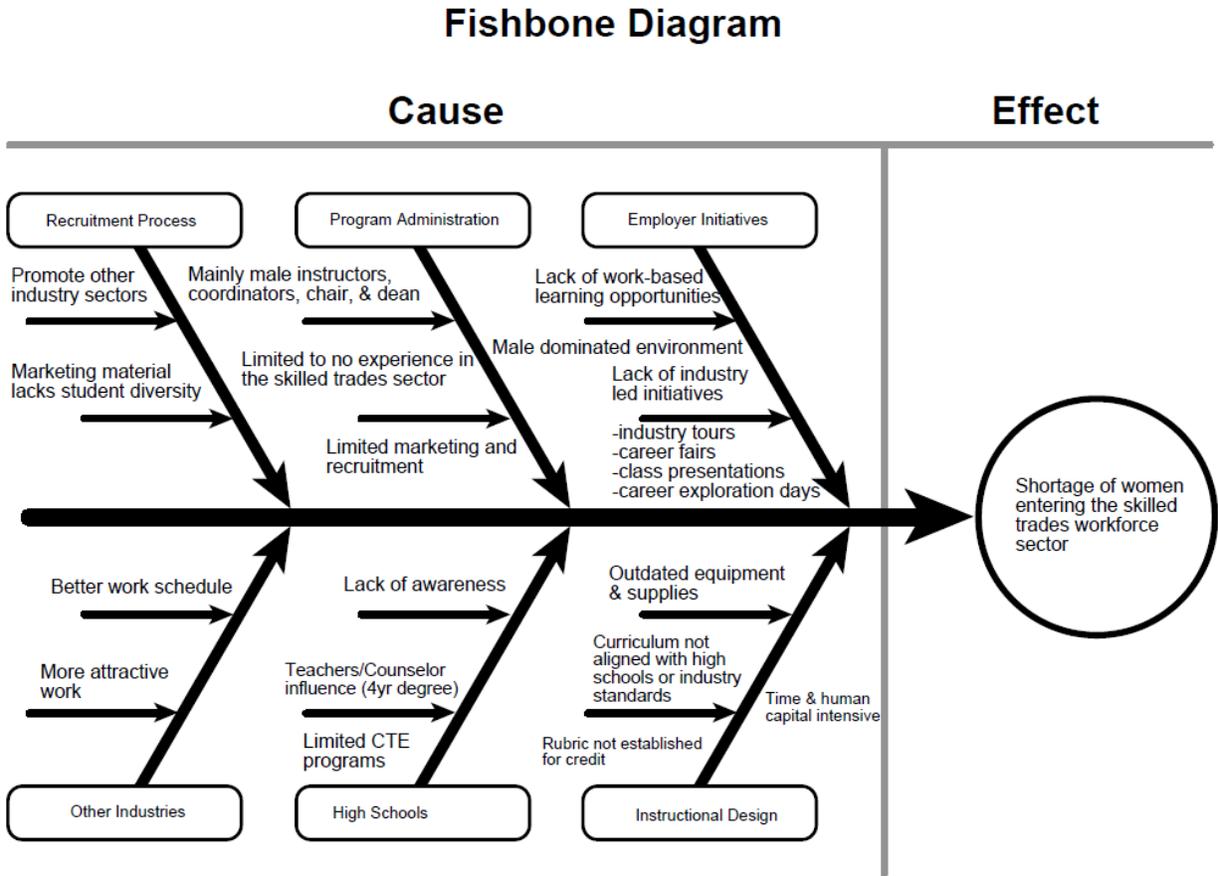
I identified the problem and its root causes in order to work toward an optimal solution that would lead to an increased number of women in skilled trades. To best identify the root causes, I completed a fishbone diagram (Bryk, et al., 2015). Employer-led initiatives and the recruitment process are the root causes that are within immediate control and will yield quicker results in increasing the number of women accessing the skilled trades workforce sector; they were the focus of this initiative.

Utilizing tools like a fishbone diagram, a driver diagram, and systems mapping aided me in mapping out the goals and determining how best to achieve them (Crow et al., 2019). Through the use of improvement science, a problem specific user-centered approach (Bryk et al., 2015), I identified changes, and made determinations on “whether or not those changes are actually improving outcomes and practice” (Crow et al., 2019, p. 13). Using improvement science will yield better processes (Bryk et al., 2015) to ensure at least a 20% increase in women accessing the skilled trades workforce programs. I used improvement science to see the complex system in its entirety and to ensure that the core problem was identified, and the causes (rather than symptoms) were treated (Anderson & Fagerhaug, 2000; Dew, 1991; Sproull, 2001).

The fishbone diagram in Figure 2 illustrates several causes that contribute to the shortage of women accessing the skilled trades workforce. The overarching causes are: recruitment process, program administration, employer events, instructional design, high schools, and other industries.

Figure 2

Fishbone causal analysis



Note. Causes and factors contributing to a shortage of women in skilled trades.

Literature Review of Causal Analysis

Recruitment Process

The absence of a recruitment process in continuing education (CE) that targets women greatly impacts the ability to attract women into the skilled trades workforce sector. Community college recruitment is designed to mainly focus on curriculum (CU) degree programs without bringing awareness to CE certification programs that segue into curriculum or programs that provide a workforce skill that can be gained in less than one year.

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Marketing materials typically lack gender diversity. They exhibit males for traditionally male-dominated industry sectors like skilled trades rather than also displaying photographs of women actively working with HVAC systems, electrical panels, welding components, industrial machines, drafting tools, mechanic equipment, agricultural crops, or other skilled trades areas. Research shows that two key factors attract women into skilled trades programs – effective recruitment programs and economic stability of the specific trade (Richards, 2007).

Stereotyping is another cause of women not accessing the skilled trades workforce sector. According to Richards (2007), women base their career choices on stereotypes at an early age and it is difficult to alter this mindset as they age. Owen (1993) concedes that one of the most challenging obstacles women face in pursuing skilled trades career options is the stigma these male-dominated positions impose upon them. Everyone is influenced to some degree by what and how the media and marketing materials portray male and female roles and the jobs they are expected or assumed to be able to perform. Since skilled trades are continuously being portrayed specifically as male occupations, women are reluctant to pursue skilled trades as a workforce skill or a career option.

Program Administration

Program administration affects the shortage of women in skilled trades. The opportunity for students to identify with someone who looks and sounds like them is not only critical to their learning, but it helps promote recruiting efforts and foster retention. A-B Tech's continuing education student population is 56% male and 43% female, but student demographics for the past three years in the skilled trades program has averaged 80% male and only 20% female (A-B Tech, n.d.). When faculty, coordinators, program administrators, and staff are predominately men, it makes it more difficult to appeal to women. This lack of balanced gender representation

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results in a sense of hesitancy for women who may otherwise be interested in skilled trades. Good relations among faculty, staff, and students tend to generate trust and build confidence in students, whereby they are more likely to remain interested, engaged, willfully share information, and ask for help and support. Communication and engagement are important in helping create gender diversity. It is important that faculty and staff understand the significance of gender diversity and engage in (1) opportunities that build gender capacity, and (2) targeted recruitment efforts.

Marketing efforts are important in bringing about awareness and creating gender diversity. Clear messaging should be used in recruitment. According to Armin (2019), administrators need to take responsibility in promoting diversity on their campus and build a culture where faculty are included, and students are heard. Students tend to gravitate toward people who are most like them (Harper & Quaye, 2015). Leadership must make it a priority to have women -- and men -- faculty and staff on search committees and interview teams who are aware of the need for -- and support -- gender diversity. Kezar and Posselt (2020) discuss the influence of cultural biases of faculty thinking in search committees as problematic and perpetuating the status quo of hiring candidates who are representative of the dominant culture.

Targeted recruiting efforts for women at A-B Tech do not exist. Such efforts could include (1) utilizing existing program staff to encourage women to pursue skilled trades, and (2) hosting job fairs regularly in neighborhoods with housing established for women and where women congregate. In addition, there is a lack of structure to build internal capacity within the skilled trades program. Growing internal faculty and staff by encouraging existing staff to assume teaching roles in skilled trades would be helpful. Mentoring and job shadowing opportunities are also beneficial but are lacking in many vocational education programs.

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Employer Initiatives

The lack of employer engagement and industry-led events, such as work based-learning opportunities, industry presentations and tours, apprenticeships, internships, etc., has a sizable impact on the shortage of women in skilled trades. Developing training programs in conjunction with industry positively impacts recruiting and employability (Ishengoma & Vaaland, 2016). Higher education institutions partnering with industries allows students to acquire the skills necessary for employment in that industry sector (Ishengoma & Vaaland, 2016). According to Ishengoma and Vaaland (2016), internship opportunities have the most impact on students gaining employment in their field of study. However, as the need for skilled trades workers increases, particularly during the pandemic, apprenticeships are more advantageous to aid in getting individuals back to work in skilled trades occupations (North Carolina Community College System & NC Department of Commerce, 2021). Apprenticeships offer more than internships -- long term employment, structured training, mentorship, paid experience, industry-recognized credentials -- NCCCS and USDOL Completion of Apprenticeship Certificate, as well as tuition-free college certificate, diploma, or degree from any community college in NC (USDOL, n.d.).

“Apprenticeship is an employer-driven training model that combines paid work-based learning with related classroom instruction” and “upon completion of training, participants earn state and federal certificates signifying their knowledge and skill set in a particular field” (NCCCS & North Carolina Department of Commerce, 2020, p. 2). Apprenticeships were created in the early 1900’s and the National Apprenticeship Act was enacted in 1937 through the United States Department of Labor (USDOL) to help train the workforce mainly in skilled trades occupations (USDOL, n.d.). Many apprentices were masons, carpenters, and shipwrights;

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notable apprentices included George Washington who worked as a surveyor, Benjamin Franklin who was employed as a printer, and Paul Revere who served as a Silversmith (USDOL, n.d.).

The apprenticeship program in NC, ApprenticeshipNC, is structured to align training and education with the 16 high school CTE career cluster pathways and offers over 1,000 approved apprenticeship occupations in those career pathways (USDOL, 2021). Apprenticeships provide out of school youth and high school students an opportunity to access quality skilled trades occupations through the pre-apprenticeship program (NCCCS, n.d.). The youth apprenticeship model allows high school and college students the chance to earn money while they learn on-the-job and in the classroom -- “earn and learn,” and offers a tuition waiver to NC community colleges (NCCCS, n.d.). This is a win-win for businesses, public schools, community colleges, students, and the community, while continuing to build a workforce pipeline of skilled trades workers.

Although USDOL, NCCCS, and other entities that promote apprenticeships continue referring to a skilled apprentice who has completed the apprenticeship program as a journeyman rather than a skilled craftsperson, tradesperson, journeyperson, or journeyworker, for the first time in history, the USDOL designated November 18, 2021 as the National Women in Apprenticeship Day to celebrate women apprentices and increase the number of women registered as apprentices (USDOL, 2021). Perhaps this milestone will be a turning point that will not only applaud women in skilled trades, but reassure them it is a workforce environment in which they can thrive. Establishing this designation advocates for skilled trades careers, and highlights women in male-dominated positions and helps create a positive image of women in skilled trades.

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Negative perceptions within the skilled trades industry and the industry's poor image remain issues in recruiting women into the workforce. According to Majid et al. (2018), skilled trades are portrayed as being a dirty, dangerous, and difficult industry. Since skilled trades are represented as a masculine occupation, women have limited opportunities to explore and gain awareness of careers in skilled trades. Women are less likely to be interested in careers when they are led to believe, through marketing materials, that it is an industry specifically suited for men. According to Majid et al. (2018), India regularly depicts women performing labor intensive jobs, which result in women seeking career opportunities in skilled trades. This arrangement has led to women helping to address the workforce shortage in the skilled trades industry (Majid et al., 2018).

Another strategy that has been proven to work in other areas is designing pre-apprenticeship programs that provide the hands-on training necessary to equip students with skills necessary to enter a skilled trade occupation. One example is the Tools for Tomorrow pre-apprenticeship program at all Wisconsin Technical Colleges (Richards, 2007). A wide variety of programs have been established to help recruit women in skilled trades. Women in the Skilled Trades (WIST) at North Lake Community College in Dallas, Texas, provides women with specific skills necessary to increase their income (Richards, 2007). When Australia encountered a shortage in women accessing the skilled trades industry sector, the New South Wales government recruited women in the skilled trades workforce sector that led to community-based programs recruiting women in the skilled trades workforce (Richards, 2007).

Other Occupations

Competing with other occupations that are portrayed as traditional careers for women is another cause of a shortage of women in skilled trades. These other occupations generally exist

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in a nurturing environment, like healthcare, childcare, cosmetology, and teaching, and require significantly less physical labor, whereas male suitable careers are labor intensive, associated with machinery, and more physically challenging (Majid et al., 2018). Healthcare, childcare, cosmetology, and teaching are represented as traditional roles for women.

High Schools

CTE courses are designed to enable students to segue into the skilled trades programs at community colleges; however, more high schools are abolishing skilled trades courses, creating another reason for a shortage of women in the skilled trades workforce. Limiting exposure to skilled trades classes in high school decreases the likelihood of female students pursuing skilled trades programs in the community college. The CTE classes that are still in existence are declining in enrollment and continue to be male-dominated. Research shows that although women are interested in taking CTE courses, they are being discouraged by high school counselors and faculty and directed toward other career choices that seem more fitting for women (Richards, 2007). This limits the ability of high school students to engage in work-based learning opportunities and internships. Additionally, the skilled trades industry carries a negative connotation compared to other industries, providing another reason why school counselors do not promote this workforce sector to students (Majid et al., 2018). Many of the high school CTE programs do not offer students opportunities to be exposed to skilled trades industries, which further limits exposure of students to skilled trades and increases the misconception of the industry (Majid et al., 2018).

Instructional Design

Skilled trades' classrooms and labs visually represent traditional construction sites and manufacturing shop floors, with concrete floors and dirty workspaces. Machinery and equipment

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are outdated, supplies are well used, and tools are scattered about. Even the exterior of the buildings that house the classrooms and lab areas are not aesthetically pleasing and need repair and updating. There is no labeling system or organization in many of the classrooms and labs. Women tend to compartmentalize; therefore, a cluttered environment does not visually appeal to, or feel welcoming to women. They are more confident in a clean and decluttered environment with items organized and labeled. In addition, women are hesitant to ask the names of tools, machinery, equipment, or supplies in front of a male-dominated class.

Problem of Practice within the Local Context

A-B Tech is a public two-year community college that was established in 1959 inside Asheville City limits within Buncombe County. Buncombe County is an urban area located in the Blue Ridge Mountains of western North Carolina (WNC). A-B Tech is comprised of four separate campuses – Asheville, Enka, Woodfin, and Madison, which are geographically located to serve a diverse student population. A-B Tech serves a two-county region – Buncombe County and Madison County. All four campuses are located within these two counties. There is no on-site student housing; all students commute to the College. The College has seven academic divisions, as well as the Division of Economic and Workforce Development in CE. There are 61 degrees, 61 diplomas, and 78 certificates offered at the College. Like other public colleges, A-B Tech is financially supported through a structured state funding formula based on student enrollment, which is known as full-time equivalent (FTE). There are 9,560 CU students and 13,504 CE students at the College (A-B Tech, n.d.). Although gender demographics show CU students are 58% female and 42% male and CE students are 44% female and 56% male, the percentage of students enrolled in skilled trades programs is 14% female and 86% male in CU and 22% female and 78% male in CE (A-B Tech, n.d.). The number of female students interested

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in skilled trades has been on the decline over the last three years (A-B Tech, n.d.). The significant gender imbalance of students enrolled in the skilled trades program across the North Carolina Community College System (NCCCS) is also evident: 26% female and 74% male (NCCCS, n.d.).

Since the inception of the NCCCS, local colleges have been responsive to the environment in which they operate. From the mountains to the sea, NC is so geographically diverse that each of the 58 community colleges offers vastly different programs targeted to meet the evolving needs of the businesses and communities within their service area. For example, the community colleges in the Western Region focus mainly on skilled trades and manufacturing, those in the Central Region place emphasis on research, science, and technology, and community colleges in the Eastern Region capitalize on agribusiness and agritourism (NCCCS, n.d.). Like many other community colleges, A-B Tech was organized to best respond to its environment; however, as technology advances and business demands shift, the College is adapting to the changes the environment is imposing on it. A-B Tech's survival is based on the relationship it has with its environment, particularly in CE where the emphasis is on businesses, industries, the workforce, and the community. It is necessary to recognize and understand environmental demands so that policies can be created or revised, and leadership and student outcomes can be improved. Leaders must maintain constant contact with stakeholders in the organization's environment to ensure effective communication, which is important to the success of the College. This also helps promote shared decision making (Donaldson & Weiner, 2017), which is important when collaborating with local businesses and industries.

Skilled trades are one program area that includes both CU and CE classes. This industry sector has been part of A-B Tech's CE workforce programming from the College's inception of

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workforce development programs, and new courses have developed over time in response to the needs of the community and area businesses. A shortage of women in skilled trades is a critical problem that impacts the entire college system; however, it most intensely impacts the skilled trades workforce program in CE and the engineering and applied technology division in CU; it also impacts the community and area businesses and causes a shortage of workforce in such a high demand industry sector.

