What Works for Workforce?

A Report on Advanced Manufacturing Workforce Development

Prepared for MyFuture NC

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University of Virginia, Spring 2025

my FUTURE NC
2 million by 2030.

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DISCLAIMER

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other organization.

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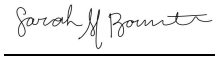
HONOR PLEDGE

On my honor, I have neither given nor received unauthorized aid on this assignment.



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EXECUTIVE SUMMARY

Electric vehicle and silicon carbide chip factories expected to open in Central North Carolina will require a much larger advanced manufacturing workforce than the area currently offers. Two factories will begin operations in Spring 2025 in Chatham and Randolph Counties, with others expected to follow. Many current residents of these counties do not earn a family-sustaining wage, while advanced manufacturing jobs pay enough for many families to meet this threshold. Increasing training opportunities in this field will be beneficial for industry, residents, and the state's overall economic growth. With federal tariffs affecting the automotive industry's supply chain and profit margins, domestic investment in such products and the people equipped to produce them is becoming more important for state and local economic concerns.

Current educational training programs will not be able to keep up with such high levels of increased demand from local manufacturing firms without comprehensive program evaluation and careful investment of additional resources. After exploring the current workforce development landscape, including community colleges, workforce development boards, K-12 educational agencies, and demographic recruitment challenges, this report moves into analysis of potential solutions.

While there is no shortage of ideas to address such programmatic gaps, the literature indicates the best potential solutions for the current North Carolina context are:

- Replicate an apprenticeship program from neighboring counties (Surry-Yadkin Works)
- Add industry-funded teaching positions at community colleges
- Establish a stacked credential pathway across industry and education

These alternatives are weighed against four criteria: sustainability, costs to the state, benefits to participants, and access to training. This report recommends establishing a stacked credential pathway. Analysis indicates this choice would offer high sustainability, low costs, and meaningful benefits to a broad range of participants.

Implementing a pilot program in Chatham and Randolph Counties across three years will provide the opportunity to troubleshoot, modify, and test such a program for effectiveness before adding more counties to the program. Additionally, this framework can be applied to other workforce areas of concern in the state.

INTRODUCTION

ECONOMIC OPPORTUNITY

North Carolina has an emerging economic opportunity for new advanced manufacturing factories slated to open over the next few years. These factories are anticipated to bring close to 10,000 jobs to the central part of the state, with the potential for more economic growth at the Siler City Advanced Manufacturing Site. This area has some manufacturing activity on a small scale, but the scale of labor required to support the new factories will take strategic planning on the part of the state and region. One major area for this strategic planning is workforce development initiatives. Advanced manufacturing jobs are much less dirty than traditional manufacturing but still face stigma around shift-based work and require specialized technical skills that most people in the area do not have. Economic and reputational stakes are high if this initiative fails, so a wide variety of organizations are invested in increasing these skills for the state's current residents. This is an incredible opportunity for North Carolina to continue diversifying its economy, increasing the availability of family-supporting wage jobs through industry, and generating training pathway protocols that can be applied to other high-demand industries.

ADVANCED MANUFACTURING INDUSTRY

Advanced manufacturing refers to the collective set of technologies used to produce electronics, electric vehicles, semiconductor chips, and more. This industry was supported by the Biden-era Inflation Reduction Act and the CHIPS and Science Act, as many government and business leaders see the potential of domestic factories for clean energy growth, national security interests, and job creation (M. Ross & Muro, 2024; The White House, 2022, 2024). As interest in clean energy products grows, these items are in high demand for consumer and business use and the production of other complementary and supplementary goods. Many corporations want to expand their US factory capabilities increasing retention of these jobs domestically. To do this, they need a specialized American labor force equipped with the skill sets to ensure the factories run smoothly and produce enough goods to meet demand (*Explore Advanced Manufacturing in North Carolina*, 2024). However, many advanced manufacturing firms struggle to find qualified workers due to skills gaps. Such gaps are worsened by the reputational stigma surrounding these jobs and declining birth rates after 2008 (Reyes et al., 2022).

PROBLEM STATEMENT

Too few North Carolinians have the skill set to fully staff Advanced Manufacturing factories, although these roles pay family-sustaining wages. New economic development opportunities encourage migration to Randolph and Chatham Counties for individuals

with these skills, while only 54% of Chatham County and 41% of Randolph County residents earn a family-sustaining wage (Chatham County, 2024; Randolph County, 2024). The development of local talent initiatives has progressed too slowly to meet the needs of evolving economic opportunities in the region, limiting economic potential for both individuals and companies.

CLIENT OVERVIEW

This report is prepared for Cory Biggs, Policy and Advocacy Director at MyFuture NC to offer strategies for workforce development at the scale needed to meet such economic demand. MyFuture NC is an independent nonprofit operating at the state level. They must report on progress toward organizational goals to the North Carolina General Assembly (NCGA) but otherwise lack direct supervision. Their board includes a combination of public officials, including NCGA members, and private business leaders. The organization exists to drive up the number of post-secondary credentials earned among North Carolinians and to improve the number of jobs that offer family-sustaining wages (*North Carolina Family-Sustaining Wage*, 2023). Ideally, these two goals will support one another.

MyFuture NC coordinates among various stakeholders (see Figure 1, Appendix A) to generate meaningful progress toward this two-fold goal. Many businesses, organizations, politicians, educational institutions, and workforce development boards are stakeholders in this problem, but none are naturally positioned to take the lead in solving it. Monetary and resource investments by the state of North Carolina, its educational institutions, localities, private companies, and foundations should be channeled where their impact is greatest in solving this problem. MyFuture NC is well-situated and respected by community partners to coordinate with the problem's many stakeholders. They offer a strategic direction for all organizations involved in meeting North Carolina's workforce goals of 2 million post-secondary credentials among residents ages 25-44 by 2030.

BACKGROUND

FIRM OVERVIEWS

One of the largest factories driving this workforce increase will be the first North American Toyota electric battery factory in Liberty, NC (Toyota USA, 2022b). Toyota has given $1 million to Randolph County, where Liberty is located, to invest in educational initiatives but has left the expenditures to the discretion of the local education organizations, taking a hands-off approach to how this money is spent (Toyota USA, 2022a). The other primary employers of interest are Wolfspeed, a components manufacturer for the Toyota supply chain, and VinFast, a Vietnamese car manufacturer.

Wolfspeed is headquartered in Durham, NC, and has some input with several community colleges and local K-12 districts through existing educational partnership programs (E. Blakely, personal communication, October 16, 2024). Despite this established partnership for their Durham location, generally, they prefer state and local education organizations to do most of the program ideation and development. VinFast's factory completion date has been pushed back to 2028, offering a slightly longer runway to train individuals headed to this site (Cawthon, 2024). One of the biggest challenges is balancing the needs of these new, large factories with existing factories with a much smaller, but still important, footprint in the area (B. Brothers, personal communication, February 10, 2025; A. Gardiner, personal communication, February 19, 2025). If training efforts fail in this area, corporate profits will suffer, but they have primarily entrusted training and equipping workers to the state and local education system, creating a need to quickly increase educational capacity in the region.

TALENT DEVELOPMENT PROBLEMS AND PROCESS

The workforce development problem facing North Carolina is not unique to this area. Industries like construction, healthcare, information technology, and manufacturing all face skill shortages as their workforces age, and the recruitment of younger workers to such professions is limited by social stigma against these types of work. Additionally, there is an increasing mismatch across all these industries between skills requested by industry professionals and those possessed by job seekers (Construction Workforce: The Value of Training and Credentials, 2024; *Minnesota Dual-Training Pipeline | Minnesota Department of Labor and Industry*, n.d.; J. B. Fuller et al., 2021). Many advanced manufacturing jobs require post-secondary training but not necessarily a bachelor's degree (M. Ross & Muro, 2024). Although they do not require a bachelor's degree, advanced manufacturing jobs offer a family-sustaining wage, according to the Massachusetts Institute of Technology's Living Wage Calculator (B. Brothers, personal communication, February 10, 2025; *North Carolina Family-Sustaining Wage*, 2023).

Within the talent pipeline problem, there are three distinct challenges: initial staffing initiatives, maintaining a talent pipeline to fill vacancies, and recruiting Central NC residents to the advanced manufacturing industry. Initial staffing will need to occur quickly and efficiently, as Toyota and Wolfspeed begin operations in April 2025, requiring close to 5,000 jobs in 2025 and more as production increases (Thomas, 2024; *Toyota Powers On New North Carolina Automotive Battery Plant | Corporate | Global Newsroom*, 2025). VinFast is expected to open in 2028, with 7,500 jobs (Cawthon, 2024). Once initial training and hiring for Wolfspeed and Toyota are complete, local pathways then need to be able to maintain a talent pipeline. Maintaining such a pipeline will require much of the same programmatic structure, but it needs to be able to nimbly fill vacancies and adapt to location-specific needs as they arise after initial staffing.