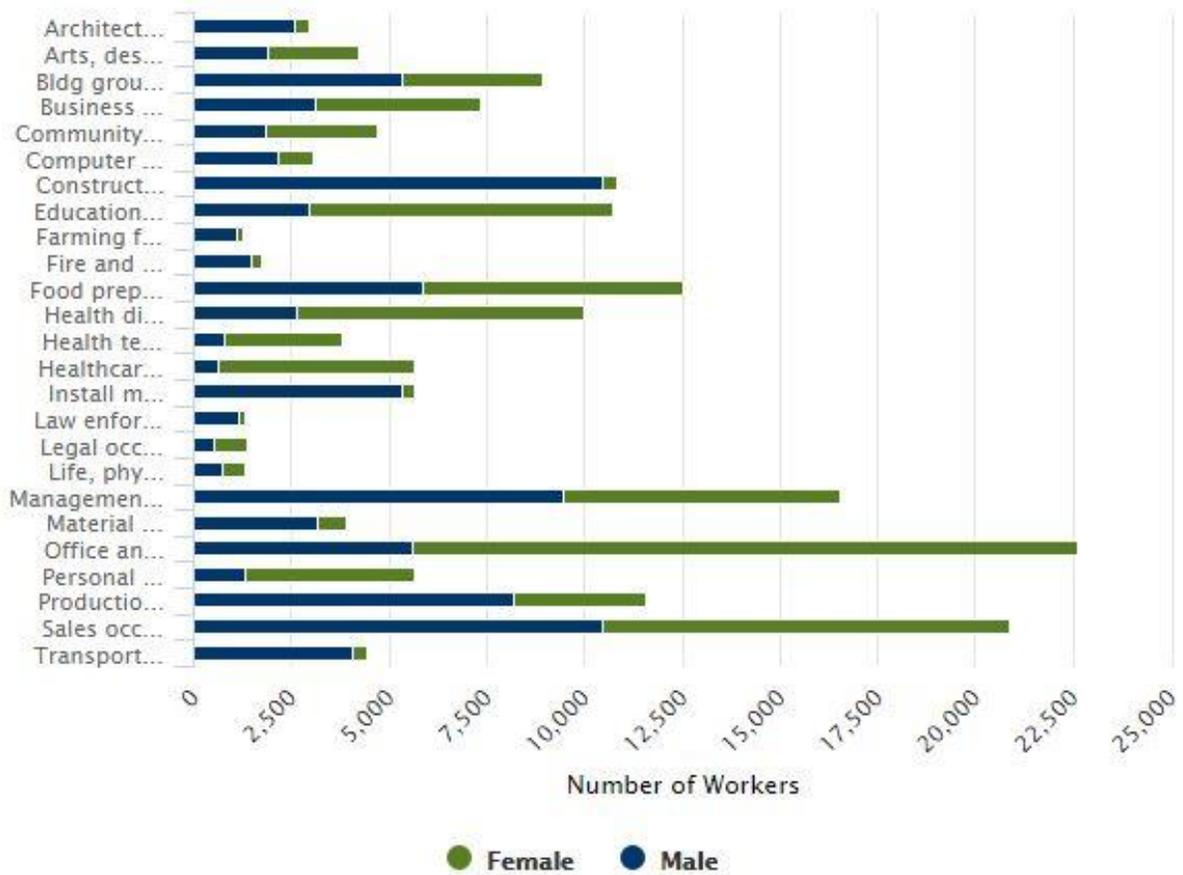
Although on-the-job training is invaluable, employers prefer students who have at minimum, the basic knowledge and skills to work in the skilled trades industry sector. The community colleges are responsible for developing and “refining academic curriculums to best prepare students for the construction work of the future” (Becker et al., 2011, para. 39). Skilled trades programs deliver workforce skills that are valuable to local employers and support the need of individuals to be successful (Mortrude, 2017). With increased access into skilled trades, students are more marketable for high-wage, high-demand employment opportunities in the construction industry (Alssid et al., 2002). Additional students will increase FTE for A-B Tech and generate more skilled labor for the skilled trades industry. An increase in skilled trades workers will boost the economy and benefit the community through the services provided. In the NC Works July 2019 report, construction trades ranked 9th in the top 10 occupations in demand, with 364 job openings within A-B Tech’s service area. In years past, these types of jobs have not been filled by women. Figure 3 includes the most recent data from the North Carolina Department of Commerce’s (NCDOC) Labor and Economic Analysis Division (LEAD) that document a major disparity between women and men in the skilled trades industry, which includes construction. This is another indicator of the seriousness of the gender disparity in A-B Tech’s labor market area. Figure 4 further breaks down the skilled trades positions and also

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shows there is a disproportionate representation of women compared to men in these positions in NC.

Figure 3

Skilled Trades Occupations by Gender in Mountain Area Workforce Development Region



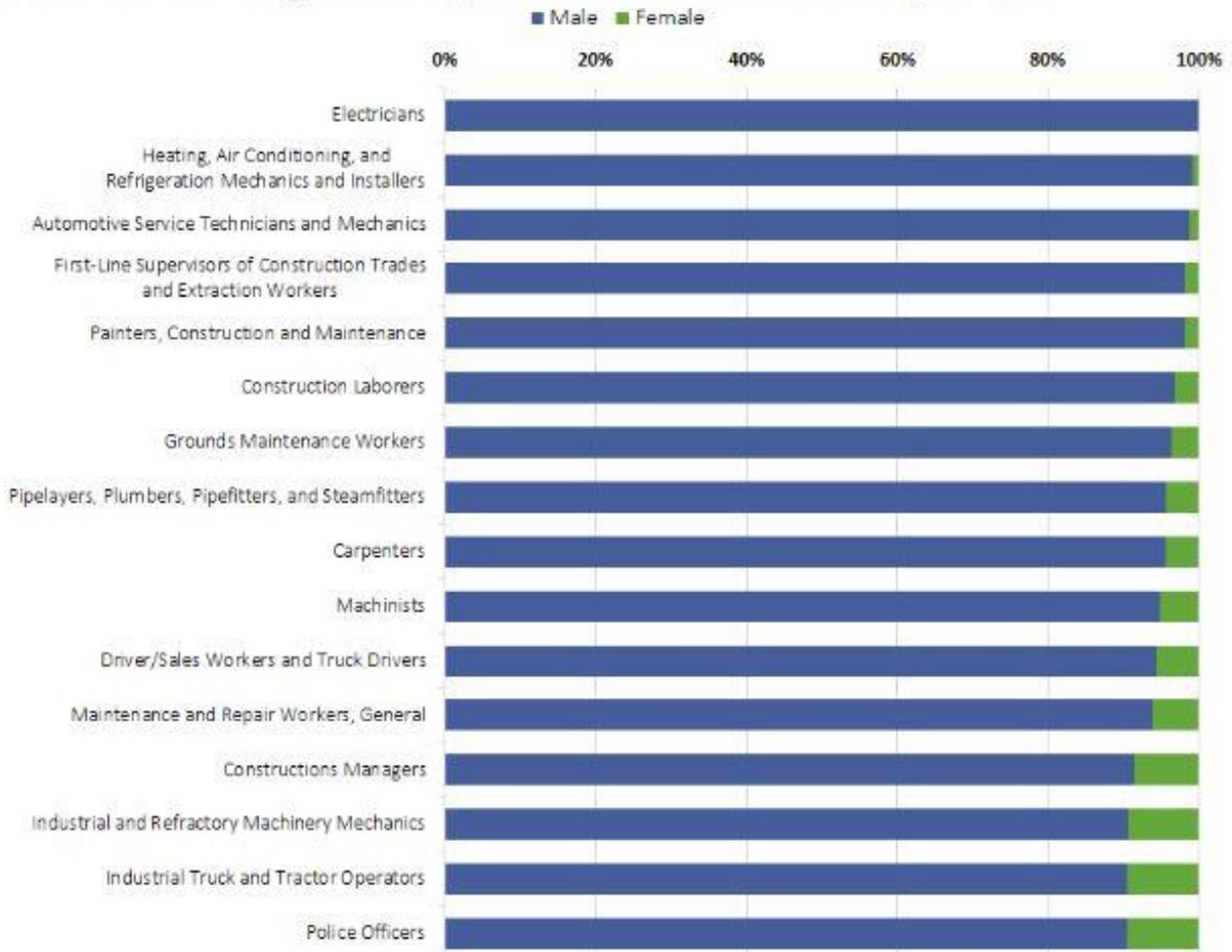
Note. Women are significantly underrepresented in the construction trades workforce in A-B Tech's workforce development region.

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Figure 4

Male-Dominated NC jobs

Male-Dominated NC Jobs with 10,000 or more Full-Time Workers, 2013 ACS



Data Source: 2013 ACS, IPUMS-USA
Among 25-64 year olds working 30+ hours per week.



Note. Female workers are a minuscule part of the skilled trades workforce in NC.

A-B Tech’s neighboring college, Haywood Community College (HCC), is also experiencing a shortage of women in its skilled trades program that is contributing to labor shortages. It is causing the institution to rethink its approach to workforce training in skilled trades (Johnson, 2018). To remedy the problem, HCC suspended its construction diploma and instead offers more short-term classes in this program area to best respond to the huge demand

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for construction jobs (Johnson, 2018). Prior to this action, females comprised a mere 12% of the students in the classes since 2013, and in 2017 not a single female student registered for skilled trades classes (Johnson, 2018). They are also working to restructure their recruiting efforts, and devise strategies for more of a target marketing approach.

To help reignite HCC's construction technology program, in Fall of 2021 the DOL, in partnership with the Appalachian Regional Commission (ARC) awarded HCC a workforce initiative grant to develop new training programs through CE that will build a pipeline of skilled trades workers for the local industries (HCC, n.d.). HCC workforce leaders intend to create Project UP, which will center the training on construction and expand their programing to include plumbing and HVAC while creating a career pathway for justice involved individuals (HCC, n.d.). Project UP will be a tool for HCC to use for marketing to women and recruiting them into their skilled trades programs.

Although A-B Tech has implemented workforce initiatives targeted at recruiting more students into all their programs, including skilled trades, there has not been a focus on creating awareness and recruiting women in skilled trades. There have been a variety of outreach and career events targeted toward high school students, as well as recruiting events highlighting all A-B Tech's program areas, but none have been specific to women or particularly focused on women in skilled trades. In addition, the career awareness, outreach, and recruiting events have been primarily led by the College rather than by industries. Instead of creating a new partnership between the College and local skilled trades industries to establish industry-led career initiatives that directly market skilled trades to women and actively recruit women into the skilled trades workforce sector, I determined the most effective route would be to make use of an existing

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industry partnership the College had and expand it into a formalized structure to focus on women.

Under my leadership, years ago Raising Awareness of Manufacturing Possibilities (RAMP) was created to be a community-wide workforce initiative that would eventually be led by local industries in skilled trades, construction, and manufacturing. This initiative originated at the College as a partnership with local industries, local public high schools, the Mountain Area Workforce Development Board (MAWDB), and the NCCCS Apprenticeship Division (ApprenticeshipNC) to develop a workforce pipeline from the local high schools through creating awareness and generating interest in skilled trades, construction, and manufacturing careers. Currently, RAMP still exists and continues to be focused on high school students. Realizing that (1) the previous recruitment methods were not generating an increase of women enrolling in skilled trades, (2) were not they designed to attract women specifically, and that (3) there was a lack of attention to the problem, I saw an opportunity to expand RAMP to target women in skilled trades and help alleviate the gender disparity.

Theory of Improvement

While gender diversity is important on all college campuses and A-B Tech demonstrates this fairly well among the student body, there are few female students in the program area of skilled trades. Highlighted in Figure 5 is a driver diagram that shows components or “key improvement hypotheses, called *primary drivers*” (Bryk et al., 2015, p. 74), which have been identified as critical to improving gender diversity in the skilled trades workforce. The driver diagram represents the analysis of primary and secondary drivers, as well as specific change concepts (Bryk et al., 2015). The primary drivers related to the problem of practice are community awareness, industry-led and employer-driven initiatives, and instructional design.

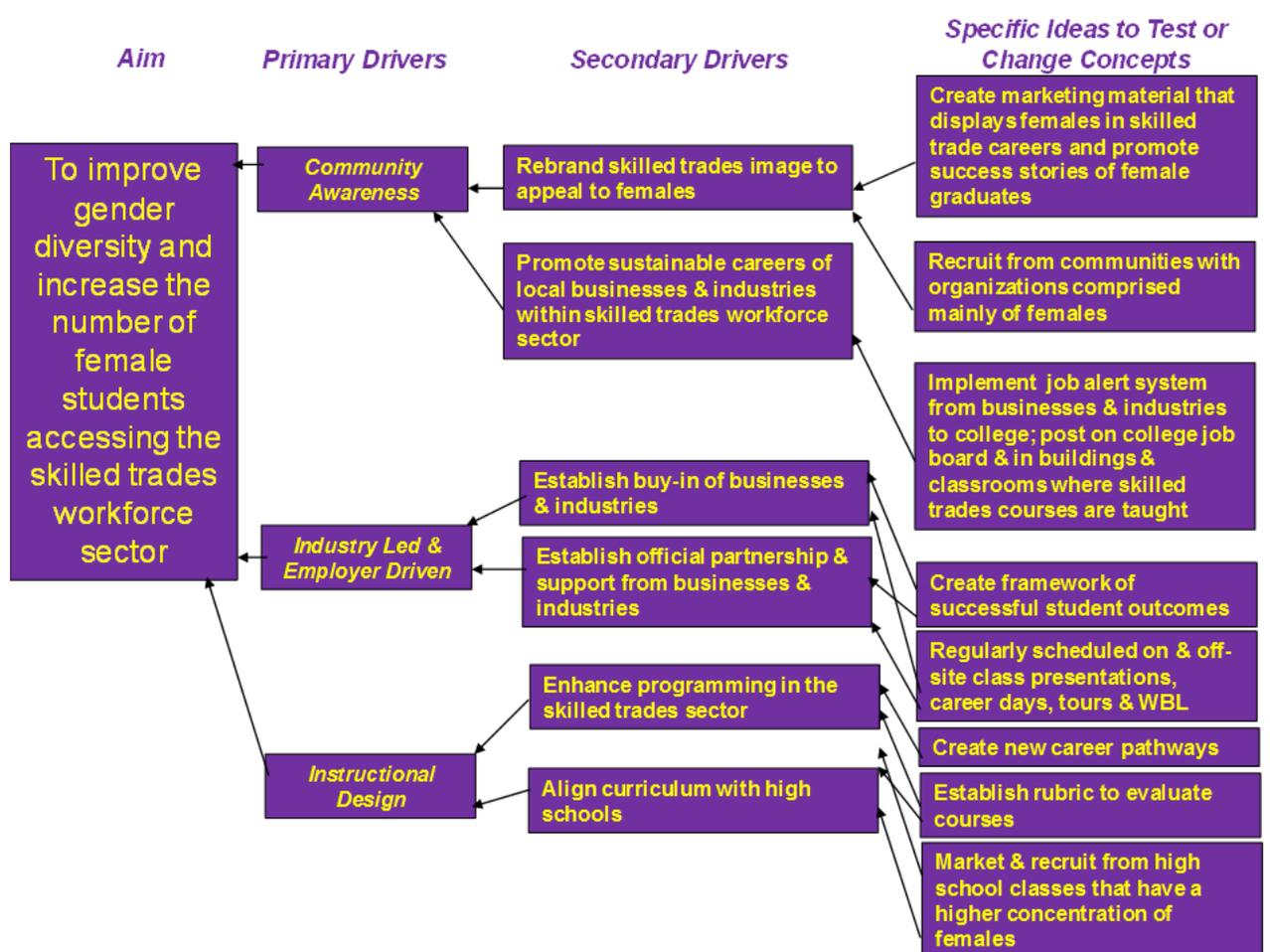
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The primary driver I focused on for this improvement initiative was industry-led and employer-driven initiatives. I hypothesized that industry-led and employer-driven initiatives would have a positive impact on increasing the number of female students accessing the skilled trades workforce. Secondary drivers are necessary components that support the primary drivers and help identify relevant change ideas (Bryk et al., 2015). Change ideas that were used to work toward improving the primary driver are (1) collaborate with workforce partners to create industry-led career events, (2) develop marketing strategies, and (3) promote skilled trades. It is imperative to the change process to include female and male workforce partners of diverse backgrounds. This will help to gain different perspectives and ensure inclusiveness of all students when focusing on creating awareness and recruiting women into the skilled trades workforce sector.

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Figure 5

Driver diagram



Note. The analysis of primary and secondary drivers, as well as specific change concepts are necessary to meet the aim.

Catron (2016) discusses how crucial it is to have industry professionals leading the career efforts and collaborating with the community colleges to develop programs that can serve as a sustainable pipeline of skilled workers for years to come; however, these programs need to remain current in their teachings and technologies. Developing marketing strategies in collaboration with stakeholders that align with the values and benefits of the skilled trades industry will further entice women to consider careers in skilled trades.

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To ensure changes are an improvement, they were tested through Plan-Do-Study-Act (PDSA) cycles (Langley, 2009), to ensure that the initiative was a continual improvement. According to Bryk et al. (2015), multiple approaches are necessary to develop a change idea that works (Bryk et al., 2015). As the demand for skilled labor rises, additional change ideas will likely surface.

For this improvement initiative, I proposed to focus on industry-led career events. My theory of improvement maintains that: *Industry-led marketing initiatives and marketing practices focused on women in skilled trades careers will result in enhanced women's career-related self-efficacy and increase their exposure to skilled trades and awareness of work-based learning opportunities leading to improved gender diversity and an increased number of female students accessing the skilled trades workforce sector.* This change initiative was designed to create equity in the skilled trades programs at A-B Tech. With A-B Tech's pledge to improve diversity in their programs and on campus, this work will enhance that effort.

Improvement Methodology

After an examination of the drivers, for my intervention, I determined the best approach was to focus on industry-led career events to increase the number of women in the skilled trades workforce sector. The improvement initiative was implemented in A-B Tech's two county service area – Buncombe County and Madison County. Although all the career events were initially planned for in-person, we were only permitted to conduct one career event in-person. Due to COVID-19 mandates and safety measures implemented by local industries, most of the career events were virtual with the option of participants to meet in-person at the Asheville NC Works Career Center (the Career Center) to participate in the events. Social distancing and mask wearing requirements were adhered to by those who chose to meet in-person, including some of

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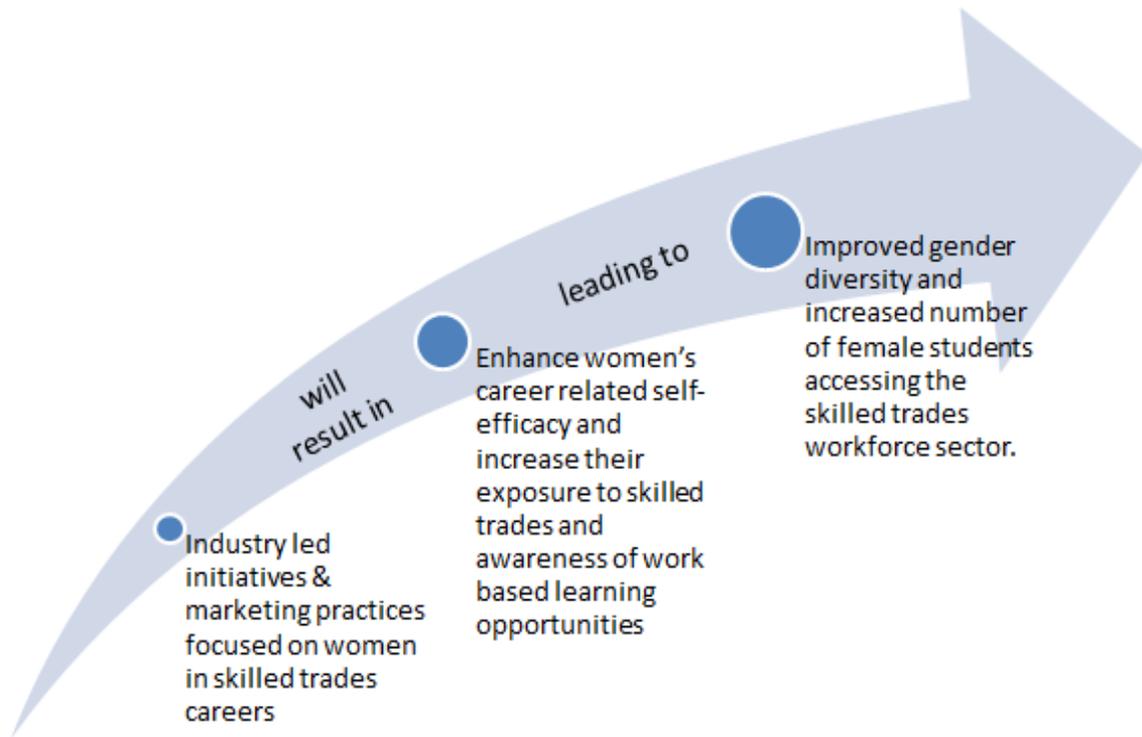
the intervention participants, design team members, and myself. Utilizing RAMP as the foundation to springboard to industry-led career events targeting women in skilled trades, female industry leaders from RAMP were selected to lead the career events. This helped to effectively market skilled trades to women and successfully recruit women into the skilled trades workforce sector, which increased awareness and exposure of skilled trades to women. This approach ultimately increased the number of women in the skilled trades workforce sector. By providing an opportunity for women to outreach to other women, it allowed them to (1) understand the wide variety of occupations that are categorized as skilled trades, the career opportunities in skilled trades, and (2) see themselves in positions relating to construction and manufacturing.

A small pilot group of six female job seekers, who will hereafter be referred to as intervention participants, were recruited from the Career Center to take part in this intervention to determine if the improvement initiative worked. Five of the intervention participants were unemployed and one intervention participant was underemployed, working part-time at the time of the intervention. However, all six of the intervention participants were actively seeking full-time sustainable employment in A-B Tech's service area. Figure 6 provides an overview of the improvement initiative.

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Figure 6

Improvement Initiative



Note. Industry-led initiatives will ultimately increase the number of female students accessing the skilled trades workforce.

Literature Review of Improvement Initiative

Programs established through a partnership among community colleges and businesses and industries can effectively address the shortage of women in the skilled trades workforce. To inspire more women to work in skilled trades, industry-led career events need to be established that promote and support women in traditionally male-dominated positions. Majid et al. (2018) wrote about the Women on the Tools (WotT) program in the UK that was created to help industries recruit and retain women into the skilled trades workforce. In South Africa, South

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African Women in Construction (SAWIC) was formed to encourage women to pursue skilled trades and address matters of concern related to women in the skilled trades workforce (Majid et al., 2018).

According to Majid et al. (2018), recruitment of women should begin in secondary school and have strong support from government organizations and industry leaders. There is not a recruitment process in secondary school, which contributes to the problem. A more skilled workforce is still in demand, and high school CTE courses that segue into community college skilled trades programs are acknowledged as a solution to workforce training (Stevens et al., 2019). Some research recommends beginning as early as elementary and middle school presenting images and opportunities of females in traditionally male-dominated occupations (Richards, 2007).

Peer support helps overcome the challenges women face gaining access to careers in skilled trades. According to Sugerman (2019), Chicago Women in Trades (CWIT) was established from a series of informal dinner gatherings, where women began mentoring and supporting other women, then expanding into pre-apprenticeship training and providing technical assistance to contractors within the skilled trades industry.

Building women's success in apprenticeship is important and can be accomplished by creating committees and mentorship programs (Sugerman, 2019). According to Knutson (2019), industry-education partnerships help students advance their education, and since learning occurs on the factory floor, collaborating with industry partners shares the financial burden, builds a workforce pipeline, and helps design and align curriculum with the skillset industry needs. Colleges should create a learning environment that blends education and industry (Knutson, 2019). An example of this environment is the Virginia's Commonwealth Center for Advanced

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Manufacturing (CCAM), which is a collaboration between education and industry whereby both sectors work in tandem on research and application (Knutson, 2019).

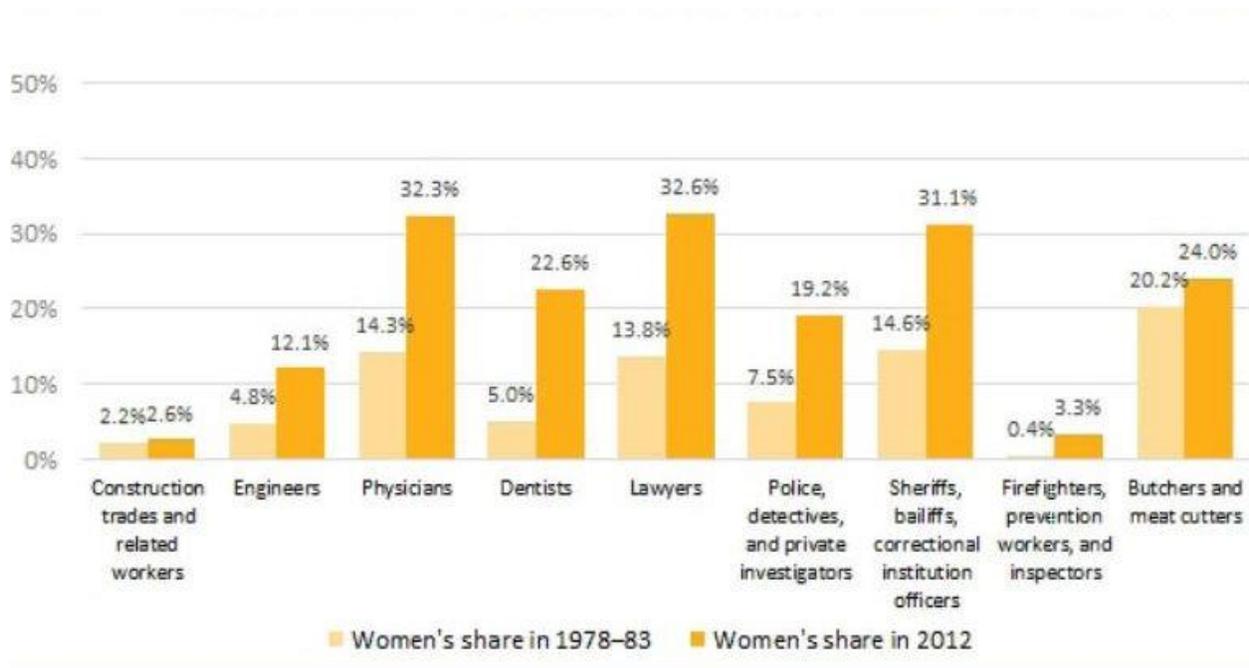
Research shows that women are more likely to be interested in careers that are traditionally male-dominated when they are exposed to powerful female role models within the industry (Beilock, 2019). According to Beilock (2019), women who have employer support can thrive by connecting with women mentors in the industry sector. Furthermore, the younger generation needs to be exposed to female role models. Opportunities in skilled trades need to be emphasized to female students in high school to help them understand the variety of opportunities and benefits available to them in skilled trades careers.

In skilled trades, apprenticeship programs are the pathway to careers but industries typically do not seek out women to apprentice in the traditionally male-dominated occupations. Gaining access to information and applying for apprenticeship programs are usually controlled by the industry, and because the skilled trades industry is comprised mostly of men, this further complicates women's ability to gain access (National Women's Law Center, 2014). Figure 7 shows that women's share of male-dominated occupations has remained low for decades, illustrating the need for additional measures to increase their numbers (National Women's Law Center, 2014).

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Figure 7

Women's share of Male-Dominated Occupations



Note. From 1978 to 2012 there was only a .4% increase in women in the skilled trades workforce in the U.S.

Milgram (2011) indicated the most successful recruitment strategies are ones where women see gender role models in the workforce who look like them; the key is that they see this depicted repeatedly. Other research based on targeting women and centering them in specific careers that have proven effective are, “Rosie the Riveter,” organized by the U.S. government depicting Rose Monroe promoting women working in factories during World War II. This public campaign contributed to a 57% increase in women in the workforce (Milgram, 2011). Other successful outreach events targeting women include the National Institute for Women in Trades, Technology and Science (2020) CalWomenTech Projects that included women role models pictured on marketing materials, women hosting workshops about skilled trades and technology

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to groups of women, and career fairs focusing on women in the skilled trades, manufacturing, and technology sectors.

Increasing the number of women in the skilled trades workforce sector will require a partnership between community colleges and local industries to develop and execute a local outreach and recruitment campaign that focuses specifically on women. To entice women, local skilled trades businesses and industries need to articulate the reasons women would benefit from entering the skilled trades workforce such as good healthcare benefits, retirement plans, the ability to advance in the company, and be paid above average wages with which they can effectively support families (Roberts, 2007). On-the-job-training is beneficial for women to gain exposure and experience with the trade and overcome any skepticism they have. According to Richards (2007), a formal framework needs to be established for a stronger on-the-job training program, as well as a mentoring program for women pursuing apprenticeships.

Alternative learning strategies, such as apprenticeships in skilled trades, are available but not well known. This is an ideal approach to receiving on-the-job training, and a nationally recognized credential that oftentimes yields incentive pay. Outreach and marketing can help improve the image of skilled trades careers. Waldon (2013) suggests that fewer women are interested in pursuing skilled trades, and “the emphasis on college education and a white-collar career path is reinforcing a societal barrier to the construction field, where the image of blue-collar labor still prevails” (p. 1). According to Makhene & Thwala (2009), this requires intervention by the skilled trades industries to execute industry-led career events such as skilled trades day/week and skilled trades career fairs at secondary and post-secondary schools.

A tangible approach to combat the shortage of women in skilled trades programs is to transform the instructional design of CE through restructuring the occupational and skilled trades

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programming, training, outreach, marketing, and recruitment at the community college. Dr. Chris English, former Vice President of Economic and Workforce Development in CE at neighboring Blue Ridge Community College (BRCC), explained that they have gained much momentum through collaborating with partners to create an industry-led initiative, developing target marketing strategies, and promoting skilled trades as a sustainable career. Articulating credit in a few of their skilled trades classes and developing target marketing strategies has also helped them to increase the number of women in the skilled trades workforce sector. Collaborative efforts with industry partners, the local chamber of commerce, and high schools are other effective approaches. BRCC is starting an apprenticeship program, Apprenticeship Blue Ridge, that is a different model from A-B Tech's; it seems to be gaining momentum with high school students. A-B Tech would likely benefit from adopting Blue Ridge's model; however, additional staff is necessary for effective implementation. This approach would allow A-B Tech to expand its apprenticeship offerings in skilled trades and utilize the employer membership dues to market and recruit more female students.

Apprenticeship Blue Ridge is a collaboration among BRCC, Henderson County Public Schools, Henderson County Partnership for Economic Development, Made in Henderson County Partnership, and Henderson County manufacturing and skilled trades industries to transition high school students and college students into high demand careers in automotive, electrical, manufacturing, business and banking (BRCC, n.d.). In partnership, they have created a consortium of similar industries and built an apprenticeship program that is sponsored by BRCC whereby the industries pay into an apprenticeship program and benefit from collective marketing, outreach, and recruitment efforts (BRCC, n.d.). Additionally, BRCC has partnered with a local staffing agency that serves WNC industries to be the first agency of its kind to offer

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an apprenticeship program (BRCC, n.d.). The affiliation that BRCC has with the staffing agency not only benefits the industries within the consortium by providing them with access to qualified applicants that use the staffing agency to search for employment, but BRCC profits from the FTE gained from offering the related instruction.

To alleviate the labor and skills shortage in Hong Kong, the construction industry is partnering with workforce stakeholders, construction related industries, and government to: (1) improve the image of the industry, (2) provide more training incentives to recruit new students and upgrade the skills of existing workers, and (3) allocate resources to attract and train minorities (Ho, 2016). Their partner for high-quality training, Chartered Institution of Building, is an educational institution that promotes career pathways in construction, similar to that which occurs with the NCCCS. The strategies that increased the labor supply of skilled workers in the construction industry were government interventions to provide training incentives for recruitment and the resources to attract and train minorities. (Ho, 2016). This approach could be offered at A-B Tech in collaboration with local skilled trades and manufacturing industries.

Toppin (2018) suggests that expanding apprenticeships, re-introducing building and skilled trades programs, and changing marketing from menial to meaningful will help persuade women to consider skilled trades as a career option. Two of the benefits of apprenticeships are that 91% of apprentices find employment after completing their program, and their average starting wage is greater than \$60,000 (Toppin, 2018). This resulted in the United States Department of Labor (USDOL) investing \$265 million since 2015 to increase apprenticeships (Toppin, 2018). Apprenticeships and other work-based learning opportunities tend to yield a more committed workforce when the student is matched with the appropriate job. Re-introducing skilled trades programs that were once taught in high schools, is another tactic to attract women

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to skilled trades. Many of the area high schools have significantly decreased their CTE classes, which were formerly known as vocational education. Such decline greatly impacts the supply of potential workers in the skilled trades workforce.

A movement to re-align marketing of skilled trades careers is a valid strategy as well. Educators, parents, students, industries, and the community would all benefit from this effort. To re-image skilled trades careers, Toppin (2018) reports that the State of California is spending \$6 million on a campaign to revive the reputation of vocational education, and \$200 million to improve its delivery. This is perceived as a “cultural rebuild” (Toppin, 2018). For years, and still today, the message is to go to college, earn a degree, and secure optimal employment. However, this mentality of focusing on academic instruction has led to neglect of career education (Toppin, 2018). Students can access both academic and career education through a community college with more hands-on skills and less time and debt invested, and gain employment sooner than they would if they enrolled in a four-year college. Through the NCCCS ApprenticeshipNC program, students can earn money from an industry by becoming an apprentice, while simultaneously being enrolled in high school and taking coursework that is related to the industry in which they are apprenticing. Additionally, the student can obtain free tuition at a NC Community College if they continue with the apprenticeship program following high school graduation.

To help attract more women into this growing industry, Callan et al. (2015) note that “training organisations in Australia are using blended forms of e-learning to provide more responsive, flexible and innovative training” (p. 1). In addition, using today’s creative approach to student-centered teaching – where students are engaged in learning outside the classroom and less emphasis is placed on textbooks (Course Hero, 2018, 41:40) – seems to be a feasible option.

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This is an option that will most likely appeal to single mothers and female caregivers who desire to succeed financially (Roberts, 2007).

Improvement Initiative Design

My improvement initiative is designed to increase diversity and improve gender equity in the skilled trades workforce, thereby increasing social justice. My improvement initiative proposes that collaborative, industry-led and research supported marketing initiatives centering women in skilled trades careers, and targeted toward women, will: 1) increase women's awareness of employment opportunities in skilled trades, and 2) increase women's self-efficacy related to skilled trade employment, resulting in gainful employment for women and a more equitable representation of women in the skilled trades professions. Recognizing the problem, identifying root causes and primary drivers, collaborating with stakeholders, as well as utilizing P-D-S-A cycles, allowed for successful accomplishment of the goals mentioned above.

Design Team

The improvement process included engagement and feedback from design team members, who were chosen based on their expertise and the contributions they bring to the table, which directly relate to the problem of practice. The design team members are local stakeholders who serve in an advisory capacity and helped guide the improvement initiative. Their feedback was helpful in identifying changes that were necessary for continual improvement. Each design team member has their own unique workforce experience. Their individual backgrounds include private industry, academia, government, and self-employment. These varied experiences were useful in helping implement the improvement initiative. They all have experience with college students, recruiting, and marketing.

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The design team members included (1) college faculty and staff working in departments that are aligned closely with skilled trades and manufacturing programs and who work with CU and CE programming, as well as (2) administration from workforce development partnering agencies, and (3) industry leaders who partner with the College on workforce development initiatives. Each team member is knowledgeable of the College's recruiting practice and uses their expertise to promote the College's programs. Their connection with other workforce partners and local industries helped contribute to the implementation of the improvement initiative.

The design team includes the Dean of Engineering and Applied Technology; the Instructor of Computer Technologies; the Director of Work-Based Learning and Apprenticeships; the Manager of the Asheville NC Works Career Center; the Director of MAWDB; and the Director of Asheville Home Builders Association (AHBA), who is also a member of A-B Tech's Business and Industry Advisory Committee.

The Dean of Engineering and Applied Technology, formerly the Chair of Electrical, Electric, and Computer Engineering, has worked in CU and CE at the College for nine years in faculty and staff leadership roles focused on skilled trades, manufacturing, and engineering. In all his positions at the College, he has a responsibility to develop innovative programs and increase enrollment in the program area specific to my interest/intervention. He is also an Authorized OSHA Outreach Trainer for General Industry and Construction and previously served in senior leadership roles in skilled trades industries.

The Instructor of Computer Technologies has been with the College for 30 years, serving many years as the Chair of Computer Technologies. She also has served as a Principal

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Investigator for a National Science Foundation project entitled Skilled Workers Get Jobs, which promotes women in technology careers.

The Director of Work-Based Learning and Apprenticeships has 10 years' experience at the College working with local industries to create job opportunities for students, specifically in the skilled trades and manufacturing workforce sectors. She is tasked with creating new work-based learning opportunities for students and increasing the number of students in existing work-based learning opportunities, as well as helping to align students with career opportunities and industries that are suitable to their skillset. Prior to joining the College, she held several positions with the North Carolina Association of Manufacturing Alliance (NCAMA), where she was responsible for creating internships for college students and recruiting them to intern with advanced manufacturing companies.

The Manager of the Career Center has been an adjunct instructor at A-B Tech in Human Resources Development and Computer Technology for 19 years and has had several leadership positions at the Career Center that focuses on helping job seekers with employment services to better prepare them for and connect them to suitable jobs. The Career Center is a state government agency that provides employment services to job seekers and helps employers find qualified applicants. The Career Center has a long-term partnership with A-B Tech to provide skills training and employment services to students and job seekers.

The Director of MAWDB has 20 years' experience working in workforce development, serving the last six years in his current capacity. Prior to joining MAWDB, he was a Business Service Representative for the North Carolina Department of Commerce at the Career Center, where he assisted businesses and industries with their workforce needs. He has also served as a Trustee for A-B Tech.

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The Executive Director of AHBA manages the general operation of the AHBA. She has served in this leadership capacity for the past three years. She is an advocate for skilled trades and encourages women to join the skilled trades industry by providing educational opportunities to the members. AHBA partners with the College to promote the skilled trades programs.