LOCAL GOVERNMENT STAKEHOLDERS

Many government agencies own a small part of the talent development process, contributing to the number of stakeholders whose perspectives matter in addressing such a problem. Many smaller agencies working on this problem are key allies, but they do not hold enough decision-making power to spearhead a solution on their own. Specifically, in response to the expected advanced manufacturing boom, the Advance NC initiative was begun as a new forum for engagement, but it currently lacks the financial and administrative resources to act as a manager for this problem. Efforts are in progress to expand Advance NC's capacity and leadership potential (M. Roberton, personal communication, February 17, 2025). Therefore, MyFuture NC is the current convening organization for strategic planning and workforce decision-making.

COMMUNITY COLLEGE LEADERSHIP

Despite dispersed ownership of talent development problems, community colleges often step forward as community leaders on workforce issues and have been doing so in North Carolina for many years (Lowe et al., 2011). Generally, advanced manufacturing talent development initiatives are primarily centered at community colleges, as they already work closely with other stakeholder organizations like K-12 schools, workforce boards, industry, and social services. They are uniquely embedded in the job market, shaping the skills students develop in their classrooms and receiving local business feedback on the quality of these skills and where gaps lie, often articulated as a dual customer approach (Lowe et al., 2011).

Community colleges have few administrative barriers to entry, are low cost, and maintain a consistent funding base from state budget appropriations, making them a reliable and relatively cheap option for individuals wanting to continue education outside of a four-year institution (Alssid et al., 2002; McIlwain & Jaeger, 2023). Almost every NC resident lives 30 minutes from one of its 58 community colleges, offering convenience that likely increases educational take up among those unlikely to attend four-year colleges (Acton et al., 2024; Barricklow & Jaeger, 2024; *NCCCS*, n.d.). In the 2000s, North Carolina community colleges successfully trained a pharmaceutical and bioprocessing manufacturing workforce, demonstrating the system's ability to produce 1,000 certificate graduates annually across 13 community colleges by 2011 (Lowe et al., 2011).

EXISTING COMMUNITY COLLEGE SOLUTIONS

Community colleges in Chatham and Randolph Counties and surrounding areas currently offer certifications in advanced manufacturing as part of their continuing education programs. All community colleges in North Carolina offer Customized Training Programs in partnership with local industry at no cost to the employees or the companies (*Customized Training - NCCCS*, n.d.). Many local manufacturing employers, including Wolfspeed, take advantage of this program since it is free to employers and is supported

by a dedicated fund at the NC Community College System Office (E. Blakely, personal communication, October 16, 2024). However, exclusive reliance on this pathway to train all incoming workers would place the entire financial burden of workforce training on the state. At the scale required to upskill so many individuals, the Customized Training Program would quickly exceed its financial and administrative capabilities. While educational institutions are essential to deliver relevant learning, effective workforce development systems are the primary goal of addressing these problems. Community colleges are a critical part of developing such mechanisms but must work closely with industry and other institutions like high schools and workforce development boards to ensure training is contextualized and well supported.

HIGH SCHOOL PATHS FOR TRAINING

Demographic challenges prevent full reliance on high school recruitment; declining birth rates after 2008 mean fewer high school students in the coming years. Despite declining numbers, they are a key part of creating an effective solution, especially since the rate of Opportunity Youth[1] in both Chatham and Randolph Counties is higher than the state average (Chatham County, 2024; Randolph County, 2024). Anecdotal evidence demonstrates the importance of recruiting at high schools to increase awareness of these jobs among both high school students and their parents (M. Burton, personal communication, February 21, 2025; S. B. Cox, personal communication, February 14, 2025; D. Cross, personal communication, February 14, 2025). In some cases, parents need to be convinced of the value of their children pursuing such careers instead of more familiar career paths. However, parents themselves are often looking for higher-wage jobs and express interest in the opportunities advanced manufacturing careers offer (S. B. Cox, personal communication, February 14, 2025).

While high schools are not equipped to be the primary educational providers for advanced manufacturing credentials, they serve as an important conduit for students who would be well-suited to such careers. Career coaches and other high school staff can connect students to opportunities that streamline training timelines and lower educational costs while still in school. These opportunities ensure high school graduates land a job or further training opportunities, in turn minimizing the number of students lost in their transition out of high school. Through funding structures like the federal Workforce Innovation and Opportunity Act (WIOA) and North Carolina's Career and College Promise program (CCP), initial training in advanced manufacturing can begin before high school graduation at little or no cost to the student (M. Burton, personal communication, February 21, 2025). These opportunities, along with internships or other paid programs, may also incentivize students to remain in school until graduation (Lindsay et al., 2024).

[1] Opportunity Youth refers to individuals ages 16-24 who are not in school or participating in the labor force (North Carolina's State of Educational Attainment Report, 2024).

High schools in both Randolph and Chatham Counties have existing pre-apprenticeship programs that prepare students for apprenticeship programs after high school (M. Burton, personal communication, February 21, 2025; D. Cross, personal communication, February 14, 2025). In Randolph County Schools, a registered apprenticeship pathway trains over 100 students annually, with options for them to enter advanced manufacturing pathways through this program (D. Cross, personal communication, February 14, 2025). Such programs offer a basic programmatic structure within high schools that could be developed into a much larger program. A particularly successful and popular program in nearby Surry and Yadkin Counties facilitates, develops, and streamlines additional programmatic support to increase the quantity and quality of apprenticeship and pre-apprenticeship programs offered to high school students in their public schools (McIlwain & Jaeger, 2023; *Senate Bill 240 (2025-2026 Session) - North Carolina General Assembly*, 2025).

In addition to apprenticeship programs, North Carolina high schools offer dual enrollment options through the state's standardized, streamlined approach to dual enrollment, Career and College Promise (CCP). High school students take classes at community colleges or universities to gain both high school and college credit at no cost to them through the CCP program (*Career and College Promise | NC DPI*, n.d.). Participation in CCP's CTE program is associated with an increase in post-secondary enrollment at community colleges (Edmunds et al., 2022). Even if students do not participate in formal apprenticeship or pre-apprenticeship programs, they can begin to take advanced manufacturing basic courses for free under CCP while still in high school, reducing the time and cost needed to attain an entry-level credential after graduation (M. Burton, personal communication, February 21, 2025).

High schools also administer the In-School Youth portion of the Workforce Innovation and Opportunity Act (WIOA), offering flexible, customized workforce training programs for under-resourced students, including those who lack basic skills, have interacted with the juvenile justice system, are English Language Learners, are teen parents, are members or former members of the foster care system, or have another significant limitation to long-term economic success (*WorkforceGPS - WIOA Youth Program Fact Sheet*, n.d.).

WORKFORCE INNOVATION AND OPPORTUNITY ACT

The WIOA Youth program and its counterpart programs for adults fund many workforce development programs, including educational training, individual career advising, and job search assistance (*Workforce Innovation and Opportunity Act*, n.d.). Adult programs focus on the most under-resourced individuals, as benchmarked by low income levels, receiving public benefits, and include mandatory priority to veterans of the US Armed Forces (*Workforce Innovation and Opportunity Act*, n.d.). Workforce development boards provide many of these services to qualifying adults and Out of School Youth. Barring any change to this federal grant structure, workforce efforts in this area should effectively utilize WIOA funds and its targeted demographics.

Workforce pathways must be easily communicated to potential participants. While a marketing strategy is outside the scope of this project, identifying local population recruitment priorities is not. Social stigma around shift-based work can limit willingness to engage with the industry, especially among adults (Brock, 2010; Jacob, 2017; Reyes et al., 2022). However, well-designed career paths can convert interest in these industries into potential employees who are prepared to enter industry positions (Cotner et al., 2021; J. B. Fuller & Raman, 2022). The large number of people needed to initially fill these positions requires interest from adults who might be underemployed or not earning a family-sustaining wage. The current rate of family-sustaining wage jobs in Chatham County is 54% and 41% in Randolph County, indicating potential long-term benefits for residents who choose to enter this industry and the region as a whole (Adams, 2016; Chatham County, 2024; Randolph County, 2024). It should also increase industry awareness among high schoolers as they graduate and decide whether to go to a 4-year college, 2-year college, or enter the workforce (Hamilton, 2019; Jacob, 2017; Lindsay et al., 2024).

In addition to skills gaps, potential employees may also be members of "hidden worker groups," which are systematically excluded from the labor market due to non-traditional labor force participation or group membership (J. B. Fuller et al., 2021). A Harvard Business Review study generalizes workforce mismatch in three categories: individuals working one or more part-time jobs instead of one full-time position, those with long gaps in employment history, and those not actively looking for employment but who would enter the labor market with the right incentives or accommodations (J. B. Fuller et al., 2021). The latter two categories of hidden workers are not traditionally included in unemployment rates but can be effective employees with appropriate accommodations. The Harvard study identifies a long list of such groups, but examples include those with disabilities, refugees and asylum seekers, and those participating in informal labor markets (2021).