The design team intentionally consists of a balanced representation regarding gender. Members of the team were selected based on their knowledge and experience in workforce development, skilled trades, and their understanding and commitment to increase the number of women in the skilled trades workforce. Members of the design team were instrumental in (1) helping generate survey questions, (2) approving a timeline of activities, (3) coordinating partnership efforts, (4) encouraging engagement of industry representatives, and (5) documenting minutes from the focus group meetings.

I finalized the selection of the design team members and met with them in Summer 2021 to discuss and strategize a Fall 2021 implementation plan. I sought their input, and made the appropriate adjustments based on their recommended changes. The design team also approved the implementation plan. Progress updates of the initiative were provided to the design team for feedback and suggested changes.

Intervention Participants

Working in conjunction with the design team, I identified and recruited a pilot group of six female job seekers who were willing to participate in this improvement initiative. Each intervention participant had taken at least one class previously at A-B Tech, although none of them were students at the time of this intervention. Although they share the same commonality as being job seekers, they are not working together, as a group of students or employees would. As such, they are a randomly selected group and it was challenging to assemble them

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simultaneously. Not being an organized group with a consistent or mandatory meeting schedule, it was sometimes difficult to bring them all together for data collection. The smaller sample size does however result in ease of management, while still being indicative of the small number of women currently in the skilled trades workforce. It serves as a decent representation for the improvement initiative. A better outcome would more likely be obtained with a larger formal organized group.

Pseudonyms were used to protect the confidentiality of the intervention participants (Olsen, 2012). They have had variability in their employment history but were actively seeking sustainable careers in various occupational fields. They were pursuing employment services through the Career Center to help with their job search and placement. This improvement initiative not only exposed them to a variety of skilled trades and helped them increase their knowledge of career opportunities in skilled trades, but it also connected them with the local industries that were hiring for those careers. This connection was helpful for them to learn about the training necessary for the skilled trades occupations that were featured.

Implementation Plan

In collaboration with the design team members, I organized strategic industry engagement, marketing, recruitment, and outreach events focusing on and targeted toward women and led by women industry representatives. These events were referred to as industry-led career events. All of the industry-led career events were originally planned as in-person career fairs, career exploration days, workshops, industry tours, open houses, presentations, lunch-and-learns, and work-based learning and apprenticeship showcases. But because of the COVID pandemic and other circumstances out of our control that contributed to a delayed start to the improvement initiative, the industry-led career events consisted of only one career fair, one

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career exploration, one industry presentation, and one industry tour. All of the industry-led career events were conducted virtually except the industry tour, and we were able to conduct that one in-person. There was not enough time within this improvement initiative to conduct the other industry-led career events mentioned above, although data from the industry-led career events that were held indicates the improvement initiative would continue to be successful. In addition, all industry-led career events were initially planned to align with the timing of enrollment for skilled trades training programs that were specific to the skilled trade occupation that was featured, but the impact of COVID-19 shifted the enrollment schedule, not allowing time for the first industry-led career event, the career fair, to be rescheduled. However, the career exploration, the industry presentation, and the industry tour were aligned with the skilled trades classes that matched the skilled trades occupations on which each event focused.

Marketing materials featured women working in skilled trades at local industries and highlighted women's success in skilled trades. The materials also included information on the College's skilled trades training programs and the schedule of classes. Marketing materials were displayed virtually immediately before the industry-led career events as a prelude to the event and to advertise training programs that aligned with the skilled trades occupation being demonstrated. Weblinks to career opportunities, training programs, and the local industry that was presenting was placed in the virtual chat panel for the intervention participants and attendees.

Timeline

Following WCU and Institutional Review Board (IRB) approval, my improvement initiative began in October 2021. During this time, the U.S. was experiencing the effects of two new COVID-19 strains – the Delta variant and Omicron variant (Centers for Disease Control and

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Prevention [CDC], 2022). Safety protocols were reactivated, including mask wearing and social distancing. This contributed to a delay in the timeline. In late August 2021, I finalized the selection of the design team members. In early October 2021 the intervention participants were recruited through an information session at the Career Center. During this time, I also collected data for student enrollment, which was used for a baseline. Data revealed there were 51 students enrolled in skilled trades programs in Fall 2020. The gender breakdown was 86% male and 14% female. The intervention consisted of four 21-day P-D-S-A cycles that began in early October 2021 and ended in early January 2022. Initially, the P-D-S-A cycles were planned to begin earlier and to be conducted over a 30-day timeframe; however, due to the academic program schedule changing and government mandates relating to COVID-19, adjustments to the timeline were necessary. Another significant delay due to COVID-19 was the recruitment of the intervention participants because the Career Center staff was working remotely and limiting in-person visitors, including job seekers during the timeframe planned to recruit the intervention participants. Additionally, the Thanksgiving, Christmas, and New Year's holiday impacted the timeline by decreasing the amount of time available for the implementation. Figure 8 displays the implementation timeline that was followed. Although there is not enough time in the improvement initiative to see the implementation plan to completion, the intermediate goal for a 20% increase in women enrolling in skilled trades workforce sector by December 2021 was successfully accomplished. This short-term accomplishment will help meet the long-term goal of a balanced representation of men and women pursuing the skilled trades workforce, provided the improvement initiative is followed. In the recommendations section, I have included strategies that will likely help the College to approach a more equitable representation in skilled trades more quickly.

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Figure 8

Implementation Timeline

	August 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022
Design Team Meetings	✓	✓	✓	✓	✓	✓
Collect Student Registration Data			✓	✓	✓	✓
Devise Marketing Strategies Focused on Women in Skilled Trades			✓	✓	✓	
Collaborate with Industry Leaders to Design Initiatives		✓	✓	✓	✓	
Implement Industry-led Career Events			✓	✓	✓	✓
Recruit Six Female Job Seekers			✓			
Conduct Pre-Survey			✓	✓	✓	✓
Conduct Post-Survey			✓	✓	✓	✓
Focus Group Meetings			✓	✓	✓	✓
Observations					✓	

Note. Timeline for implementation of industry-led career events.

P-D-S-A Cycle

Improvement science was used to determine if the changes produced improvements (Crow et al., 2019). According to Bryk et al. (2015), improvement science is an action-research design that uses rapid tests of change to lead the development, revision, and adjustment of change initiatives in education. Within the improvement science framework, four P-D-S-A cycles were conducted, and data were collected and analyzed to help guide continuous improvement and revise processes to yield better outcomes by focusing on these three

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fundamental questions: What are we trying to accomplish? How will we know that a change is an improvement? What changes can we make that will result in an improvement? (Langley et al., 2009).

Prior to each industry-led career event, a pre-survey was completed by the intervention participants. The pre-survey included six questions and was intended to take no more than five minutes to complete (see Appendix A). At the end of the industry-led career event, a post-survey was completed by the intervention participants to assess their awareness and interest in skilled trades (see Appendix B). The post-survey consisted of eight questions and was intended to take no more than five minutes to complete. Data collected from pre-surveys were analyzed and compared to post-surveys to determine if the interventions were working or alerted me that a change was necessary. Descriptive statistics was used to compare the data and summarize the findings. A statistical test was not performed because six intervention participants are too small of a sample size to yield adequate results. According to Tanner (2012), using sample sizes that are too small affects the reliability of the results of the survey.

Sample questions from surveys include:

Pre-survey question: Do you know what skilled trades are?

- Yes
- No
- Somewhat

Post-survey question: Do you have more of an awareness of skilled trades?

- Yes
- No
- Somewhat

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Pre-survey question: Are careers in skilled trades appealing to you?

- Yes
- No
- Somewhat

Post-survey question: Will you be more likely to pursue training or a career in skilled trades?

- Yes
- No
- Somewhat

Pre-survey question: Are you aware of any training programs in the area for skilled trades?

- Yes
- No
- Somewhat

Post-survey question: Are you more aware of the skilled trades training programs in this area?

- Yes
- No
- Somewhat

Pre-survey question: Are you aware of any career opportunities in skilled trades in the area?

- Yes
- No

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- Somewhat

Post-survey question: Are you more aware of the skilled trades career opportunities in this area?

- Yes
- No
- Somewhat

Post-survey question: Did you register for any skilled trades training program?

- Yes
- No

In addition, a focus group was convened after the career events to assess the intervention participants' awareness, knowledge and, interest in skilled trades training programs and career opportunities. Focus groups were used to generate an open and thorough discussion of intervention participant's understanding of skilled trades and gain insightful feedback about the career events. Intervention participants were given nine open-ended focus group questions that were designed to take no more than 30 minutes to discuss (see Appendix C). Minutes were taken and feedback was analyzed after each career event by comparing focus group outcomes with the outcomes of the previous career event.

Observations were also conducted to obtain information on the intervention participant's behavior and the amount of communication and engagement. Data collected included participant's questions and comments, as well as their non-verbal expressions. Information obtained through observational data was helpful in determining what changes needed to be made for continuous improvement.

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The first P-D-S-A cycle included the planning of the career fair. Once the implementation plan and assessment tools were approved during the first P-D-S-A cycle, each P-D-S-A cycle consisted of the following phases: Plan, Do, Study, Act. During the planning phase, the design team members finalized and approved the implementation plan and survey assessment tools and planned the virtual career fair. Industry leaders from RAMP were selected and scheduled to present, and the intervention participants were informed of the event and invited. I facilitated each of the industry-led career events. During the do phase, the virtual career fair was conducted, and all of the intervention participants attended. I had the intervention participants complete the pre-survey before the career fair and the post-survey following the career fair and assemble for a focus group meeting after the event. To determine if an improvement occurred, I used a mixed methods approach. I used quantitative surveys for a quick determination of the knowledge, awareness, and interest intervention participants had about skilled trades. In focus group meetings, qualitative questions were asked to gain more in-depth information about the intervention participants' understanding of skilled trades and their experience at the career fair, as well as to gain feedback on what needed to be improved. During the study phase, I reviewed, analyzed, and compared data gathered from the career fair and shared with the design team members. During the act phase, recommendations were made that helped shape future implementations of the industry-led career events that followed.

Career Fair

The first industry-led career event was planned as a career fair that focused on a variety of skilled trades occupations; the industry representatives were a mixture of women and men. The wide range of skilled trades occupations represented was in electrical, welding, machining, information technology, drafting, commercial painting, lab technician, and heavy equipment.

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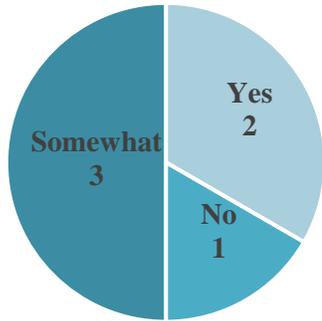
Prior to the career fair, two intervention participants knew what skilled trades were, two somewhat knew what skilled trades were, and one did not know what skilled trades were. Following the career fair, half of the intervention participants indicated that they had an increased awareness of what skilled trades were. Before participating in the career fair, two intervention participants noted that skilled trades were appealing to them, two documented that skilled trades were somewhat appealing to them, and two confirmed that skilled trades were not appealing to them. However, following their experience with the career fair, four intervention participants claimed they were more likely to pursue training or a career in skilled trades, one was somewhat likely, and one was not likely. Only one intervention participant was aware of training programs in the area for skilled trades before the career fair, one was somewhat aware, and the other four research participants were not aware of any training programs for skilled trades. The results did not change following the career fair. Their experience was the same with their awareness of careers in skilled trades. The small positive impact that the career fair had on the intervention participants is displayed in Figure 9. Due to the delay in starting the improvement initiative and COVID-19 impacting the class schedule, we were not able to align the career event with the start of skilled trade classes. This may be why there were no enrollments in skilled trades programs following the career fair.

Figure 9

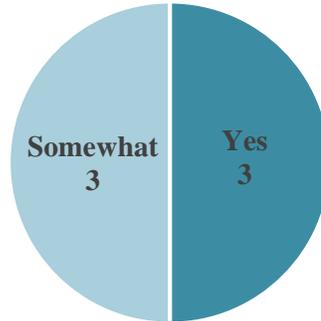
Career Fair Results

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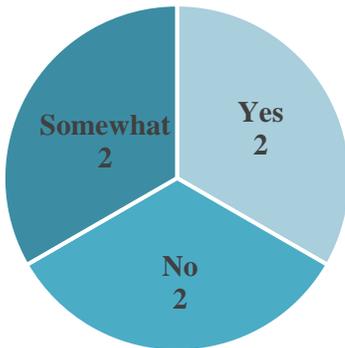
Do you know what skilled trades are?



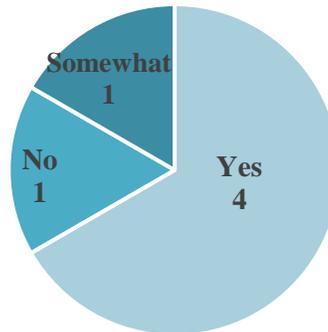
Do you have more of an awareness of skilled trades?



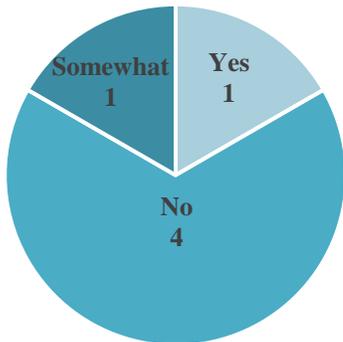
Are careers in skilled trades appealing to you?



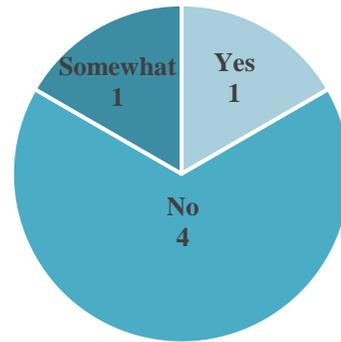
Are you more likely to pursue training or a career in skilled trades?



Are you aware of any training programs in the area for skilled trades?

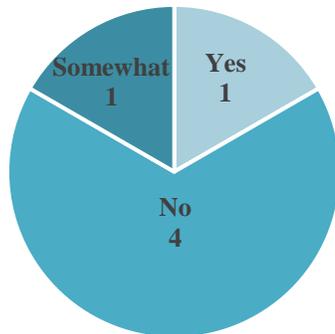


Do you have more of an awareness of training programs in the area for skilled trades?



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Are you aware of any career opportunities in the area for skilled trades?



Do you have more of an awareness of career opportunities in the area for skilled trades?



Note. Intervention participants' awareness of and interest in pursuing skilled trades increased after the event.

Although there was a positive impact experienced by the intervention participants because of the career fair, their feedback during the focus group meeting suggested there needed to be tweaks made to the process for it to be more successful. With this being the first industry-led career event, the timing and the quick turnaround required to organize it impacted our ability to produce an all-female industry team. Including male industry leaders may have caused intervention participants to feel less connected and less comfortable. One intervention participant shared, and another intervention participant concurred that it felt to them that the career opportunities were unrealistic for women because it appeared the positions required physical strength and muscle that not many women have. The reference was made based on a male industry representative overviewing job details and tasks of a machine operator. Another intervention participant suggested careers in skilled trades need to start making an impression on females at an early age, like high school. She felt this was the case after observing what she referred to as the younger to middle aged females representing their specific industry at the career fair. Four of the six intervention participants mentioned that skilled trades are appealing because of the money, health benefits, and the opportunity to advance in the workplace. Only

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two intervention participants mentioned that they were aware of any training programs in the area for skilled trades. One of those intervention participants suggested that she would be more comfortable learning from female teachers and female mentors than men, and she anticipated that was the case for most women. This remark confirmed our suspicion that having to use male industry leaders to demonstrate skilled occupations at the career fair limited the intervention participant's ability to freely engage with them and causing them to feel less comfortable and less interested.

After analyzing the data and reviewing with the design team, it was decided that the career fair was less significant than anticipated; therefore, we began to reassess our strategy to help improve the outcomes based on the intervention participants' feedback. We decided necessary changes for the next industry-led career event was for the event to be (1) a more in-depth exploration of skilled trades occupations, (2) structured to align with CTE career cluster pathways, and (3) led by female industry representatives. An all-female led career exploration was planned and the research participants were invited. Marketing materials were displayed that showed female students in skilled trades programs at A-B Tech and highlighted success stories of women in industry. See Appendix E for marketing examples.

Career Exploration

This industry-led career event was more narrowly focused on specific skilled trades than the career fair was, and the content was aligned with the CTE career cluster pathway for architecture and construction, and information technology (IT). It highlighted skilled trades occupations in woodworking, surveying, plumbing, automotive, sheet metal, and masonry. The event was virtual, and each skilled trades occupation was featured individually. An overview of the company, with specific emphasis on the skilled trades occupations was provided by a female

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industry representative of the company. Woodworking consisted of home construction, carpentry, and millwork for molding, trim, doors, and flooring. Demonstrations were made of woodworking tools and carpentry handheld and power tools. The presentation on surveying occupations consisted of explaining the different types of land surveying performed, the primary tools and equipment used in surveying, the environments surveyors work in, and the safety apparel worn by surveyors. Information presented on plumbing included new installation projects, as well as repairs, maintenance, and plumbing emergencies. The different types of plumbing, water supply and drainage were explained. Demonstrations were made using the basic plumbing tools. Safety measures were also covered relating to the work processes and working with wastewater. The automotive presentation was from an auto mechanic perspective relating to diagnostics, repair, and maintenance. Illustrations focused on parts identification, problem solving, and customer service skills. The sheet metal occupation involved on-site installation mostly of commercial roofs and ductwork for HVAC systems, as well as manufacturing and assembly of sheet metal. Demonstrations were made on how to operate a computer-aided design (CAD) program and then use a plasma cutter to produce the product. Lastly, masonry was demonstrated using bricks, stones, and concrete blocks. The pros and cons of each material and the environmental limitations of masonry were explained, and how concrete is produced was illustrated. There was emphasis on the creativity surrounding artwork masonry that is observed in sculptures, entranceways, sidewalks, fireplaces, and decorative walls and fencing. Each of the female industry representatives referenced the education, skills, and training either required or helpful in working in these skilled trade careers. They also mentioned the incentives in working in the skilled trades industry, which included a higher amount of take-home pay than the other jobs they have worked, an increased chance of moving up in the company or to create your own

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company, and having the ability to do-it-yourself (DIY) when it comes to hands-on projects that relate to our everyday lives. Career opportunities and program information were provided at the conclusion of the career exploration.