Workforce development boards serving Randolph and Chatham Counties work with many job seekers to promote training programs for advanced manufacturing when skills and interests make this industry a good fit (B. Brothers, personal communication, February 10, 2025). Workforce development boards are also able to partner with existing nonprofits to extend their capabilities to specific sub-groups. Nonprofits are often able to fill needs like transportation and childcare that may limit labor force participation for a specific sub-group of potential employees (B. Brothers, personal communication, February 10, 2025). Such nonprofits may also have existing relationships with specific under-served subgroups and encourage engagement between these groups and workforce development boards to facilitate employment in the advanced manufacturing industry.

RESEARCH CHALLENGES

Little causal research has been done on workforce training pathways because of the difficulty in establishing a counterfactual to these programs and other research and perception challenges (Cotner et al., 2021; Jacob, 2017; S. L. Ross et al., 2021). Cotner et al. recognize these research challenges in their meta-analysis of existing quantitative evidence for theoretical metrics identified in descriptive literature (2021). Their study summarizes twenty experimental or quasi-experimental papers on CTE programs for adult learners at community colleges. A similar study evaluates CTE programs in secondary education (Lindsay et al., 2024).

Cotner et al. find large research gaps in establishing causal relationships between CTE programs and medium- and long-term earnings, technical skill proficiency, and long-term employment (2021). Only short-term earnings and employment outcomes were positive and statistically significant across the studies they analyzed, indicating a lack of evidence on key metrics beyond the short term (Cotner et al., 2021). These are the primary outcomes of interest to the North Carolina organizations and institutions working on this program.

Lindsay et al. also find large research gaps among CTE programs in high schools and small numbers of studies on researched outcome areas (2024). No studies they evaluate on CTE courses in traditional high schools causally evaluate CTE course exposure on student discipline, school attendance, or post-secondary academic achievement. They find only between 1-4 causal studies evaluating almost every other outcome of interest, including employability skills, actual employment, earnings, and high school completion (Lindsay et al., 2024). Since the current NC context relies on traditional schools for delivery, extensive evidence on any implemented program would be a beneficial contribution to the literature.

The wide variety of options for implementing CTE pathways provides a dizzying array of possibilities for implementation in North Carolina. Although small, discrete examples provide helpful context to understand potential avenues forward, the scale demanded in North Carolina makes some of them appear impractical. Yet the demographic concerns among high schoolers, Opportunity Youth, hidden workers, and adults making a career change require a range of programs targeted around different groups of potential employees. There is no shortage of programs being created to address these workforce challenges in this instance and nationwide, but there is also little rigorous evidence on what works when and for whom. Given the lack of evidence beyond short-term outcomes in most academic literature, any path forward in North Carolina should be comprehensively evaluated in the short and long term to add to the body of literature around this topic and inform future efforts in the state.

ALTERNATIVES

ALTERNATIVE 1: EXPAND SURRY-YADKIN WORKS

Surry-Yadkin Works is a vocational education program with the potential to expand to other parts of the state. It connects high school students in the Surry and Yadkin County school systems to apprenticeship and pre-apprenticeship programs in the area. Since its launch in 2021, it has helped place over 350 students with employers across industries in the area (McIlwain & Jaeger, 2023). Led by a coordinator at Surry Community College, it incorporates perspectives from businesses and local government through Workforce Development Specialists. They interface with schools and businesses to understand the whole local picture and develop strong relationships among stakeholders (McIlwain & Jaeger, 2023). The program aims to start recruitment processes for non-college careers before students leave high school, hoping early engagement will pique interest among students and reduce barriers to credential completion as students decide their next step after high school (Lindsay et al., 2024; McIlwain & Jaeger, 2023).

A similar program launched in the Charleston, South Carolina, area led to an increase in registered apprenticeships of over 600% in seven years (Vice, 2019). This increase is promising because of its situational similarity to the North Carolina context: it was launched in anticipation of the Boeing plant arriving in the area in the 2010s (*Chatham County News | Chatham County, NC*, 2022; Vice, 2019). However, this statistic has not been causally evaluated and was presented in a dissertation. Therefore, more evidence should be analyzed before using the South Carolina success to predict similar outcomes in Central North Carolina.

In Chatham and Randolph Counties, Central Carolina Community College (CCCC) will house the coordinators for the program, as they are already hosting the Advance NC initiative for the whole state and have worked closely with Wolfspeed to develop extensive Customized Training Programs. They have the institutional knowledge and extensive connections to direct this program. Where possible, WIOA funds should be deployed to support student success. Otherwise, operating funds will likely come from Chatham and Randolph Counties, private foundation grants, and anonymous donations (McIlwain & Jaeger, 2023). On March 5, 2025, the NC Senate filed a bipartisan bill to fund such a program at three community colleges in the state, but the bill has not proceeded to committee by report submission (*Senate Bill 240 (2025-2026 Session) - North Carolina General Assembly*, 2025).

Because large companies support so much of the economic development in these areas, significant consideration should be given to transitioning some of the funding burden to Toyota and Wolfspeed once the program proves its utility. This is a different decision the Surry-Yadkin Works program made, but Boeing's relationship with the Charleston, South Carolina, educational landscape can provide a guide to transitioning this funding (Cummins, 2015; *Governor McMaster and the Department of Employment and Workforce Announce Boeing as the Inaugural 2023 Workforce Champion Award Recipient | SC*

Department of Employment and Workforce, 2023; Lindsay et al., 2024; Vice, 2019). Because so much of the workforce trained under such a program in Randolph and Chatham Counties will be going to Wolfspeed and Toyota, and later VinFast, the Surry-Yadkin concerns about employer interests being overbearing for the program are less relevant, at least at this point (McIlwain & Jaeger, 2023).

ALTERNATIVE 2: ADD INDUSTRY-FUNDED TEACHING POSITIONS

In the North Carolina healthcare context, hospitals are funding and providing one or two employees as part-time instructors to generate additional FTE capacity and then streamlining hiring into these sponsoring employers (McIlwain et al., 2024). From a funding perspective, these instructors may help colleges respond to industry needs more quickly by not relying on retroactive state funding. A lack of teachers is a major problem in providing the level of training needed to scale the workforce appropriately (S. B. Cox, personal communication, February 14, 2025). This alternative provides quick capacity building for educational institutions, especially in the short term. A key part of the Swiss vocational education system is utilizing industry professionals as part-time instructors for the relevance of the subject matter and connection with the industry (Hoffman & Schwartz, 2015). Program flexibility, quick response time, and promoting feedback loops with industry can help guide program development toward certifications that are useful to local companies (Cotner et al., 2021).

Cotner et al. find that these professionals may need better professional development to communicate their industry expertise to students effectively (2021). Integration with the community college will improve this aspect of instruction by immersing instructors in effective learning environments (Cotner et al., 2021). The Swiss system has been very successful in using this strategy to train its teachers (Hoffman & Schwartz, 2015). Employees who are performing hands-on tasks every day can teach relevant skills better than managers or those who have left the industry to teach full time. The concentration of jobs into a few local employers makes such a relationship more attractive to both parties. Toyota, Wolfspeed, and VinFast can each sponsor a position or two, potentially increasing their investment if these are successful.

ALTERNATIVE 3: DEVELOP A STACKABLE CREDENTIALS PROGRAM

Cotner et al. present a template to structure a comprehensive, industry-wide career pathway that systematically builds credential stacking and flexibility to serve a wide variety of people hoping to enter the industry at different skill and education levels (2021). Credential stacking refers to the strategic design of each certificate and degree available in the advanced manufacturing area to build on the previous step, improving educational efficiency, ease of upskilling, and aiding with industry retention (Cotner et al., 2021; J. B. Fuller & Raman, 2022). See Figure 2, Appendix A for a generalized pathway. Advance NC leads coordination between the community college system and local industry to develop such a pathway since they are already established to coordinate

among employers and community members and currently hold a grant to do so. As a regional initiative, their involvement will help align corporate interests in the area and streamline potential expansion.

With any additional non-recurring funding from the North Carolina General Assembly, additional personnel resources should prioritize this alternative. Information about existing training programs should be compiled for Advance NC and other stakeholders to succinctly draft into a micro-credential plan for approval by local corporate entities. This will draw from Advance NC resources, Community College System Office resources, and individual college resources. MyFuture and the Community College System Office should consider requesting nonrecurring funding from the NCGA for additional positions to compile this information and draft it, as this will add a significant workload to existing positions. A micro-credentialing program in Utica, New York, offers training for the first step of a credential stacking program in about 14 weeks (McIlwain & Barricklow, 2024; Zigrino, 2023). Although the New York program has not been causally evaluated, Cotner et al. offer valuable evidence that this option in other locations significantly improves student credit accumulation, industry-recognized credential attainment, short-term employment, and short-term earnings (2021).