Data collected prior to the career exploration indicated that five of the intervention participants had an increase in awareness of skilled trades following the career exploration; however, one intervention participant felt the career exploration only somewhat increased her awareness of skilled trades. Four of the intervention participants noted that skilled trades were appealing to them before they participated in the career exploration, one found skilled trades somewhat appealing, and one did not find them appealing at all; however, post-survey data indicated that four intervention participants are more likely to pursue training or a career in skilled trades. One intervention participant was aware of training programs in the area for skilled trades, one was somewhat aware, and four intervention participants were not aware of any training programs in the area for skilled trades. After the career exploration, three of the intervention participants confirmed they experienced an increase in awareness of training programs in the area for skilled trades and three intervention participants had somewhat of an increase in awareness. The same results held true for their previous and post awareness of career opportunities in skilled trades careers. The positive outcome of the intervention participant's increased knowledge and interest in skilled trades is illustrated in Figure 10.

Following the career exploration, student registration data reveal that none of the intervention participants have enrolled in the skilled trades program at the College. However, data reveal that there was an increase of intervention participants who are considering pursuing training, but they may not sign up until next program session. I continued collecting student

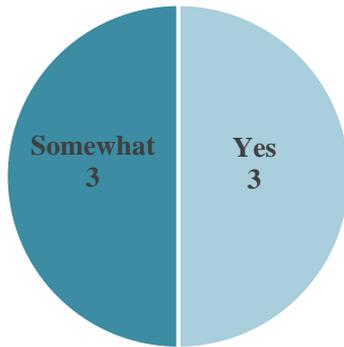
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registration data on the program sessions throughout the improvement initiative in case there is a delay in intervention participants registering for skilled trades programs.

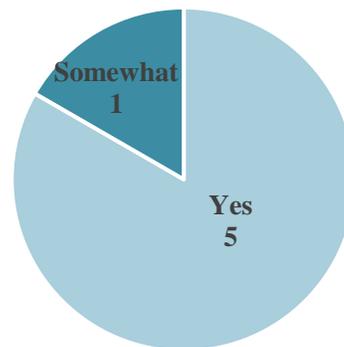
Figure 10

Career Exploration Results

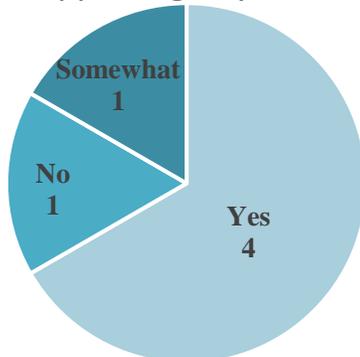
Do you know what skilled trades are?



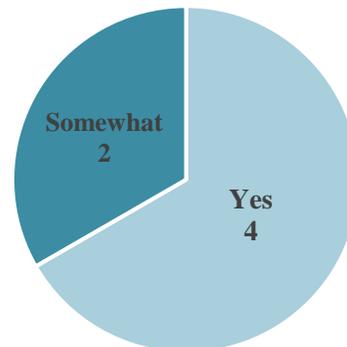
Do you have more of an awareness of skilled trades?



Are careers in skilled trades appealing to you?

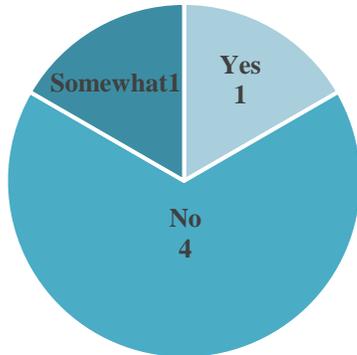


Are you more likely to pursue training or a career in skilled trades?

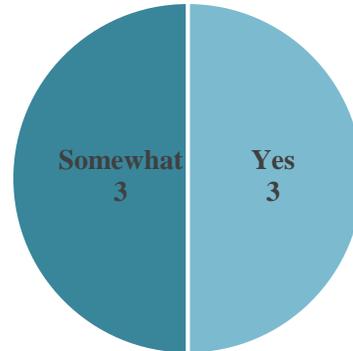


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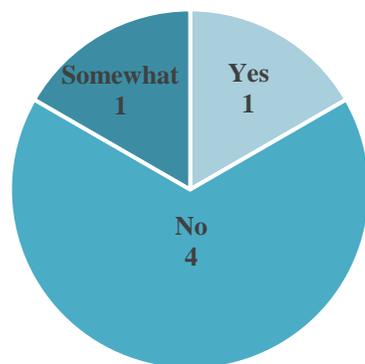
Are you aware of any training programs in the area for skilled trades?



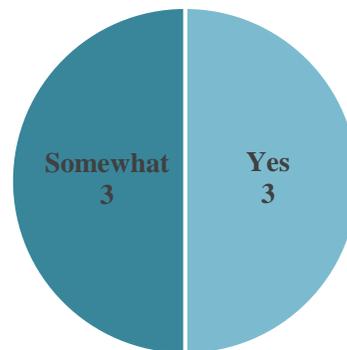
Do you have more of an awareness of training programs in the area for skilled trades?



Are you aware of any career opportunities in the area for skilled trades?



Do you have more of an awareness of career opportunities in the area for skilled trades?



Note. Intervention participant's awareness of skilled trades, training, career opportunities, and interest in pursuing skilled trades increased after the event.

During the focus group discussion, intervention participants expressed mostly positive feedback, and some were excited to see exactly how specific occupations were pursued and how the tools and equipment were managed by female skilled trades workers. The intervention participants expressed their emotions more during the focus group meeting for the career exploration than in the focus group meeting for the career fair. There was one intervention participant who expressed concern about the strength requirements necessary to operate the equipment prior to the career exploration, but afterwards she was impressed to learn that the

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tasks did not require as much strength as she had imagined. A second intervention participant mentioned that her previous perception of women working in skilled trades careers was mainly that they were lesbian or bisexual, but her view changed after the career exploration. She continued to say that she expected women to be more timid, but instead they all spoke with enthusiasm and intelligence about their talents and tasks. A third intervention participant suggested there should be more emphasis placed on the skills necessary to perform the skilled trades occupation and not so much on gender. She also mentioned that it was helpful to be able to see the hands-on demonstrations and to be able to see the end product and how it fits into the common items we use every day in society. She said that “experiencing women talking about working in the trades inspires me and makes me want to go back to school and become an electrician!” A fourth participant expressed the need for more recruitment efforts designed and implemented by women already practicing skilled trades. She suggested there should be coping strategies taught and training on how to conduct yourself and protect yourself in a work setting that is comprised predominantly of the males. This same intervention participant suggested the need for career assessments to be conducted that identify women’s strengths and help match them with the skilled trades career that is in line with their assessment. A fifth intervention participant mentioned that after she participated in the career fair, she became interested in skilled trades and searched out local training for skilled trades. She also mentioned that after becoming aware at the career exploration of the upcoming courses in skilled trades at A-B Tech, she was “pumped up about grabbing a welding helmet and enrolling!”

After reviewing the data of the career exploration with the design team members, we determined that the outcomes may be more beneficial if we set up an industry presentation that individually highlights a female industry leader in the company, who can provide an overview of

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the company that includes summarizing the skilled trades occupations within that company and providing information on job postings for that company. Also, we would offer further explanation of the partnership with the College and other workforce partners to support industry training for the occupations within the company. Other changes suggested by the design team members included incorporating program representatives into the industry presentation. This included having a female program coordinator from the College to provide an overview of A-B Tech's skilled trades program and an apprenticeship coordinator to inform attendees of work-based learning opportunities with local industries. Since Goodwill Industries of Northwest NC hosts A-B Tech classes through their Workforce Development Center, they were the workforce partner selected to collaborate on an industry presentation. This will increase the number of attendees and allow for observational data to be collected to evaluate women's interaction and behavior during the industry presentation. An industry presentation was planned in conjunction with Goodwill Industries. Intervention participants and other workforce partners were invited to attend. It was organized with the intention of further increasing the intervention participant's awareness and knowledge of skilled trades and to generate an interest for them to pursue skilled trades training programs at the College and through Goodwill Industries, as well as to pursue career opportunities with local industries. Along with the marketing materials we continued to use, we included marketing materials from Goodwill Industries.

Industry Presentation

The industry presentation was structured to align with the CTE career cluster pathway for manufacturing and science, technology, engineering, and mathematics (STEM). It was led by a female engineering lab technician, who had worked in other skilled trades positions throughout the company and with previous manufacturing companies. She had over 20 years' experience as

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a female working in male-dominated industry positions. An overview of the manufacturing and engineering company was provided and she demonstrated how she conducted her job tasks. The industry presentation was more of an intimate setting than the career fair and the career exploration, and the intervention participants were observed to be more engaged. The female engineering lab technician addressed the concerns that she previously experienced in each of her skilled trades careers and dispelled several myths about women in skilled trades. Those myths included (1) requiring a great deal of muscle and strength to perform jobs in skilled trades, (2) being singled out as a female in an all-male work environment, (3) jobs in skilled trades require workers to get dirty and work in environments that are filthy, and (4) male workers look down upon and do not help or support their female counterparts. At the conclusion of the presentation, attendees were informed of the job openings within the company and the skills required for the positions. Also, the company's weblink was supplied to the attendees for additional information on job availability. Upcoming skilled trades programs at A-B Tech were discussed and the schedule was presented to attendees.

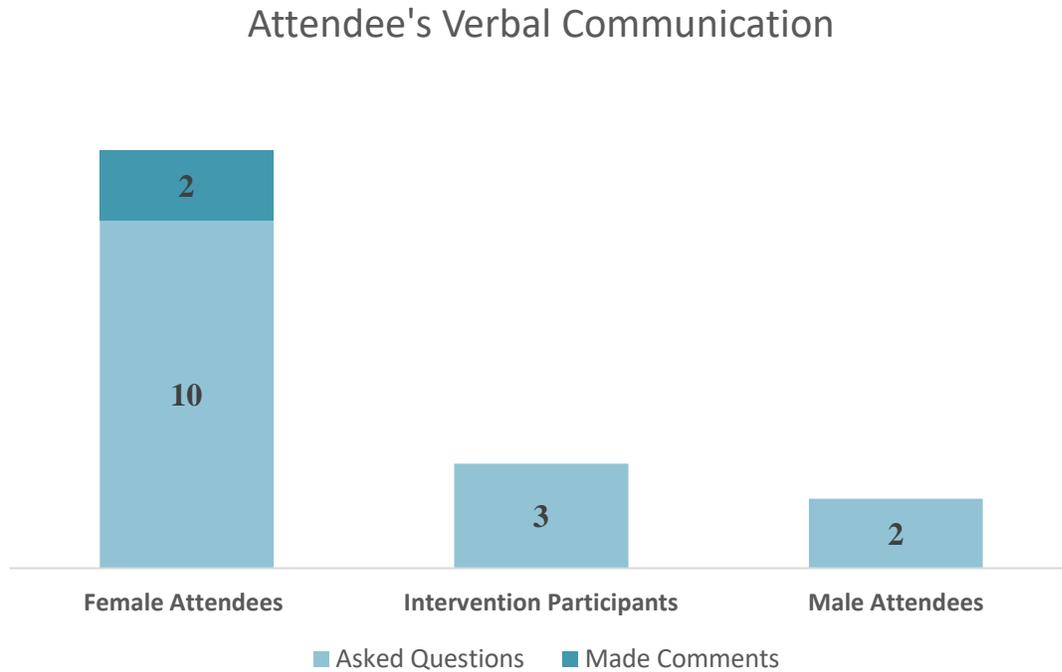
The industry presentation was attended by a total of 29 people. There were 19 females -- including the six intervention participants -- and 10 males in attendance. In addition to collecting data from the pre-survey, the post-survey, and the focus group meeting, observational data were collected and recorded. The observation protocol is displayed in Appendix D. A male design team member from the Career Center and I observed and collected data on the attendees participating in the industry presentation. Having a male and a female conduct the observations helped reduce the risk of gender bias. We observed the non-verbal communication and verbal communication from female and male attendees with the female engineering lab technician. Additionally, we observed the amount of engagement that took place between female attendees

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and the female engineering lab technician compared to the amount of engagement between male attendees and the female industry leader presenter. There was no engagement of attendees among themselves. The amount of engagement was indicated by the attendee's number of questions and comments. Non-verbal communication indicated whether the attendees were attentive by assessing if they maintained eye contact with their webcam or screen or if they were distracted and regularly looking away. Attendees' facial expressions were also observed and recorded as smiling, which we decided was an indicator for agreement, or by wrinkling their forehead, raising an eyebrow, or tilting the head slightly to the side, which we assumed expressed disagreement. The female attendees asked 12 questions and made two comments. One attendee, who was not one of the intervention participants asked two questions; none of the other women asked more than one question or made more than one comment. Of the 12 questions asked by female attendees, three of the intervention participants asked one questions each. There were only two male attendees who each asked one question; no male attendee asked more than one question. All but two attendees maintained eye contact with their webcam or screen throughout the industry presentation; one was a male attendee and one was a female attendee who was not an intervention participant. It was challenging to capture an accurate representation of facial expressions with so many attendees, but neither of us reported observing any expressions of disagreement, concern, or confusion. There were many occasions that we documented as expressions suggesting attendees' agreement with the female engineering lab technician's remarks. Both male and female attendees, including the intervention participants were observed as expressing agreement. Observational data results are shown in Figure 11.

Figure 11

Observation of Industry Presentation



Note. Female attendees verbally expressed more interest in skilled trades than male attendees.

Prior to the industry presentation, only one of the intervention participants indicated that she had no knowledge of what skilled trades were; the other five indicated they were knowledgeable of skilled trades. Subsequent to the industry presentation, all six intervention participants noted that they increased their knowledge of skilled trades after participating in the industry presentation. However, four intervention participants found skilled trades appealing to them and two indicated they were somewhat appealing to them preceding the industry tour. Following the industry presentation, four intervention participants were more likely to pursue training or a career in skilled trades, with two intervention participants being somewhat more likely to pursue training or a career in skilled trades. Half of the six intervention participants were aware of training programs and career opportunities in the area for skilled trades and the

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other half were not aware prior to the industry presentation; afterwards, all of the intervention participants had more of an awareness of local training programs and career opportunities in skilled trades. The results of the industry presentation are charted in Figure 12.

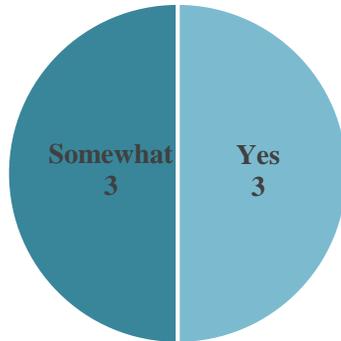
Figure 12

Industry Presentation Results

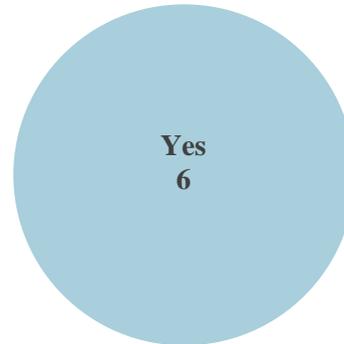


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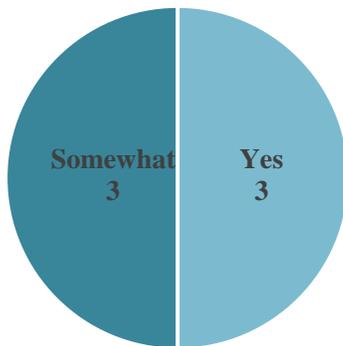
Are you aware of any training programs in the area for skilled trades?



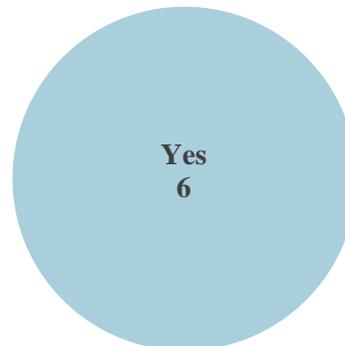
Do you have more of an awareness of training programs in the area for skilled trades?



Are you aware of any career opportunities in the area for skilled trades?



Do you have more of an awareness of career opportunities in the area for skilled trades?



Note. All intervention participants experienced an increase in awareness of skilled trades, training, and career opportunities following the event.

During the focus group meeting one intervention participant spoke about how her view of skilled trades has changed since she has been exposed to the career events, saying that “I wanted to cry a few times during the events because I was so excited!” She mentioned that she has been considering starting a business either in home repair or furniture and cabinet manufacturing, and being engaged in the industry-led career events have encouraged her more strongly to pursue that. She was glad to learn that skilled trades occupations of today have evolved into more lucrative careers and that there are more women involved in them than before; the issue for her is

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that women are not being shown in the spotlight enough for other women to recognize they can comfortably fulfill these career opportunities. She mentioned that these industry-led career events are the only source of education that she has seen or is aware of that focused on increasing the number of women in skilled trades careers. Three other intervention participants agreed, with one intervention participant verbalizing that she is not aware of any marketing to women or recruiting of women for careers in skilled trades at any of the colleges or locally, regionally, statewide, or nationally -- even though skilled trades workers are in demand in all geographic areas. Two intervention participants mentioned that they were surprised to hear that training programs existed at the College for all the skilled trades occupations that have been demonstrated but were thankful to have gained that awareness so they could inform others. Three other intervention participants concurred, and one intervention participant was aware of the training available because they were once employed by A-B Tech. The intervention participant who was formally employed by the College was the only intervention participant who was aware of the skilled trades career opportunities at the local industries. The other intervention participants have slowly been made aware of those career opportunities following the industry-led career events and were made aware of work-based learning options after the industry presentation. At the conclusion of the industry presentation, one intervention participant informed me she had decided to enroll in one of the upcoming skilled trades programs at the College to learn more about woodworking related to making furniture. The changes made for the industry presentation generated more of an awareness of skilled trades than the other industry-led career events. The singular focus on a specific industry and demonstrations of the occupation from a female worker who is in the occupation resulted in not only an increased awareness of skilled trades but an active enrollment in the skilled trades training program at the College.

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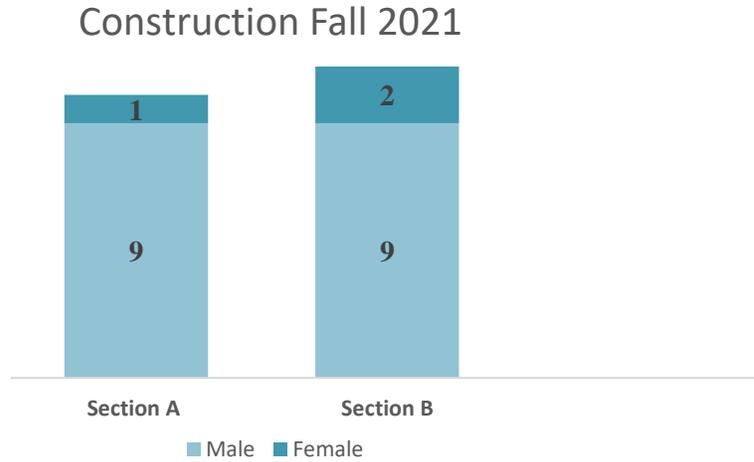
After participating in the industry presentation, all the intervention participants reported they gained more of an awareness of skilled trades than they did from the career fair and the career exploration, but there was no movement in the intervention participant's interest in pursuing training or a career in skilled trades. However, student registration data revealed that the intervention participant who was interested in woodworking did enroll in the skilled trade training program, as did the participant who, after the career exportation, expressed interest in welding.