CRITERIA

MyFuture's organizational goals are to increase post-secondary credentials and family-supporting wages among North Carolinians. Secondary goals include improving the labor force participation rate, with a special interest in Opportunity Youth. For this project, MyFuture priorities include establishing templates for workforce development across sectors and regions. There is also concern about prioritizing resources toward training local residents so there is not a large influx of migration to the area from different parts of the state and country.

MyFuture NC has open communication pathways with many stakeholders across the ecosystem, and they have the informal authority and buy-in from partners to offer direction on what direction this project should take. Based on organizational goals in the state and insights from academic literature, the criteria used to evaluate each alternative will be sustainability, costs to the state, benefits to participants, skill attainment and certification, and access to training.

NOTE ON POLITICAL FEASIBILITY

Political feasibility is not included as an evaluative criterion because stakeholders are actively engaged in finding a solution to this issue. In North Carolina, the question is not whether to expand workforce development, but how to best prepare for this economic opportunity. Such opportunities and their potential impact on the region's economy drive a willingness to collaborate and innovate. Political momentum supports the project's ultimate goal: equipping and fully staffing these factories with North

Carolinians. Logistical details of program implementation, including who will be primary beneficiaries, are most important when determining resource allocation in the state.

SUSTAINABILITY

Sustainability will be assessed based on long-term viability, regional coordination, and integration with existing systems. The number of collaborating institutions and their contributions to each workforce development program will measure coordination and integration. Long-term viability refers to buy-in among stakeholders and contributions of money, time, and talent from organizations. Buy-in will be measured by the proportional contributions of these resources to any adopted program. Programs that engage more stakeholders, utilize existing communication channels, and promote regional coordination among similar institutions (e.g., local education agencies, workforce development boards) will be rated higher than those that do not. To ensure longevity, the industry will be viewed as a key stakeholder, but over-reliance on a single company's financial support will be discouraged, as programs should remain independent of individual firm decisions.

COSTS TO STATE

Cost will be estimated by direct costs to government stakeholders: community colleges and their system office, local education agencies, the state of North Carolina, and workforce development boards. Since these stakeholders are publicly funded, their budgets will be publicly available, and cost estimation will be based on direct costs of salaries, benefits, operating expenses, training materials, specialized equipment, and facility space.

BENEFITS TO PARTICIPANTS

Benefits to program participants will be calculated too, with direct savings of tuition, wage gains, and other financial benefits offered through the program structure counting toward benefits for participants. In many cases, individuals can access training for free, generating no direct costs for program participants.

SKILL ATTAINMENT AND CERTIFICATION

Skill attainment will primarily measure increases in the number of post-secondary credentials earned by those without previous educational attainment. Additionally, earned credentials should offer value to industry partners. For programs that have an apprenticeship component, such programs generate easily transferable skills. This will be measured from evaluations of similar programs, showing the expected increase in return to school or workforce participation generated by increasing the availability of these programs.

ACCESS TO TRAINING

Access to training should prioritize those who would benefit most from jobs in advanced manufacturing, particularly residents near proposed factory sites. Key populations of concern include individuals without post-secondary credentials, Opportunity Youth, and hidden workers. Programs serving all these groups will be rated higher than those targeting only one or two. Given the region's labor needs, initiatives supporting both high schoolers and adult learners will also be prioritized over those focused on a single group.

ANALYSIS

ALTERNATIVE 1: REPLICATE SURRY-YADKIN WORKS

These estimates and analysis assume a one-year planning period, followed by a three-year pilot program at a smaller scale to establish regional mechanisms of the apprenticeship program, develop employer relationships, and work out any logistical issues before scaling the program up to better address demand. At this point, reevaluating the funding structure with increased employer contributions may be necessary.

SUSTAINABILITY

Community colleges and high schools primarily drive the development of an apprenticeship model like Surry-Yadkin Works (McIlwain & Jaeger, 2023). Historically, Randolph County Schools and Asheboro City Schools have not collaborated on such initiatives because of organizational structure (D. Cross, personal communication, February 14, 2025). However, Randolph County is interested in developing its own apprenticeship model using the Surry-Yadkin Works Playbook. Given Randolph County Public Schools' working relationship with Randolph Community College and Chatham County Public Schools' working relationship with Central Carolina Community College, coordination among all four organizations through a structure like Surry-Yadkin Works is feasible. This alternative also requires the interest and buy-in of Wolfspeed and Toyota for its success. By generating a well-established feedback loop between industry and educational partners, strategic alignment between the two is improved beyond simply providing funding (Lowe et al., 2011). This alternative is driven by industry capacity to sponsor and run the apprenticeship programs but benefits educational stakeholders by facilitating direct communication about industry trends and potential training gaps (J. B. Fuller et al., 2022; Hoffman & Schwartz, 2015; Lowe et al., 2011).

Randolph and Chatham Counties are in different workforce development boards and different DPI regions. Creating a regional partnership like Surry-Yadkin Works would improve coordination between these two counties so their initiatives are aligned and efforts to develop talented workers are not duplicated. Given the incorporation of each

primary stakeholder organization, the potential for increased collaboration among currently siloed counties, and Surry-Yadkin Works' success in similar NC counties, this alternative ranks **high on sustainability**.

COST TO STATE

It will cost between **$450,000-$500,000 per year** to establish and run a program at the scale of the Surry-Yadkin Works model (McIlwain & Jaeger, 2023; *Senate Bill 240 (2025-2026 Session) - North Carolina General Assembly*, 2025). See Appendix B for detailed costing information from Surry-Yadkin Works. A current bill in the NC Senate estimates and appropriates $500,000 to replicate Surry-Yadkin Works in other parts of the state (*Senate Bill 240 (2025-2026 Session) - North Carolina General Assembly*, 2025). Developing and maintaining this alternative presents a **high cost**.

BENEFITS TO PARTICIPANTS

For program participants, the Surry-Yadkin Works model estimates the following average monetary benefits:

- **$11,346.26** saved in college tuition per student through Career and College Promise arrangements.
- **Over $1,000** per month in pre-apprenticeship wages
- **$66,594.32** in future earning potential per year at current market rates (*Return on Investment*, n.d.)

Surry-Yadkin Works currently supports 150 students. At this scale, the approximate aggregate benefit per year is **$10.6 million**. See Appendix B for calculations. This alternative ranks **high on benefits to participants**, especially if it can be scaled beyond 150 participants in later years.

SKILL ATTAINMENT AND CERTIFICATION

A similar program was undertaken in Charleston, SC, when the Boeing plant opened in 2011 (Vice, 2019). While this program analysis was presented in a PhD dissertation, Vice indicates the relative success of this program (2019). Other more robust economic analyses of the Boeing plant in the Charleston area and the state of South Carolina indicate a positive impact on both the city and the state (Scavette, 2024; Strader, 2023). No study directly measures the impact of such training efforts on long-term individual or sector outcomes. However, it can be reasonably assumed the large increase in apprenticeships in this sector offered increased awareness and training in the industry that contributed to its success in its first decade.

Since Surry-Yadkin Works' inception in 2017 until the end of the 2023-2024 school year, **1,691 industry-recognized credentials** have been awarded (*Return on Investment*,

n.d.). On average, this is about 240 credentials per year, recognizing that the program has only been running at full capacity for three of the past seven years, and many credentials may take more than a year to complete. This alternative ranks **high on skill attainment and certification.**

ACCESS TO TRAINING

This plan builds on the WIOA federal funding model, which offers opportunities for training or upskilling to those who would otherwise fall through the cracks. As part of the Surry-Yadkin Works program, students are prepared with interview skills, career skills, a professional wardrobe closet, and program stipends (McIlwain & Jaeger, 2023). The program's direct funding takes several routes, including a participation stipend in addition to their wages to incentivize performance and a transportation stipend when students are responsible for their own transportation (McIlwain & Jaeger, 2023). These additional supports help participation rates among under-resourced students.

Because of the grassroots aspect of Surry-Yadkin Works, its direct consideration of students eligible for WIOA funding, and its high retention rate (87%) of youth in the region, this alternative is excellent for current students in the North Carolina public school system and recent graduates enrolled at the community college (*Return on Investment*, n.d.). Adults can participate in this program, but many of its resources are targeted toward younger students, especially graduating seniors from the region's public high schools, recent high school graduates, and current community college students. No effect is distinguishable between women and men (J. B. Fuller et al., 2022). Because the program does not have a specific strategy for adult learners or target any specific hidden worker populations, this alternative rates **medium on access to training**.

ALTERNATIVE 2: INDUSTRY-FUNDED TEACHING POSITIONS

SUSTAINABILITY

Industry-funded teaching positions develop deep ties between industry and the community college but do not require as much involvement from the K-12 stakeholders or the workforce development boards. While secondary educational partners rely on community colleges to offer CTE training to their students, the lack of direct involvement increases the potential for miscommunication or misalignment of goals among these stakeholders. Higher levels of industry direct investment may be helpful to proactively establish teaching capacity before the community college funding formula would respond to such an increase in enrollment (McIlwain & Barricklow, 2024).

However, there is a tradeoff in program independence from the industry stakeholders if one of them disagrees with community college decisions (McIlwain & Jaeger, 2023). An additional challenge to the sustainability of this alternative is capacity limitations at industry locations for available instructors. No evidence exists on long-term outcomes for this kind of model, but its fixed-term implementation across several localities in the

healthcare context indicates a short-term scope to develop capacity quickly across the region (McIlwain & Barricklow, 2024). Because of the limited scale where this has been implemented and administrative questions around who these instructors might be, this alternative rates **low on sustainability.**

COSTS TO THE STATE

When pursued for five years, this alternative will cost firms a maximum of $100,000 (salary plus benefits) per instructor per year (*Faculty Salary Comparison (IPEDS)*, n.d.; *Nursing Instructor (12 Months) | Job Details Tab | Career Pages*, 2025). At the scale needed to increase the advanced manufacturing talent pool in a meaningful but sustainable manner, three of these instructors will be needed to increase capacity. Although firms pay instructor salaries, community colleges absorb the instructor training costs. These additional programs cost **$4000** in instructor compensation, training materials, and operational costs for one cohort. This alternative rates **low on costs** due to the minimal amount of investment required by government entities.

BENEFITS TO PROGRAM PARTICIPANTS

Industry-funded teaching positions will not decrease costs to program participants from the status quo. While this alternative will increase availability to students, availability does not ensure completion and will not be quantified as a monetary benefit (Cummins, 2015). NC Boost grants are available as wrap-around support for any of the community college workforce programs. Outside of these retention supports, evidence is minimal on the benefits and take-up rate of simply adding more seats without associated support strategies to drive program take up and aid retention (J. B. Fuller et al., 2022; Hamilton, 2019; *North Carolina Community College System Launches Boost Program*, 2025). This alternative rates **low on benefits to program participants**, given its minimal change from the status quo.

SKILL ATTAINMENT AND CERTIFICATION

By increasing the number of instructors available to teach students, skill attainment and certification will improve in magnitude. By involving instructors from the industry, these credentials will be valuable to employers (J. B. Fuller et al., 2022; Hoffman & Schwartz, 2015; Holland, 2016). Assuming a retention rate of 80%, **between 120-768 credentials** will be generated annually by this plan, depending on employer interest and the proportion of entry-level credentials to 2-year programs. See Appendix B for calculations.

Variation in capacity is determined entirely by corporate decision-makers, who may be outside of the Central North Carolina region, or the United States entirely. It should be noted that Hoffman et al. present such variation in credentialing as a benefit of such a program since business stakeholders are likely the quickest responders to changing business staffing needs (2015). However, since the Central NC region has far below the

needed number of qualified people to work in advanced manufacturing, this point is less salient for the foreseeable future. Weighing these concerns, this alternative rates **medium on skill attainment and certification.**

ACCESS TO TRAINING

The alternative will preserve the status quo for costs to local residents. However, by increasing opportunities for advanced manufacturing instruction across the region, access for current residents is improved by offering more seats to those who are interested. No differential effect is expected for adult learners since simply expanding seating availability does not affect retention and completion (Cummins, 2015). By operating under the existing community college model, additional support and resources are lacking. Evidence shows these are important to drive retention and improve opportunity costs for those who might not otherwise make a career shift or reenter the workforce (Evans et al., 2017; Fuller et al., 2021). This alternative rates **medium on access to training.**

ALTERNATIVE 3: DEVELOP A STACKED CREDENTIAL PATHWAY

SUSTAINABILITY

Efforts to develop a stacked credential pathway will last for years to come, with small adjustments needed as the advanced manufacturing industry develops. This plan will require initial input and feedback from all workforce development entities in the region: K-12, community colleges, workforce development boards, Advance NC, and industry. All organizations will have to work together to condense existing metrics and programs into a clear pathway. This may be difficult when entities have different measures of success, but previous coordination efforts prove this will not be impossible (B. Brothers, personal communication, February 10, 2025). This alternative rates **high on sustainability** because the plan primarily requires an up-front investment of time and relational capital, is independent of industry funding, and relies on existing systems.

COST TO THE STATE

Advance NC currently holds a grant to support a credential stacking determination process that began in January 2025 (M. Roberton, personal communication, February 17, 2025). Primarily, these funds will support the time and data-gathering process from stakeholder employees to develop effective credentials. No additional funding is required to implement this alternative from the institutional side. Maintenance of the pathway as adjustments are needed and periodic evaluation of the program will be required. While this cost will be dependent on the Advance NC budget and capacity at the time of reevaluation, it will fall under the purview of existing employees and will not impose direct costs on any state entity. With the recent NC Boost funding, these additional supports will already be provided through a different funding and planning

channel (*North Carolina Community College System Launches Boost Program*, 2025). Because of its low additional cost to government stakeholders, this alternative performs **low on costs**.

BENEFITS TO PROGRAM PARTICIPANTS

Evidence from Virginia Community Colleges estimates the completion of a second credential within a stacked framework is associated with a **$2280 annual increase in wages** and an increase of 4 percentage points in labor force participation when compared with those who started a second credential but did not finish (Meyer et al., 2022). These estimates are across multiple sectors, including business and health, but represent the best available evidence to quantify the effect of such a program (Meyer et al., 2022). Therefore, this alternative rates **medium on benefits**.

SKILL ATTAINMENT AND CERTIFICATION

When career-stacking programs are supported by wrap-around social supports at community colleges, they generally improve attainment among students who would otherwise not pursue post-secondary credentials (Cotner et al., 2021). Because this portion of student support is already covered by a private grant, this alternative can focus on developing effective attainment outcomes. Evidence suggests that these supports are highly correlated with credential completion rates, making this alternative perform **high on skill attainment and certification** (Alssid et al., 2002; Cotner et al., 2021; Evans et al., 2017; J. B. Fuller et al., 2022; Jenkins, 2003).

ACCESS TO TRAINING

By creating a streamlined pathway with clear on- and off-ramps between the community colleges and industry, individuals who would not otherwise be willing to navigate this ecosystem can more easily understand how job training can benefit them (Cotner et al., 2021; Meyer et al., 2022). Evidence suggests these benefits may be greater for women and adults over 50. Women are more likely to have gaps in formal employment and, therefore, more likely to be members of one or more hidden worker classes (Fuller et al., 2021; Meyer et al., 2022). Adults over 50 are more likely to want their credits to end in a degree (Cummins, 2015). Many older adults have challenges navigating new hiring norms around technology and a greater emphasis on a skills-based economy that stacked credentials can help navigate (Cummins, 2015).

While this alternative can and should be used in high school CTE curricula, it offers clear benefits to adult learner populations, who are often left out of strategic plans despite likely filling many of these positions (Cummins, 2015; Meyer et al., 2022). Due to this aspect and the simplicity of communication for hidden workers reentering the formal workforce, this alternative rates **high on access to training**.

OUTCOMES MATRIX

	Sustainability	Cost to State	Benefits to Program Participants	Skill Attainment and Certification	Access to Training
Expand Surry-Yadkin Works	high	high	high	high	medium
Industry-Funded Faculty Positions	low	low	low	medium	low
Stacked Credential Pathway	high	low	medium	high	high

RECOMMENDATION

The Stacked Credential Pathway received the most favorable ratings of all the alternatives, only underperforming another alternative on the program benefit criterion. Because of its performance against evaluative criteria and its sunk costs for the state, this option should be pursued first. Pursuing this alternative now will not impose high costs on any state or local entities, since Advance NC already has a grant to plan an advanced manufacturing stacked pathway. Also, this upfront planning will have long-lasting impacts on the advanced manufacturing talent development pool without high levels of continued management or fundraising. Once the credentials are structured logically and clearly, it will be easier for potential participants to understand the benefits of starting this career pathway. While the stacked credential model may need updating and periodic evaluation to make sure its goals are accomplished, the amount of administrative management is low once developed.

Stakeholders in central North Carolina are receptive to workforce development initiatives. If all participants contribute to pathway development, they will be able to understand and embrace their role in such a process. Careful planning and communication should consider the larger scale of labor needs from Toyota, Wolfspeed, and VinFast while not alienating small- to medium-sized companies that prefer hyper-local communication (A. Gardiner, personal communication, February 19, 2025).