The previous construction program (section A) had 10 students enrolled; nine were male students and one was a female student. After the enrollment of one intervention participant, the following construction class (section B) consisted of 11 students; nine were male students and two were female students. In the previous welding program, section A consisted of 12 students; eleven were male students and one was a female student. After the enrollment of one intervention participant, section B of welding included 13 students; eleven were male students and two were female students. The low enrollment numbers indicate the overall need for skilled trades workers and are also indicative of the current situation of needing more women in the skilled trades workforce. Figure 13 demonstrates by enrolling one intervention participant in the construction program, it doubled the number of female students in the construction program at the College. The same outcome was achieved in the welding program, as shown in Figure 14. The increased female student enrollments did not cause a change in the number of male students enrolling in the programs, as the number of men enrolled remained unchanged.

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Figure 13

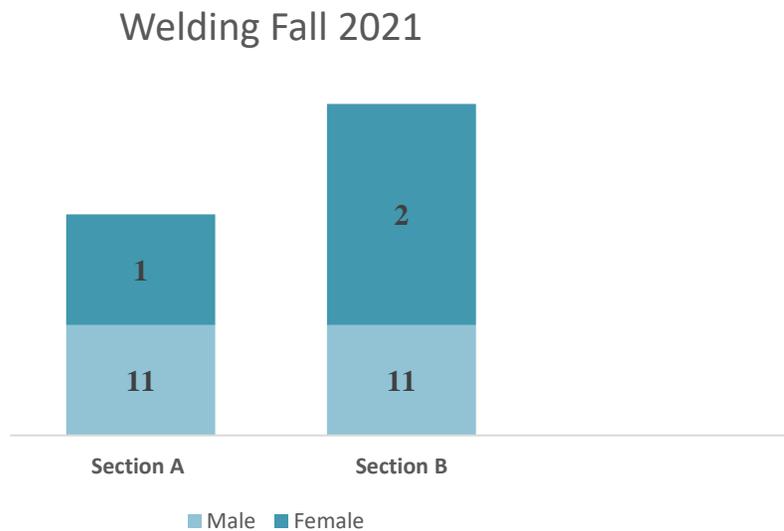
Construction Program Enrollment



Note. The number of female students in the construction program doubled following the industry presentation.

Figure 14

Welding Program Enrollment



Note. The number of female students in the welding program doubled following the industry presentation.

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Even though the design team members agreed that the changes resulted in an improvement, we anticipated that making additional tweaks to the process could result in continual improvement. Therefore, we decided to organize an in-person industry tour led by a female representative of the company and to continue to include other attendees who are interested. The only industry that was allowing in-person tours during this time was in agriculture and handcrafted food production. It was a candy factory and café combined. This career event was set up to expose participants to the entire operation beginning with harvesting the product to consumption. The process included making the product, inspecting, marketing, packaging, shipping, selling, and sampling.

Industry Tour

The content for the industry tour was aligned with the CTE career cluster pathway for agriculture, food and natural resources, and hospitality and tourism. It was led by the female co-founder and co-owner, who serves as the baker and was previously an agricultural farmer, sourcing her ingredients locally from her farmland. The occupation of farmer and industrial baker was highlighted. Due to safety measures to protect against COVID-19, attendees were separated into groups of 15 people. There were 30 attendees; 24 were females, including the six intervention participants, and six were males. The female co-owner explained the farm to table process that her company maintains to operate the business. Farm to table is the practice of sourcing their ingredients and other supplies from farms in the local area to use in their food production process. Upon starting her business, she detailed the practice of how her business began as a closed loop system whereby the ingredients she produced on the farm were sent to her business for cleaning and processing to be consumed by her customers. She pointed out that being a female in traditional male-dominated occupations was viewed more favorably in today's

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world than it was historically and being a hard worker and open-minded helps to successfully navigate through gender bias.

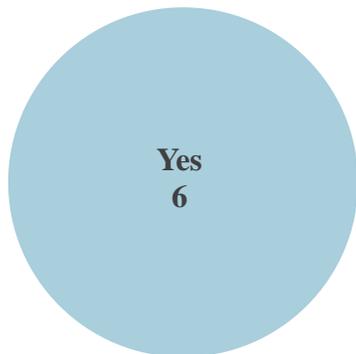
At the start of the industry tour, all six of the intervention participants were aware of what skilled trades were. Each one reported that they had an increased awareness of skilled trades after the industry tour. All but one of the intervention participants found skilled trades appealing to them prior to the industry tour and one intervention participant noted that skilled trades were somewhat appealing to them. Five intervention participants were more likely to pursue training or a career in skilled trades following the industry tour with one of them being somewhat likely. Prior to and after the industry tour, all participants were aware of training programs and career opportunities in the area for skilled trades. The results of the industry event are shown in Figure 15. One participant reported she had applied for a position with one of the local manufacturing companies, who the College has an active customized industry training program with; therefore, her participation in that would further increase the number of women in the skilled trades program. However, this was not counted in the data since the improvement initiative did not track that information.

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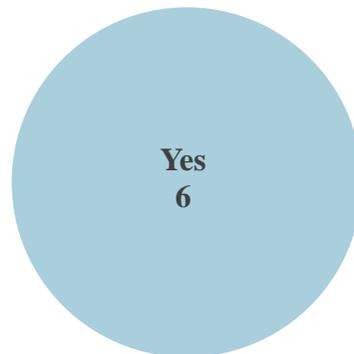
Figure 15

Industry Tour Results

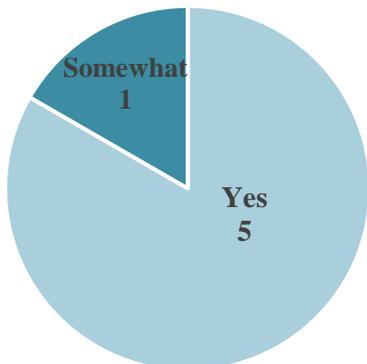
Do you know what skilled trades are?



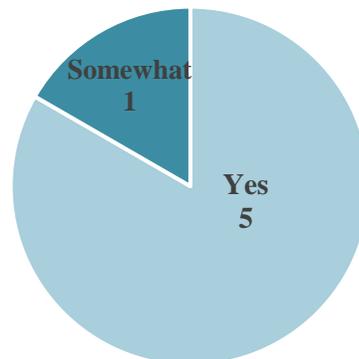
Do you have more of an awareness of skilled trades?



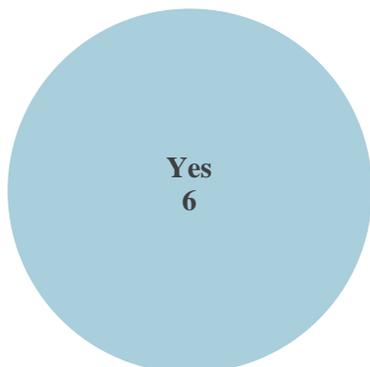
Are skilled trades appealing to you?



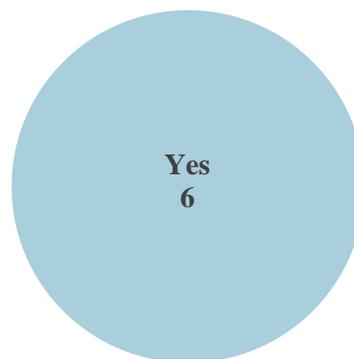
Are you more likely to pursue training or a career in skilled trades?



Do you have an awareness of training programs in the area for skilled trades?

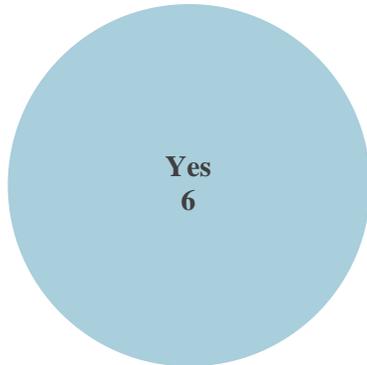


Do you have more of an awareness of training programs in the area for skilled trades?

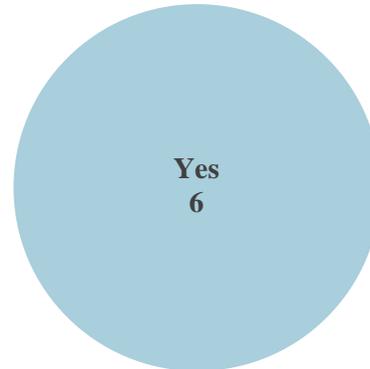


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Do you have an awareness of career opportunities in the area for skilled trades?



Do you have more of an awareness of career opportunities in the area for skilled trades?



Note. All intervention participant's awareness of skilled trades, training, and career opportunities increased following the event.

Intervention participants were more enthusiastic during this focus group meeting than they were at any of the others. One intervention participant excitedly commented about how reinvigorating it was to see a manufacturing process from start to finish and realize that by working with your hands and using your knowledge, you can create either a component of a larger product or the entire product itself, which is extremely impressive! The other five intervention participants agreed, with one of them emphasizing that being exposed to women working in skilled trades is certainly an incentive to consider skilled trades careers. Another intervention participant added that these industry-led career events have taught her that the more women in non-traditional roles are seen throughout society, the more normal this seems. She continued expressing how impressed she was with the women highlighted in these industry-led career events and that more women seemed to have stepped up to the plate. Another intervention participant mentioned that having women who are actively working in skilled trades occupations and telling their story and being used as recruiters seems the most effective approach to creating awareness and interest for other women to pursue skilled trades. She continued saying that women being highlighted and talked about positively will make other women feel more

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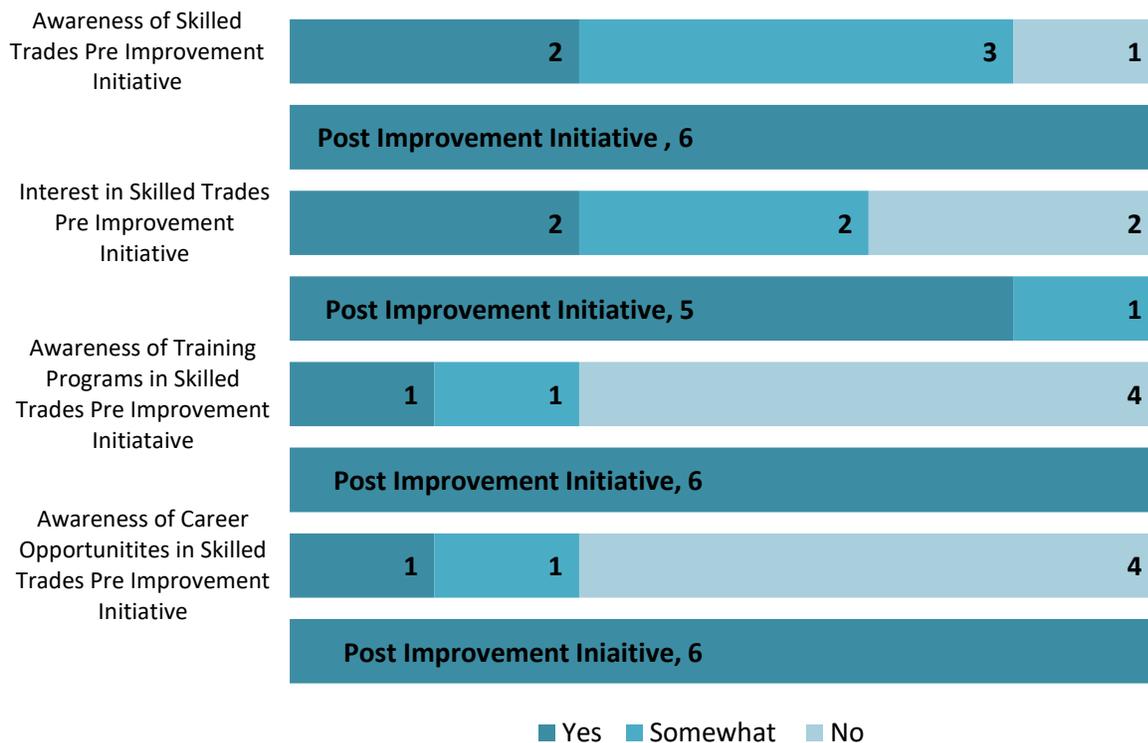
comfortable in pursuing training and careers in skilled trades, as was her experience.

Additionally, she remarked how women are sometimes more intelligent than men and typically tend to look farther down the road and see the bigger picture than the narrow task that is directly in front of them. She commented that women usually have better listening skills and pay attention to detail better than men, which helps companies be more open-minded, broaden their thought process, and have more of an awareness of the diverse opinions.

Following each career event, intervention participants experienced an increase in awareness of skilled trades. Figure 16 provides an overall summary of the pre-survey and post-survey results from the beginning to the end of the improvement initiative, showing a significant increase at the end of the improvement initiative.

Figure 16

Pre and Post Survey Results



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Note. All intervention participant's awareness of skilled trades, training, and career opportunities increased at the end of the improvement initiative.

With the small sample size of six intervention participants, data analysis of the surveys and focus groups helped determine that the intermediate goal of increasing women enrolling in skilled trades programs -- 20% by December 2021 -- was attained. The P-D-S-A cycles helped to assess the changes quickly throughout the improvement initiative, which helped to determine if progress was made toward the goal. The P-D-S-A cycles also helped keep the improvement initiative on task and on schedule to achieve the intended outcomes, even with the unanticipated impacts of COVID-19.

Impact of COVID-19

Even though the original COVID-19 strain impacted the U.S. in early 2020, causing a pandemic, the Delta variant hit in late Summer and was followed closely by the Omicron variant in November 2021 (CDC, 2022). Both variants were reported to spread more easily, cause more than twice as many infections, and could cause more illnesses than the other COVID-19 strains (CDC, 2022). Due to the potentially fatal health threats the new variants could produce, it triggered businesses and other organizations to reimpose strict safety measures like social distancing and mask wearing. Oftentimes this resulted in employees working from home and employers discontinuing in-person meetings, which transitioned to virtual meetings -- assuming they had no connectivity issues. As this improvement initiative was implemented in the mountains of WNC, where some areas do not have as much access to the internet as others, people involved in this improvement initiative experienced connectivity issues that were worked around by connecting via phone.

Initially, the improvement initiative was designed for face-to-face career presentations, workshops, and in-person career events such as industry tours and career exploratory

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experiences. However, due to government mandates, industry policy, and A-B Tech's regulations relating to COVID-19, we had to quickly transition to mostly virtual career events and virtual meetings. Due to the inability to effectively meet the required social distancing and six feet physical distancing requirements from person to person, and the personal protective equipment necessary for faculty and staff to continue working and students to come to class, A-B Tech transitioned some classes to online, cancelled other classes, and continued encouraging employees to work remotely, as did our workforce partnering agencies. Local industries adopted teleworking practices for their employees, prohibited visitors, ceased their on-site career events and tours, and halted their in-person career workshops, presentations, and other recruiting events. To date, because of the new variants continually emerging, industries have maintained their COVID-19 regulations. We were able to manage one in-person industry tour but had to limit the number of participants to comply with the industry's precautionary measurements relating to COVID-19. Mandates relating to COVID-19 required some of the design team members to work remotely, which resulted in connectivity issues at times, making it challenging to meet virtually. Another challenge that faced the design team members was being quarantined either from contracting COVID-19 or being exposed to someone who has it. To work around this, some of the interactions with the design team members occurred via individual phone calls.

The abovementioned mandated precautionary procedures directly impacted the improvement initiative. It was not only challenging from the standpoint of the design team members and participating industries, but especially through the lens of the intervention participants. Being they are job seekers, they rely on in-person visits to the Career Center and have limitations on connectivity while not at the Career Center. We were able to host some events at the Career Center for the participants who were not able to connect or chose to

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participate in-person. In addition, it is more challenging to get people to engage or even be present at a virtual event. Simply observing a task being completed may be somewhat convincing; but actual hands-on experience provides the intellectual connection and confirms that one can carry out the task successfully. Although the intervention participants were actively seeking jobs, COVID-19 presented challenges for them to experience job tasks and fully comprehend how equipment works due to the events being virtual. Because of the virtual set-up, there were limitations on what the participants had access to. These limitations were in part due to the timing of the event and the ability and/or resources available to the industries to host a virtual career event, as well as showing areas containing proprietary information, material, or processes. Unfortunately, COVID-19 has drastically changed how students are recruited, the structure of our career awareness events, and how we provide career placement for job seekers.

Formative Evaluation of Improvement Methodology

A mixed method approach was used to evaluate the improvement initiative. According to Creswell & Guetterman (2019), a mixed methods design combines quantitative and qualitative methods together and provides a better understanding of a problem than would be the case if one were to use one method only. Qualitative techniques were used to collect data and measure variables through focus groups and observations. Focus group meetings were conducted following each career event. Observations were conducted at the industry presentation. Quantitative techniques were used to collect data through a pre-survey and post-survey to identify whether the implementation created awareness and changed perceptions of skilled trades for participants (Creswell & Guetterman, 2019). Observational methods were used in conjunction with the other data collection methods as a form of triangulation (Cotton et al., 2010). Observations were done for 45 minutes to observe female representation, communication,

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and engagement. Observational data were collected to gain a better insight into the female participants' perspective (Miles et al., 2014). To reduce the chance of gender bias, there was a male team member who conducted the observations with me (DeWalt & DeWalt, 2002). We listened to conversations and observed participants' actions. Afterwards, we completed an observation protocol (see Appendix D) to assess their experience while participating in the career event. The following measures were used to address whether the intervention resulted in an improvement:

Driver Measures

Driver measures determine if the changes are causing an improvement. My theory of improvement holds that collaborative and industry-led marketing initiatives centering women in skilled trades careers, and targeted toward women, will: 1) increase women's awareness of employment opportunities in skilled trades, and 2) increase women's self-efficacy related to skilled trade employment, resulting in gainful employment for women and a more proportionate representation of women in the skilled trades professions. Surveys and focus group discussions with the intervention participants were used to measure whether their awareness of skilled trades programs and career opportunities increased. At the conclusion of this improvement initiative, all of the intervention participants documented on the post-survey an increase in awareness and knowledge of skilled trades, training programs, and career opportunities. Enrollment data revealed that two intervention participants enrolled in skilled trades training programs at the College. Also, one participant applied for a job as a result of participating in this improvement initiative.