This alternative performs best in ensuring access for all potential students: high school students and adults, current central NC residents, and under-employed community members or individuals outside of the labor market. Since all advanced manufacturing jobs pay family-sustaining wages, offering clear direction on credential achievement will improve regional economic outcomes. Other existing grants to the North Carolina Community College System provide the wrap-around support critical for this program to work. A stacked credential pathway offers career direction. Clear advising along the pathway and material support encourage persistence in completing such goals. These supports also help under-resourced individuals to start and complete such credentials, especially when the first step on the career ladder is a 16-week credential program.

IMPLEMENTATION

A pilot program lowers the financial and logistical risks of implementation and offers quick coordination of workforce needs. Although the scale of labor is limited in the short term, careful consideration and evaluation of each step ensures sustainable growth and quickly resolves problems. By collecting and robustly analyzing data on this pilot program, the North Carolina workforce development ecosystem contributes to the sparse body of technical education literature and generates useful feedback on effective program design for application to other industries and localities (Cotner et al., 2021; Ecton & Dougherty, 2023; Lindsay et al., 2024).

KEY STAKEHOLDERS

Successful implementation requires collaboration among multiple stakeholders, including:

- **Advance NC**: The Project Manager will bring all stakeholders to the table, establish communication channels, and ensure strategic alignment on all outcomes.
- **Randolph and Central Carolina Community Colleges**: Ensure curriculum alignment with industry goals, deliver the program, and integrate program feedback.
- **K-12 Local Education Agencies**: Offer CTE programs that integrate the first steps of the stacked credential programs into high school course offerings. Increase awareness of such pathways during and after graduation and facilitate WIOA funding when applicable.
- **Regional Employers**: Provide input on skill and labor demands, hire graduates, and potentially fund aspects of the initiative.

- **Workforce Development Boards**: Leverage existing partnerships, facilitate WIOA funding when applicable, and ensure alignment between job seekers and educational programs.
- **Students**: Engage with the credential pathway and provide feedback on program accessibility and outcomes.
- **Belk Center Data Evaluation Team:** Collect educational, demographic, and previous occupational data on those entering the program. Design research studies to rigorously evaluate short- and long-term outcomes.

STEPS & SEQUENCING

PHASE 1: PLANNING & DESIGN (MONTHS 1-9)

The pilot program follows a phased rollout:

- Use the grant to Advance NC to support initial coordination efforts.
- Establish a pilot coalition among community colleges, high schools, workforce development boards, and industry to develop a micro-credential framework based on employer needs (Zigrino, 2023).
- Conduct monthly stakeholder meetings to design structured levels of the stacked credential pathway, including clear entry and exit points (Cotner et al., 2021).
- Discuss responsibility for steps in the stack.
    - Identify how high schools and community colleges will share educational responsibility for students who have not graduated from high school.
    - Require each stakeholder to identify the steps needed to refer potential program participants into the pathway. Utilize existing referral systems where applicable and develop norms where such systems do not yet exist.
- Map resources needed to ensure student success. All stakeholders participate in a resource mapping guide (see Figure 3, Appendix B).
- Identify and resolve overlaps and discrepancies in reporting standards among stakeholders (B. Brothers, personal communication, February 10, 2025).
- Solicit and receive curriculum approval from educational stakeholder committees (Cotner et al., 2021).
- Generate and distribute a visual of the stacked credential pathway for easy understanding of advanced manufacturing requirements.

PHASE 2: PILOT IMPLEMENTATION (MONTHS 9-18)

- Begin using stacked credential pathways at participating community colleges, workforce development boards, and high schools.
- Implement curriculum and course changes to match the stacked credential plan.
- Continue monthly stakeholder meetings to further develop feedback loops, troubleshoot problems, and identify communication or information lapses.
- Implement any changes needed in student resource availability.
- Use NC Boost program and other community college resources to provide wraparound support (advising, financial assistance, career services) where needed to improve completion rates.
- Implement a data tracking system to measure student completion rates, credential attainment, and immediate employment outcomes including short-term wage rates, short-term employment rates, and technical proficiency (Cotner et al., 2021; Lindsay et al., 2024). All efforts should be made to collect up-to-date contact information at credential completion for long-term follow-up with program participants.

PHASE 3: EVALUATION & REFINEMENT (MONTHS 19-24)

- Conduct a midpoint assessment on program function using student, education agency, and employer feedback.
    - Submit such an assessment to the NC Community College System Office, MyFuture NC, involved community college presidents, Randolph County and Chatham County governments, and NC Commerce.
- Continue to consider where additional student support could improve retention and completion.
- Industry partners offer projections for upcoming jobs. All stakeholders evaluate if recruitment, training, and credential completion levels match projected job growth.
- Evaluate if changes in advocacy or marketing are needed to increase awareness or change the hearts and minds of a specific subgroup.
- Barring major systemic problems, such as poor recruitment and retention in programs or poor program preparation for industry jobs, stakeholder meeting frequency is reduced to quarterly.
- Adjust curriculum, advising, and employer engagement strategies as needed.

- Identify additional private funding sources for expansion.
- Identify priorities for program rollout across additional counties and community colleges.

PHASE 4: STATEWIDE SCALING (MONTHS 24- 36)

- Expand to additional community colleges in the Advance NC service area based on pilot results.
- Formalize communication channels between stakeholders through a contract or other reciprocal arrangement. Each organization will establish a chain of command for engaging in this communication, with small teams (2-3 employees) responsible for knowledge areas and engagement.
- Identify how pathways can be transferred to other industries in the state.
- Receive initial evaluations of growth areas for programmatic improvement.
- Develop an ongoing evaluation framework to ensure long-term sustainability.
    - Increase Advance NC capacity to produce an annual report on the health of the workforce training program.

ANTICIPATED IMPLEMENTATION CHALLENGES & MITIGATION STRATEGIES

- Current uncertainty on United States tariff policy may change employer supply chain and business decisions in the short and long term.
    - Solution**:** Integrate employer hiring projections at each stage of the pilot program and build in continuous feedback loops beyond the timeline of the pilot to align recruitment strategies with projected employer needs.
- WIOA funding may be limited due to changes in federal funding priorities or may experience delays in distribution to states due to decreases in federal administrative capacity.
    - Solution: Discuss potential state funding sources with NCGA to prioritize workforce development and training options for the economic health of the state. Explore private grants or foundations for additional financial support. Explore industry willingness to fill funding gaps.
- Community Colleges and K-12 Education may face limited administrative capability to redesign the curriculum and engage in such feedback loops.
    - Solution: Look for long-term funding streams to support the planning period and pilot program. Potential funding sources include non-recurring

NCGA funding or grants from private organizations such as the Belk Foundation, Golden LEAF Foundation, or other foundations.

    - Solution: Prioritize solutions without intense day-to-day management.

- Students may struggle with occupational stigma, opportunity costs, or financial constraints of starting such a program.
    - Solution: Maintain affordability of credentials, offer flexible scheduling options, and effectively communicate long-term value through advocacy and marketing campaigns.
    - Solution: Expand wrap-around supports for students and early-career manufacturing professionals further through NC Boost expansions.
    - Solution: Explore tuition reimbursement programs or other educational benefits of employment with industry partners.
- Current champions of workforce development may retire, change careers, or leave current employers.
    - Solution: Establish rigorous but flexible communication norms between stakeholder groups during the pilot period, including each organization identifying a primary point of contact and one or two alternate representatives to the group.
    - Solution: Create a formal documentation strategy for the relationships between each stakeholder.
- Advance NC may struggle to establish itself as a comprehensive authority on such an issue or struggle to secure enough funding to scale appropriately.
    - Solution: Connect early with industry partners and stakeholders across the state to build informal and formal networks that lend them credibility and open doors for a variety of funding streams. Advocate for funding from NCGA.

The pilot and scale approach provides a structured yet flexible pathway for implementing the stacked credential program in North Carolina. Starting small, refining the model, and scaling strategically minimizes risk while maximizing long-term impact. With stakeholder collaboration and a focus on measurable outcomes, this initiative can effectively bridge skill gaps, improve access to training, and create a sustainable talent pipeline for the state's advanced manufacturing sector. This project will be successful if initial training cohorts show high rates of job placement, alignment with firm skill sets, and increase the rates of family-sustaining wages in Randolph and Chatham Counties, especially among residents with the least current earning potential. From a systemwide perspective, success is indicated by the sustainability of resources and communication and does not impose large costs on governmental stakeholders.

APPENDIX A

FIGURE 1: ECOSYSTEM MAP

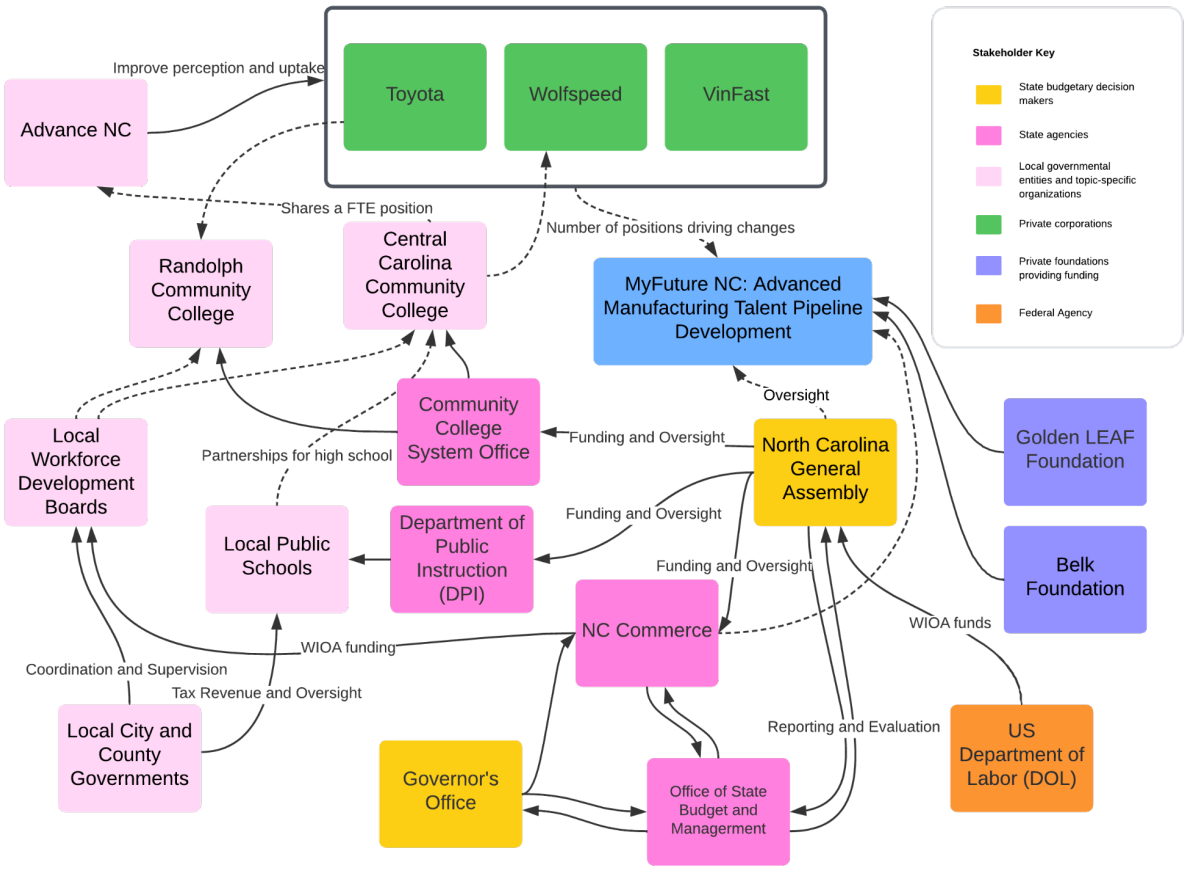


FIGURE 2: BASIC CAREER PATHWAY MODEL (COTNER ET AL., 2021)

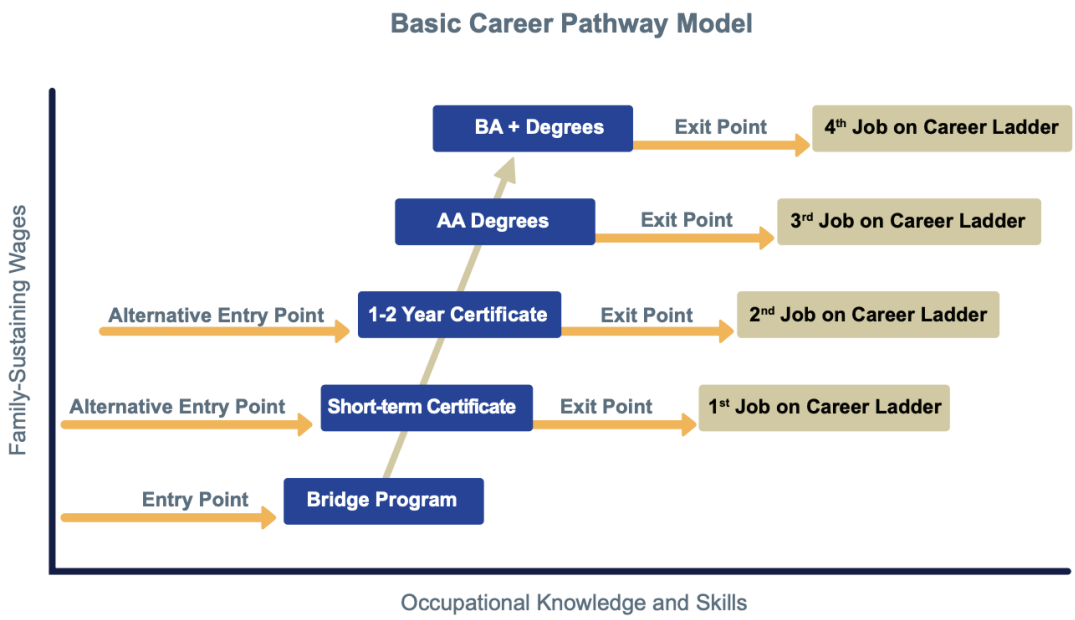
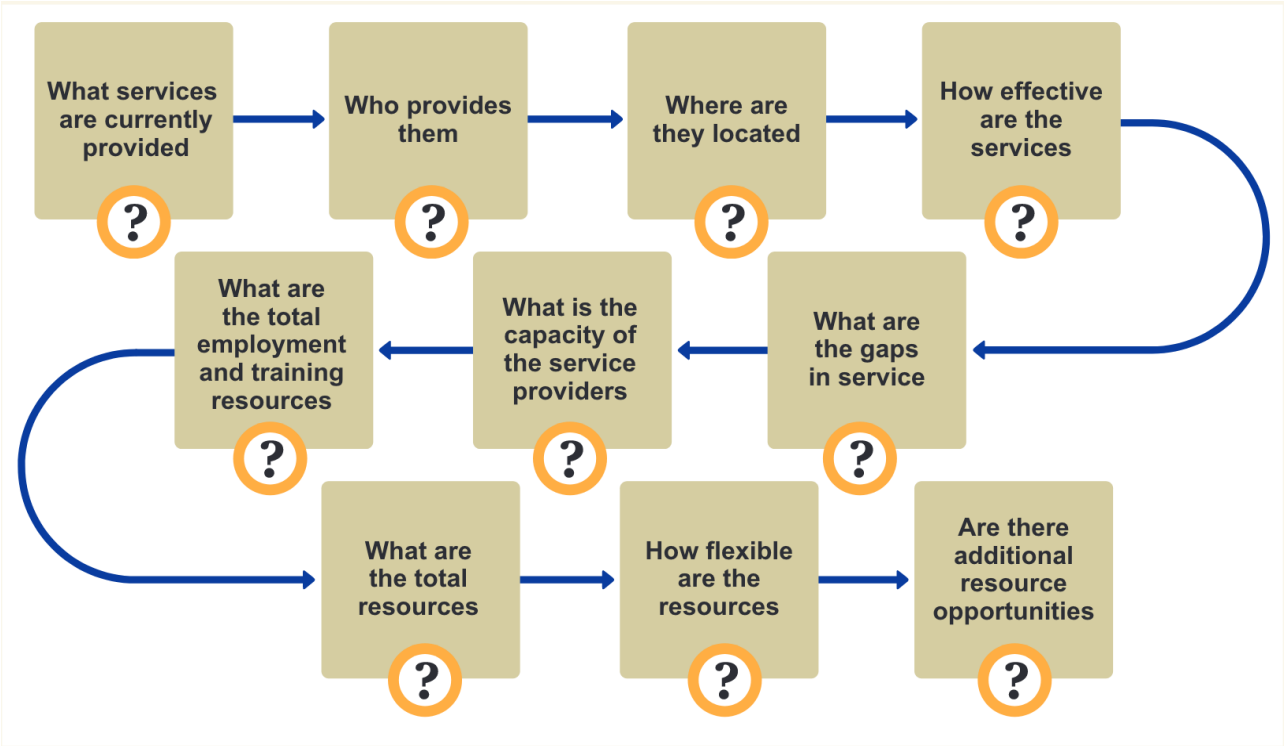


FIGURE 3: RESOURCE MAPPING GUIDE (COTNER ET AL., 2021)



APPENDIX B

COST INFORMATION FOR ALTERNATIVE 1: REPLICATE SURRY-YADKIN WORKS

The initial cost to establish Surry-Yadkin Works in 2017 was $300,000. This was provided by a Golden Leaf Foundation grant (McIlwain & Jaeger, 2023). A subsequent $100,000 anonymous donation supported its initial development steps. Grants from various sources -- including industry, MyFuture NC, and private foundations -- have supported individual programs developed under the Surry-Yadkin Works model (*Our Organization*, n.d.). In fiscal year 2024-25, Surry County Commissioners allocated $399,100 to the program (*Surry County Budget: Fiscal Year 2024-2025*, n.d.). Their financial commitment to the program as a budget line item began in FY2020-2021 with an allocation of $100,000 (*Surry County Budget: Fiscal Year 2020-2021*, n.d.). Yadkin County allocated $214,000 in FY 2024-2025, but the county budget did not include Surry-Yadkin Works as a line item in previous years (*County of Yadkin Budget Ordinance: Fiscal Year 2024-2025*, n.d.). However, according to ROI reports produced by Surry-Yadkin Works, both county governments contributed funds for the 2023-2024 school year, with grant funds making up the difference (32.1% of the overall budget) (*Return on Investment*, n.d.). Their current annual operating budget is $450,000 for 150 students. While this is not operating at the scale ultimately hoped for in the advanced manufacturing region, the region can build on Surry-Yadkin Works' model to build up a pipeline.