A focus group is most advantageous with the intervention participants due to their similarities in gender, employment status, and interest in career center services and obtaining

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gainful employment with local industries (Creswell & Guetterman, 2019). The survey instrument used to collect data during the focus group is based on The Community College Survey of Student Engagement; it helps identify engagement practices that are most successful in getting students interested in enrolling and is intended to gain a better understanding of how the college can improve their programs and services for recruitment (Texas Department of Educational Leadership and Policy, 2018).

Process Measures

Crow, Hinnant-Crawford, and Spaulding (2019) indicate that process measures are used to address the question “How is it working?” and to determine if the change is being executed as planned. A focus group was conducted following each industry event to evaluate the intervention participants’ engagement and gain their insight on the value of the event (see Appendix C). The student enrollment rate was measured following each industry event and charted when there was an increase in enrollment that resulted from the industry-led career events. This was helpful in evaluating the impact that was made throughout the P-D-S-A cycles and helped determine if the process needed to be modified.

Balancing Measures

To address whether the changes in the process were working as intended and to ensure that another aspect of the organization is not impacted, balancing measures were used (Crow et al., 2019). With marketing efforts centering women in skilled trades and targeted toward women, it is important that these efforts do not create a decrease in male students enrolling in skilled trades workforce programs. To ensure there was not a decrease in enrollment of male students when the improvement resulted in an increase of female students enrolling in the skilled trades program, student enrollment data were collected and compared the number of female and male

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students enrolled in the skilled trades programs. The data confirmed that an increase in the two female students enrolling in the construction and welding training programs did not cause a decline in male students enrolling in those programs; enrollment of male students remained unchanged.

Outcome Measures

The outcome measure was the number of women enrolling in skilled trades programs. By comparing the number of female students enrolled in the skilled trades programs in Fall 2020 to the number of female students enrolled in the skilled trades programs following the improvement initiative in Fall 2021, it was determined that there was a 28% increase. In addition, comparisons were made following each enrollment period to determine the percentage of students enrolled by gender (Tanner, 2012). The enrollment statistics showed an increase in the number of female students enrolled in construction and welding training programs following the career exportation.

Summative Evaluation of Improvement Methodology

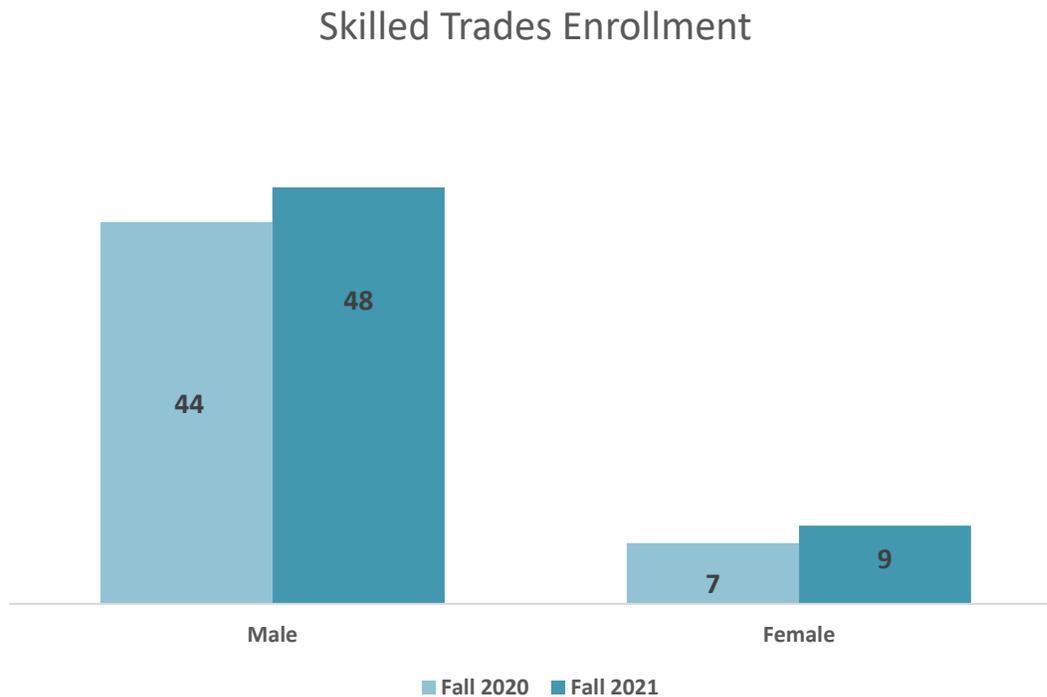
In addition to a formative evaluation, a summative evaluation was conducted to determine if the aim was achieved. My theory of improvement maintains that: *Industry-led marketing initiatives and marketing practices focused on women in skilled trades careers will result in enhanced women's career-related self-efficacy and increase their exposure to skilled trades and awareness of work-based learning opportunities leading to improved gender diversity and an increased number of female students accessing the skilled trades workforce sector.* Based on my findings, I have shown the improvement initiative to be successful. Outcome measures are necessary to determine if the intervention led to an improvement. According to Bryk et al. (2015), outcome measures explain the performance of the system and show outcomes related to the aim statement in the driver diagram. The ultimate aim of this intervention was to improve

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gender diversity and increase the number of female students accessing the skilled trades workforce. The intermediate aim was a 20% increase in women enrolling in skilled trades programs by December 2021. Figure 16 illustrates a 28% increase in female students enrolling in the skilled trades programs from Fall 2020 to Fall 2021. There was a total of 51 students enrolled in the skilled trades programs in Fall 2020; 44 were male students and 7 were female students. The Fall 2021 term had a total of 57 students; 48 were male and 9 were female.

Figure 17

Skilled Trades Programs Comparison



Note. The number of female students enrolled in skilled trades programs increased by 28% from Fall 2020 to Fall 2021.

Through this initiative, women increased their knowledge about skilled trades and training programs and careers in skilled trades locally, became interested in skilled trades as a career option, and pursued skilled trades training programs and career opportunities with local

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industries. Although there was not enough time in the improvement initiative to accomplish a gender balanced outcome in skilled trades, the intermediate aim to produce a 20% increase in women enrolling in the skilled trades workforce sector in the A-B Tech service area by December 2021 was achieved. Results from the data indicate that if the initiative continued, the ultimate aim would likely be accomplished through this improvement process. Suggestions for improvement are noted in the recommendations section.

The intervention was successful on a small scale; however, by expanding this model to include more skilled trade industries, additional workforce partnering agencies, more job seekers, as well as high school and community college students, the number of women enrolling in skilled trades programs and pursuing careers in skilled trades would likely increase significantly and at a quicker rate. Also, when the intervention is performed at a consistent rate, more women are exposed to skilled trades as a career option and become more aware of training programs and recognize how they can seamlessly access these careers, thereby developing an interest to pursue skilled trades as a sustainable career option.

In addition to women reaping the benefits of gaining access to skilled trades careers, the intervention provided value to the College, workforce partners, local skilled trades industries, and the community. The College experienced an increase in FTE, skilled trades industries began to address workforce pipeline concerns, and workforce partners linked job seekers to the industry-led career events. All organizations involved in the intervention now have access to additional marketing, outreach, and recruiting tools that are successful at helping them better position students and job seekers in training programs and align their skillset with the appropriate skilled trade occupation.

Recommendations

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Lessons for Leadership

Although it is the responsibility of college leadership to ensure a welcoming campus environment free from discrimination, and create a culture that embraces diversity and inclusion, we are all accountable for promoting such. If the leaders in the College, industries, and workforce partnering agencies are committed to increasing diversity, equity, and inclusion, they must have an increased concentration on women who continue being unrepresented and underrepresented, specifically in skilled trades. This improvement initiative designed to increase gender diversity in skilled trades complements one of A-B Tech's foundational focus areas, which is to have an organizational culture that embraces equity and inclusion. A-B Tech's Diversity and Inclusion Committee strives to create a campus-wide environment "where everyone feels invited and included" by incorporating "interactive learning opportunities" to help students understand diversity issues (A-B Tech, n.d., para. 2). To help women feel welcomed in the skilled trades programs, it would be advantageous for the committee to identify creative ways to capitalize on female students' experience in the skilled trades programs and utilize their feedback to improve access and promote awareness of skilled trades.

With diversity, equity, and inclusion in mind, the design team applied a gender lens throughout the process of this improvement initiative. Engaging the design team and considering the members' feedback was valuable in working through the process to address a systemic problem at the College. They generated ideas and provided feedback from different perspectives, which helped formulate an implementation plan with more of an openminded approach. Their knowledge of the lack of gender diversity in the skilled trades workforce and their experience as leaders in their program areas was critical to institute change. They also recognized the value of working collectively to establish a plan of action. Their collaborative efforts paralleled Roberts'

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(2017) belief that “leadership cannot be described simply in terms of the behavior of an individual; rather, leadership involves collaborative relationships that lead to collective action grounded in the shared values of people who work together to effect positive change” (p. 153).

A-B Tech’s Department of Student Life and Development offers a variety of clubs and student programs designed to enhance personal and professional development of students (A-B Tech, n.d.). To further cultivate, recruit, sustain, and positively influence women in skilled trades, organizing a club would likely be valuable in helping female students feel welcomed into the skilled trades program, and help stimulate more interest from female students in other program areas within the College. Using female students, staff, faculty, and workforce leaders, the club could provide a safe environment for women to share experiences and exchange ideas. Developing a club could also be instrumental in helping female students, who are considering skilled trades gain a wider understanding of skilled trades and the skillset that aligns with specific jobs at the local industries.

Leaders must understand that traditional recruitment and career events are casting a wide net to secure solid enrollment numbers, but through target marketing and career events targeting specific populations and presented by people who resemble the target audience, diversity is obtained. This strategy not only increases diversity in programs and the workforce, but it increases the overall enrollment (FTE) and establishes a pipeline of skilled workers for industry, which is a goal of the College.

Considerations for leadership include using existing recruitment and outreach programs and initiatives at the College -- as was accomplished with RAMP in this improvement initiative - and expand them to include groups that are lacking in the program areas. This approach could also be used by partnering with workforce partners and industries to expand and diversify their

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career awareness and recruitment efforts to include diverse populations who are currently unrepresented or underrepresented. Existing programs where this improvement initiative would likely help increase female student enrollment are: A-B Tech's Skills Training and Employment Program with NC Department of Health and Human Services, NCCCS ApprenticeshipNC Program, Goodwill Industries Career Quest Program and Business Advisory Council, Women in Manufacturing, and Asheville Buncombe Community Christian Ministry's Program for homeless women.

Selecting job seekers from the Career Center helps connect them with businesses that are looking for applicants and supports A-B Tech's strategic partnership goal of providing skills training and work-based learning opportunities. To further improve this outcome, I would recommend engaging a larger pool of (female) job seekers and other (female) participants who are registered for employment workshops and enrolled in other career classes at the Career Center, the College, and Goodwill Industries. Engaging more participants increases the chance of enrolling more female students and placing them in local industries, while reducing the gender disparities in a male-dominated workforce.

With A-B Tech's interest in expanding their apprenticeship program and supplying a pipeline of skilled students to meet the demands of industry, mainly in the program areas with lower enrollments, it is likely the efforts will continue following the intervention. The New Jersey Institute for Social Justice (n.d.) states that "Apprenticeships are a way to advance racial and gender equity, and to counter the displacement of current and future employees as our economy continues to undergo significant changes in what is being called the Fourth Industrial Revolution" (para. 4). By using the recruitment and outreach model that was created for this intervention to target unrepresented and underrepresented populations, such as women, gender

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inequities will be lessened at the College and local industries where more women have a presence.

Women need to have a voice at the table and a seat in the classroom, and A-B Tech should better understand how significant female student's contributions are to all the College's program areas, especially for the program areas that are traditionally male-dominated, like skilled trades. Female students have made progress in joining some of A-B Tech's programs, but skilled trades career pathways have more progress left to make. Women are available but A-B Tech is not effectively reaching them. In an effort to increase female student enrollment in skilled trades, it is likely the College will continue to collaborate with the workforce partners and local industries to include this improvement initiative and challenge stereotypes related to gender and occupations, which will allow more women to consider a career in skilled trades. As more women enter skilled trades, it will become less of a social stigma and easier to recruit more female students into the workforce sector. Women will also feel more comfortable in joining program areas that maintain a balanced representation of men and women.

Initiatives specifically aimed at encouraging women to enter skilled trades are making a difference. The "We Can Do It!" campaign was such a success, it would be simple for the College to use that as a model and launch a similar campaign that could be marketed as, "We Are Back!", "Can't Keep A Good Woman Down!", etc. For this improvement initiative to continue being effective, the College's marketing materials and outreach events must be designed to target women as much as it does men; promotional print and events should feature women in skilled trades training programs and careers, as well as highlight the successes of women in that career. With A-B Tech's pledge to improve diversity in their programs and on

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campus, this work will likely be used to enhance that effort, as well as help meet the goal to increase enrollment of unrepresented and underrepresented groups.

With the recruiting and outreach structure already in place at the College and the key stakeholders and workforce partners at the table, the improvement initiative will likely be continued through RAMP and then expanded to include other program areas that lack gender diversity. Using this model, I can foresee it being incorporated into additional recruitment efforts to alleviate other social justice issues such as, disparities in race, color, age, disability, etc. Using this approach will expand the College's recruiting efforts, increase enrollment of unrepresented and underrepresented students, increase diversity on campus, and increase the College's overall FTE. Currently, by utilizing RAMP and sharing resources within the group, there is not a need to hire additional human capital to continue executing this improvement initiative. All the key leadership, staff, and stakeholders who assisted with the improvement initiative remain in place and committed to advancing the aim to increase gender diversity in skilled trades.

By using the resources from the entities involved in the improvement initiative, it would be advantageous to incorporate the support services available for students in the marketing and recruitment efforts. Typically, students struggle with transportation, childcare, housing, and internet connectivity. To alleviate those concerns and barriers for students, the support services must be advertised and easily accessible. It would be valuable to have representatives from each of the agencies that offer these services to attend the industry-led career events and display their marketing material. Also, it would be helpful to create scholarships specifically for female students interested in accessing the skilled trades program.

Lessons for Social Justice

Through this intervention, feedback, and trial and error, I have discovered how to identify what is perceived as a systemic problem within the organization, trace it back to its root causes,

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and diligently work through the process to address a social injustice issue. I have also learned how to recognize if an improvement is working or if variables in the process need to be changed to improve the outcome and achieve fairness. This process engages leaders in education, workforce partners, local industries, and the community to come together and talk about issues they are facing and problems they are experiencing. Once the problem is identified and agreed upon as being an issue, it is better to work collaboratively to resolve it for the benefit of all. Working toward a more gender diverse program area benefits the College, workforce partners, local industries, as well as the community. Creating diversity in the organization, student body, and workforce falls within the purview of us all. Increasing women in skilled trades provides a new perspective, enhances creativity, challenges stereotypes, increases collaboration, and has a positive impact on recruiting other women (Yilek, 2021). The College should make it a priority to expand their marketing, recruitment, and outreach efforts to target women in each program area. Women deserve the same access to traditionally male-dominated program areas and occupations as men, and through this initiative, data indicate that providing opportunities for women to engage with female industry leaders help them feel welcome and comfortable in pursuing skilled trades opportunities. If women are not able to see themselves in a specific occupation, they are not likely to inquire about it or pursue it.

Lessons for Implementation

Through the implementation process, I discovered that the intervention participants learned that skilled trades encompass more jobs than they imagined. They were surprised to learn that there is a wide variety of jobs categorized as skilled trades, they became more aware of the number of local women in the industry, the tasks they were responsible for, and the career options in skilled trades. Through this process, the intervention participants not only gained a better understanding of the job types in skilled trades, but they also made connections with some

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of the women industry representatives and connected some of their experiences with them. This intervention also allowed the intervention participants to visualize themselves in certain skilled trades positions, which was not the case prior to them being exposed to the career events.

For future implementation, I recommend continuing to expand the RAMP initiative to reach and target more women in skilled trades by (1) highlighting each occupation at a separate career event led by female industry representatives, (2) hosting a regional all-women in skilled trades career exploratory day or week and, (3) incorporating this improvement initiative into the other existing programs already mentioned. I highly recommend advocating for in-person career events, especially industry tours where possible and having participants follow the necessary COVID-19 safety protocols. Having the ability to enroll on-site during the career events would be beneficial, as would having a career counselor to help participants determine which programs best suit their interest and an apprenticeship coordinator to link participants to career opportunities with local industries. In addition, I would recommend including Human Resources staff from the industry to help participants who are interested in the industry's open positions to complete an application, as well as potentially conducting preliminary interviews. Also helpful would be consistently aligning the career events for specific occupations to the timing of the registration for that specific program. For example, a career event focusing on electricians should be scheduled to align with the timing of open enrollment for classes relating to electrical skills training. Although the intervention was designed for the career events to match the timeframe for program enrollment, due to COVID-19 altering the course schedule and time constraints to meet those changes, this was not completely feasible.

Conclusion

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It is important to have gender diversity in the skilled trades industry, a more equitable representation of women in skilled trades training programs, and an increase of women in skilled trades workforce because “women bring a different perspective that shapes and influences Science, Technology, Engineering, and Math (STEM) disciplines” (Milgram, 2011, p. 5). The skilled trades programs feed into STEM. Having at least an equal representation of women in the skilled trades programs and career opportunities helps society benefit from women’s expertise and contribution to this industry sector. The skilled trades industry sector is continually experiencing a shortage of workers; industries throughout the U.S. recognize that the most untapped workforce is women (Richards, 2007). Increasing gender diversity in skilled trades will not occur unless A-B Tech – and institutions like A-B Tech -- collaborates more effectively with local businesses and industries to establish a sustainable partnership and develops industry events and marketing initiatives that are exclusively focused on women. According to Richards (2007), there is a need for stronger recruiting measures aimed at women to attract their interest in the skilled trades. It is imperative that A-B Tech and local businesses and industries make use of effective marketing to create a more appealing image of women in skilled trades positions. Effective marketing resources should include a clear media campaign, internal organizational marketing, and leveraging partnerships with local industry groups, community organizations, and the chamber of commerce to publicly support and effectively recruit women in the skilled trades workforce sector. Richards (2007) contends that the labor shortage offers a prime opportunity for women in skilled trades, regardless of past inequities. According to Women’s Law, it is projected that between 2012 and 2022, the skilled trades industry will add 1.6 million new positions. Data from USBLS (2019) reveals that nearly 4,000 skilled trades positions will be

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available from 2021-2023. With a demand this large, it is critical that A-B Tech helps ensure that women are well positioned to enter the skilled trades workforce during this decade.

References

- Allsid, J. L., Gruber, D., Jenkins, D., Mazzeo, C., Roberts, B., & Stanback-Stroud, R. (2002). Building a Career Pathways System: Promising Practices in Community College-Centered Workforce Development. *Workforce Strategy Center*, 1-47.
- Anderson, B., & Fagerhaug, T. (2000). *Root cause analysis: Simplified tools and techniques*. ASA Quality Press.
- Armin, E. (2019). *The 'business case' for increasing diversity in higher ed*. EA-B. <https://eab.com/insights/daily-briefing/strategy/the-business-case-for-improving-diversity-in-higher-ed/>
- Asheville-Buncombe Technical Community College. (n.d.). <https://www.abtech.edu/factbook/overview>
- Asheville-Buncombe Technical Community College. (n.d.). *Diversity and Inclusion*. <https://abtech.edu/student-resources/student-life-and-development/diversity-and-inclusion>
- Becker, T. C., Jaselskis, E. J., McDermott, C. P. (2011). *Implications of Construction Industry Trends on the Educational Requirements for Future Construction Professionals: 47th ASC Annual International Conference Proceedings*.
- Beilock, S. (2019, March). Research-based advice for women working in male-dominated fields. *Harvard Business Review*. <https://hbr.org/2019/02/research-based-advice-for-women-working-in-male-dominated-fields>
- Blue Ridge Community College. (n.d.). *Apprenticeship Blue Ridge*. <https://www.blueridge.edu/programs-courses/apprenticeships/>
- Bryk, A., Gomez, L., Grunow, A., & LeMahieu, P. (2015). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.

INCREASING GENDER DIVERSITY

Buckshon, M. (2018, September). Labor shortage: 98 percent of NC contractors are having trouble finding qualified trades workers. *North Carolina Construction News*.

<https://www.ncconstructionnews.com/labor-shortage-98-percent-of-nc-contractors-are-having-trouble-finding-qualified-workers/>

Callan, V.J., Johnston, M.A., & Poulsen, A.L. (2015). How organisations are using blended e-learning to deliver more flexible approaches to trade training. *Journal of Vocational Education and Training*, 67(3), 16-33.

Catron, C. (2016, October). Defining construction career pathways and why they matter.

Higher Education. <https://www.pearsoned.com/defining-construction-career-pathways/>

Cavalcanti, T., & Tavares, J. (2016). The output cost of gender discrimination: A model-based macroeconomics estimate. *The Economic Journal*, 126(590), 109-134.

<https://doi.org/10.1111/eoj.12303>

Centers for Disease Control and Prevention. (2022). CDC Museum COVID-19 Timeline.

<https://www.cdc.gov/museum/timeline/covid19.html>

Cotton, D., Stokes, A., & Cotton, P. (2010). Using observational methods to research the student experience. *Journal of Geography in Higher Education*, 34(3), 463-473.

doi: 10.1080/03098265.2010.501541

Creswell, J.W., & Guetterman, T.C. (2019). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson Education, Inc.

Crow, R., Hinnant-Crawford, B., & Spaulding, D. (2019). *The Educational Leader's Guide to Improvement Science: Data, Designs, and Cases for Reflection*. Myers Education Press.

Crow, R., Lomotey, K., & Topolka-Jorissen, K. (2017). An adaptive model for a rigorous

INCREASING GENDER DIVERSITY

- professional practice doctorate: The disquisition. *Educational Leadership and Administration: Concepts, Methodologies, Tools, and Applications* (pp. 478-493). IGI Global. DOI: 10.4018/976-1-5225-1624-8.ch024
- De Lea, B. (2019). *Construction worker shortage tops sector concerns in 2019*. Fox Business.
- Dew, J. R. (1991). In search of the root cause. *Quality Progress*, 24(3), 97-107.
- DeWalt, K.M., & DeWalt, B.R. (2002). *Participant observation: A guide for fieldworkers*. Altamira Press.
- Donaldson, M. L., & Weiner, J. (2017). The science of improvement: Responding to internal and external challenges in a complex school environment. *Journal of Cases in Educational Leadership*, 20(3) 65-75.
- Drake, P., Heath, L. (2010). *Practitioner Research at Doctoral Level: Developing Coherent Research Methodologies*. Taylor & Francis.
- Fielden, S. L., Davidson, M. J., Gale, A. W., & Davey, C. L. (2000). Women in construction: The untapped resource. *Construction Management and Economics*, 18(1) 113-121. DOI: 10.1080/014461900371004
- Fletcher, E. C., & Gordon, H. R. D. (2017). The status of career and technical education undergraduate and graduate programs in the United States. *Peabody Journal of Education*, 92(2), 236–253.
- Francis, V. & Prosser, A. (2013, January). Career counselors' perceptions of construction as an occupational choice. *Journal of Professional Issues in Engineering Education & Practice*, 139(1), 59-71.
- Harper, S. and Quayle, S. (2015). Making engagement equitable for students in the U.S. higher education. *Student engagement in higher education: theoretical perspectives and*

INCREASING GENDER DIVERSITY

- practical approaches for diverse populations*, (1-11). Routledge.
- Ho, P.H.K. (2016). Labour and skill shortages in Hong Kong's construction industry. *Engineering, Construction and Architectural Management*, 23(4), 533-550.
- Ishengoma, E., & Vaaland, T. I. (2016). Can university-industry linkages stimulate student employability? *Education & Training*, 58(1), 18-44.
doi: <http://dx.doi.org/10.1108/ET-11-2014-0137>
- Johnson, B. (2018, February 4). Amid construction labor shortage, HCC revamps building program. The Mountaineer. https://www.themountaineer.com/news/amid-construction-labor-shortage-hcc-revamps-building-program/article_f66fd702-07e2-11e8-9cfb-d7a4a01be1c5.html
- Kezar, A., & Posselt, J. (Eds.). (2020). Higher education administration for social justice and equity: Critical perspectives for leadership. Routledge.
- King James Bible*. (2017). King James Bible Online. <https://www.kingjamesbibleonline.org/>
(Original work published 1769)
- Knutson, C. (2019). Middle skills education: Planners are reimagining ways to meld instruction and industry. *Planning for Higher Education*, 47(4), 20-27.
<http://proxy195.nclive.org/login?url=https://search.proquest.com/docview/2305520762?accountid=14968>
- Labor and Employment Relations Association. (2019). Game changers for women in skilled trades: Women's leadership, advocacy, and support networks to break through the construction industry's concrete floor. Retrieved from <http://lerachapters.org/OJS/ojs-2.4.4-1/index.php/PFL/article/view/3260>
- Langley, G. J., Moen, R. D., Nolan, K. M., Nolan, T. W., Norman, C. L., & Provost, L. P.

INCREASING GENDER DIVERSITY

- (2009). *The improvement guide: A practical approach to enhancing organizational performance*. Jossey-Bass.
- Lomotey, K. (2020). *The Disquisition at Western Carolina University: The Capstone Experience in the University's EdD Program*. Unpublished manuscript, Western Carolina University, Cullowhee, NC.
- MacDonald, A., (2016). *Shoptalk: What more can be done within P.E.I.'s public school system to promote females in non-traditional skilled trades* [Unpublished master's thesis]. Mount Saint Vincent University] <http://hdl.handle.net/10587/1728>
- Makhene, D., & Thwala, W.D. (2009). Skilled labour shortages in construction contractors: A literature review. University of Johannesburg.
- Masidah, A. M., Wardah Fatimah, M. Y., and Abdul, R. S. (2018). Women as skilled labour: A review of issues, challenges and prospects. *International Journal of Engineering & Technology*, 7(3.25), 441-445. DOI: 10.14419/ijet.v7i3.25.17727
- McDermott, A. (2018, October 10). *How World War II empowered women*. Medium. <https://www.history.com/news/how-world-war-ii-empowered-women>
- Milgram, D. (2011, November). How to recruit women and girls to the Science, Technology, Engineering, and Math (STEM) classroom. *Technology and Engineering Teacher*, 4-11. <https://www.iteea.org/39191.aspx>
- Mortrude, J. (2017, September). *Career Pathways and Adult Education*. https://www.clasp.org/sites/default/files/publications/2017/10/2017_CareerPathwaysandAdultEducation.pdf
- National Women's Law Center. (2014). Women in construction still breaking ground.

INCREASING GENDER DIVERSITY

https://www.nwlc.org/sites/default/files/pdfs/final_nwlc_womeninconstruction_report.pdf

NCWorks Commission. (2019). Measuring the performance of North Carolina's workforce development system.

https://files.nc.gov/nccommerce/documents/files/NCWorksCommissionReport_FINAL2019_0.pdf

North Carolina Community College System. (n.d.). Mission and history.

<https://www.nccommunitycolleges.edu/mission-history>

North Carolina Community College System. (n.d.). *North Carolina Youth Apprenticeship Guide*.

https://www.apprenticeshipnc.com/sites/default/files/basic-page-files/nccc-printablehandbook-final-r1-print_quality.pdf

North Carolina Community College System & North Carolina Department of Commerce.

(2021). *North Carolina Apprenticeship Program Survey Report*.

https://www.apprenticeshipnc.com/sites/default/files/news-files/nc_apprenticeship_program_survey_report_2020_final.pdf

Olsen, W. (2012). *Data collection: Key debates and methods in social research*. Sage.

Owen, J. V. (1993). Nontraditional people for nontraditional jobs. *Manufacturing Engineering*, 110(3), 45.

Perry, J. A., Zambo, D., & Crow, R. (2020). *The improvement science dissertation in practice: A guide for faculty, committee members, and their students*. Myers Education Press.

Richards, D. (2007). *Recruitment and retention of women in the steamfitter/refrigeration apprenticeships of Madison and Southeastern Wisconsin*. University of Wisconsin-Stout.

INCREASING GENDER DIVERSITY

Roberts, D. C. (2017). Transitions and transformations in leadership. In S. Komives & W. Wagner (Eds.), *Leadership for a better world* (pp.5-16). John Wiley & Sons Incorporated.

Schwartz, K. (2019, June). *U.S. home projects, remodels suffering from worker shortage*.
<https://www.denverpost.com/2019/06/11/construction-industry-worker-shortage/>

State Leaders Connecting Learning to Work: Architecture and Construction. (2019).
<https://careertech.org/architecture-construction>

Stevens, A. H., Kurlaender, M., & Grosz, M. (2019). Career technical education and labor market outcomes: Evidence from California community colleges. *Journal of Human resources*, 54(4), 986-1036. <https://muse.jhu.edu/article/738205>

Sugerman, L. (2019). Game changers for women in skilled trades: Women's leadership, advocacy, and support networks to break through the construction industry's concrete floor. *Perspectives on Work*, 23, 2-6. <http://lerachapters.org/OJS/ojs-2.4.4-1/index.php/PFL/article/view/3260>

Tanner, D. (2012). *Using statistics to make educational decisions*. Sage.

Texas Department of Leadership and Policy. (2018). Survey for Community College Student Engagement. <https://www.ccsse.org/aboutsurvey/aboutsurvey.cfm>

The Associated General Contractors of America. (2019). 2019 annual report.
<https://www.agc.org/sites/default/files/Files/Communications/AGC%20Annual%20Report.pdf>

Toppin, I. (2018, April). Who is going to build the wall? A building trades crisis in the U.S.A. *International Journal for Research in Vocational Education and Training*, 5(1), 64-76.

United States Bureau of Labor Statistics. (2019). BLS Reports. Women in the labor force: a

INCREASING GENDER DIVERSITY

databook.

<https://data.bls.gov/oes/#!/indOcc/Multiple%20occupations%20for%20one%20industry>

United States Department of Labor. (2021). *National Apprenticeship Week 2021*.

file:///C:/Users/Owner/Downloads/NAW_2021_Report.pdf

United States Department of Labor. (2020). *Apprenticeship Fact Sheet*.

https://www.apprenticeship.gov/sites/default/files/Apprenticeship_Fact_Sheet.pdf

United States Department of Labor. (2021). *Approved Apprenticeship Occupations*.

<https://www.apprenticeship.gov/apprenticeship-occupations>

United States Department of Labor. (n.d.).

<https://www.dol.gov/agencies/eta/apprenticeship/policy/national-apprenticeship-act#original>

Watkins, D., Earnhardt, M., Pittenger, L., Roberts, R., Rietsema, K., & Cosman-Ross, J. (2017).

Thriving in Complexity: A Framework for Leadership Education. *Journal of Leadership Education*, 16(4), 148-163. <https://doi.org/10.12806/V16/I4/T4>

Waldon, G. (2013). Construction industry shortages loom. *Arkansas Business*, 30(15), 9-25.

Waugh, C. K. (2018). The obstacles we face in career and technical education. *Career & Technical Education Research*, 43(1), 3-6.

<https://doiorg.proxy195.nclive.org/10.5328/cter43.1.3>

Yilek, C. (2021, June 17). *Women in the workplace and the unfinished fight for equality*. CBS

News. Retrieved January 30, 2022, from <https://www.cbsnews.com/news/women-in-the-workplace-fight-for-equality/>

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Appendix A

Pre-Survey

Before participating in the industry event:

Do you know what skilled trades are?

- Yes
- No
- Somewhat

Is your opinion that jobs in skilled trades are mainly for men?

- Yes
- No
- Somewhat

Do you feel women are suited for jobs in skilled trades?

- Yes
- No
- Somewhat

Are careers in skilled trades appealing to you?

- Yes
- No
- Somewhat

Are you aware of any training programs in the area for skilled trades career opportunities?

- Yes
- No
- Somewhat

Are you aware of any career opportunities in skilled trades in the area?

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- Yes
- No
- Somewhat

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Appendix B

Post-Survey

After participating in the industry event:

Do you have more of an awareness of the skilled trades industry?

- Yes
- No
- Somewhat

Are you interested in skilled trades?

- Yes
- No
- Somewhat

Is this a type of work you feel like you could perform?

- Yes
- No
- Somewhat

Are you more aware of the skilled trades training programs in this area?

- Yes
- No
- Somewhat

Are you more aware of the skilled trades career opportunities in this area?

- Yes
- No
- Somewhat

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Are you likely to inform your female friends/family of career opportunities in skilled trades?

- Yes
- No
- Somewhat

Will you be more likely to pursue training or careers in the skilled trades industry sector?

- Yes
- No
- Somewhat

Did you register for any skilled trades training programs?

- Yes
- No

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Appendix C

Focus Group- following industry events

After participating in the industry event:

How would you define skilled trades?

Skilled trades careers are portrayed as male-dominated. What are your thoughts about this?

How could women prepare for skilled trades careers?

What makes skilled trades careers appealing to you and why?

What is your knowledge of training programs in the area to prepare women for careers in skilled trades?

As a woman, what would help you feel comfortable in pursuing training programs and applying for career opportunities in skilled trades?

What were your expectations of the industry event and what differed?

What was lacking at the industry event?

How could the industry event be improved?

Making Career Connections



Women in Manufacturing Series

Career Quest

Career Quest classes are a series of classes for job seekers that are ready to explore a new career. Learn the skills required and opportunities existing right here in Buncombe County!

Discover the opportunities available with local companies. All classes are fee waived for underemployed and unemployed individuals.



ENGINEERING AND APPLIED TECHNOLOGY

The Engineering and Applied Technology division offers a variety of Associate in Applied Science degree programs in engineering technologies and applied technologies. Most programs are available on a day and evening basis and are tailored for advanced manufacturing and engineering jobs with area employers.

Students enrolled in this division are provided an appropriate mix of theory and hands-on applications. Students in the diploma programs spend much of their time working under industrial shop conditions. Modern facilities include well-equipped laboratories and shops. Emphasis is placed on student proficiency in the use of procedures, equipment, and instruments related to the specific program area. Appropriate related and general education courses support these applied programs.

AVAILABLE PROGRAMS

Air Conditioning, Heating & Refrigeration Tech • Associate in Engineering
Automotive Systems Tech • Civil Engineering Tech • Computer-Aided
Drafting Tech • Computer Engineering Tech • Computer-Integrated
Machining • Construction Management Tech • Diesel and Heavy
Equipment Tech • Electrical Systems Tech • Electronics Engineering
Tech • Geomatics Tech • Mechanical Engineering Tech • Mechatronics
Engineering Tech • Sustainability Tech • Welding Tech



Welcome to the A-B Tech Advanced Manufacturing Center!

The Advanced Manufacturing Center (AMC) is a remodeled teaching and training facility on A-B Tech's main campus. This state-of-the-art manufacturing training center houses the college's Customized Training Program for business and industry training, the Composites Training Center of Excellence, the Industrial Maintenance & Automation Academy, and the Machining Training Center.

With over \$3 million in high-tech training equipment, AMC is comprised of over 30,000 square feet of instructional labs, shop spaces, classrooms, conference and student collaborative areas, staff offices, and areas for training the employees of local manufacturing companies.



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Machining Fundamentals

Take a step toward a new career in machining by learning to operate drill presses, milling machines, saws and bench grinders. During this course you will work hands-on with actual equipment to learn basic automated machining. Additional course topics include an introduction to CNC machining, shop safety, blueprint reading, shop math, Lean Manufacturing principles,

Occupational & Skilled Trades Certification Programs

Course Title	Hours	Certifying Body	Level
Auto Safety Inspection	8	NC DMV License & Theft Bureau	State
Emissions Inspection	8	NC DMV License & Theft Bureau	State
Escort Vehicle Operator	8	NC DOT	State
Refrigerant (EPA 608)	8	Environmental Protection Agency	National
		Refrigeration Board of NC	State
Electrical License Renewal	8	NC Board of Examiners of Electrical Contractors	State



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Construction and Maintenance Program

new

This course is designed to cover topics for those interested in Apartment Maintenance Technician or the Construction Trade. Topics include Construction Basics, Electrical Maintenance and Repair, Plumbing Maintenance and Repair, Heating, Ventilation and Air Conditioning (HVAC) Maintenance and Repair, Interior and Exterior Maintenance and Repair, and Appliance Maintenance and Repair. For more information on how to register for one or more modules of this program,



Welding Basics

This basic welding class covers mig, tig, stick and arc welding and is an excellent course for beginners or those simply wishing to brush up on their current welding skills. Students will be required to purchase personal protective equipment for this course (do not purchase before the first class session). Attendance at the first class is required.



Skills Classes

In partnership with community colleges, Goodwill offers skills training classes in fields such as introductory healthcare, office technology, and skilled trades. These classes are held at Goodwill's workforce development centers and are open to the public. To search for an upcoming class, please select a career field and/or a location from the menus. Classes offered are listed by location below.