BENEFIT INFORMATION FOR ALTERNATIVE 1: REPLICATE SURRY-YADKIN WORKS

Calculations assume the same benefits apply to Randolph and Chatham Counties as those found in Surry-Yadkin Works, except for potential first-year earnings. Calculations include a year of tuition saved through the program and include a midpoint of 6 months earning such pre-apprenticeship wages for those in the program for an entire academic year and those who only participate for a semester. Since Surry-Yadkin Works estimates $1000 of wages per month, earnings in pre-apprenticeship wages are estimated at $6,000 (*Our Organization*, n.d.). The average salary given for Semi-conductor Processing technicians in the Durham-Chapel Hill metropolitan statistical area (includes Chatham County) is $53,520 from 2023 BLS data (*Durham-Chapel Hill, NC - May 2023 OEWS Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates*, 2024). Average wage data in this occupation for the Greensboro-High Point area (includes Randoph County) is not available. Therefore, the average salary for Durham-Chapel Hill will be used to calculate first year benefits of employment.

College tuition savings	Earnings in pre-apprenticeship wages	First year earnings after credential completion	Number of participating students	Total aggregate benefit
$11,346.26	$6,000	$53,520	150	$10,629,939

SKILL ATTAINMENT INFORMATION FOR ALTERNATIVE 2: INDUSTRY-FUNDED TEACHING POSITIONS

Assumptions for this alternative are as follows:

- A retention rate from registration to completion of 80%
- Each instructor will work part-time and be responsible for one to three classes of 35-40 students
- Each large corporation (Toyota, VinFast, Wolfspeed) will fund one or two positions, and smaller corporations will be given the option to fund one position. The estimate of 5-8 instructors assumes each large company funds at least one position and is optimistic that companies with smaller footprints in the area also are willing and able to fund additional positions.

Instructors	Classes per Instructor	Students per Class	Retention Rate across the program	Total Entry Level Credentials generated
5-8	1-3	30-40	0.8	120-768

WORKS CITED

Acton, R. K., Cortes, K., & Morales, C. (2024). *Distance to Opportunity: Higher Education Deserts and College Enrollment Choices* (Working Paper 33085). National Bureau of Economic Research. https://doi.org/10.3386/w33085

Adams, B. (2016). The employment impact of motor vehicle assembly plant openings. *Regional Science and Urban Economics*, *58*, 57–70. https://doi.org/10.1016/j.regsciurbeco.2016.02.005

Alssid, 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*. https://eric.ed.gov/?id=ED470457

Barricklow, Z. J., & Jaeger, A. J. (2024). *FOCUS AREAS FOR INNOVATION AND CHANGE*. Belk Center for Community College Leadership and Research. https://www.myfuturenc.org/wp-content/uploads/2024/10/BelkCenter_FutureofRuralWorkReport-compressed_1.pdf

Blakely, E. (2024, October 16). [Video Call].

Brock, T. (2010). Young Adults and Higher Education: Barriers and Breakthroughs to Success. *The Future of Children*, *20*(1), 109–132.

Brothers, B. (2025, February 10). [Personal communication].

Burton, M. (2025, February 21). [Personal communication].

Career and College Promise | NC DPI. (n.d.). North Carolina Department of Public Instruction. Retrieved March 24, 2025, from https://www.dpi.nc.gov/students-families/enhanced-opportunities/advanced-learning-and-gifted-education/career-and-college-promise

Cawthon, H. (2024, July 17). *VinFast pushes back North Carolina factory timeline*. Construction Dive. https://www.automotivedive.com/news/vinfast-delay-north-carolina-timeline-ev-production/721526/

Chatham County (Attainment Profiles). (2024). MyFuture NC. https://dashboard.myfuturenc.org/wp-content/uploads/county-profiles/Chatham_County.pdf

Chatham County News | Chatham County, NC. (2022, September 9). [Government Locality]. Chatham County, North Carolina. https://www.chathamcountync.gov/Home/Components/News/News/15778/19?locale=en

Construction Workforce: The Value of Training and Credentials. (2024). National Center for

Construction Education and Research. https://tracker.pardot.nccer.org/l/961192/2024-02-07/59hs8/961192/1707324004PpLqfi2z/Value_of_Training_NCCER_Whitepaper_Final.pdf

Cotner, H., Bragg, D., Goold, G., Heiser, E., Miller, D. G., & Van Noy, M. (2021). *Designing and Delivering Career Pathways at Community Colleges: A Practice Guide for Educators*. Institute of Education Sciences. https://files.eric.ed.gov/fulltext/ED611350.pdf

County of Yadkin Budget Ordinance: Fiscal Year 2024-2025. (n.d.). Yadkin County, NC. Retrieved February 22, 2025, from https://www.yadkincountync.gov/ArchiveCenter/ViewFile/Item/3945

Cox, S. B. (2025, February 14). [Personal communication].

Cross, D. (2025, February 14). [Video Call].

Cummins, P. A. (2015). The Role of Community Colleges in Career Transitions for Older Workers. *Community College Journal of Research and Practice*, *39*(3), 265–279. https://doi.org/10.1080/10668926.2013.843144

Customized Training—NCCCS. (n.d.). Retrieved March 27, 2025, from https://www.nccommunitycolleges.edu/college-faculty-staff/academics/customized-training/

Durham-Chapel Hill, NC - May 2023 OEWS Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates. (2024, April 2). Bureau of Labor Statistics. https://www.bls.gov/oes/2023/may/oes_20500.htm

Ecton, W. G., & Dougherty, S. M. (2023). Heterogeneity in High School Career and Technical Education Outcomes. *Educational Evaluation and Policy Analysis*, *45*(1), 157–181. https://doi.org/10.3102/01623737221103842

Edmunds, J., Unlu, F., Phillips, B., Hutchins, B., & Mulhern, C. (2022). *CTE-Focused Dual Enrollment: Participation and Outcomes. EdWorkingPaper No. 22-692*. Annenberg Institute for School Reform at Brown University. https://eric.ed.gov/?id=ED625873

Evans, W. N., Kearney, M. S., Perry, B. C., & Sullivan, J. X. (2017). *Increasing Community College Completion Rates among Low-Income Students: Evidence from a Randomized Controlled Trial Evaluation of a Case Management Intervention* (Working Paper 24150). National Bureau of Economic Research. https://doi.org/10.3386/w24150

Explore Advanced Manufacturing in North Carolina. (2024). AdvanceNC. https://advancenc.com/explore-advanced-manufacturing/

Faculty Salary Comparison (IPEDS). (n.d.). NCCCS. Retrieved February 24, 2025, from https://www.nccommunitycolleges.edu/about-us/data-reporting/data-dashboards-page/faculty-salary-comparison-ipeds/

Fuller, J. B., Lipson, R., Mallah, F., Pendse, G., & Synder, R. (2022). *The Options Multiplier: Decoding the Careerwise Youth Apprenticeship Journey*. The Project on Workforce at Harvard. https://www.pw.hks.harvard.edu/post/careerwise

Fuller, J. B., & Raman, M. (2022). Building From the Bottom Up. *Harvard Business Review*.

Fuller, J. B., Raman, M., Sage-Gavin, E., & Hines, K. (2021). *Hidden Workers: Untapped Talent*. Harvard Business School. https://www.hbs.edu/managing-the-future-of-work/Documents/research/hiddenworkers09032021.pdf

Gardiner, A. (2025, February 19). [Personal communication].

Governor McMaster and the Department of Employment and Workforce Announce Boeing as the Inaugural 2023 Workforce Champion Award Recipient | SC Department of Employment and Workforce. (2023, September 28). South Carolina Department of Education and Workforce. https://dew.sc.gov/news/2023-09/governor-mcmaster-and-department-employment-and-workforce-announce-boeing-inaugural

Hamilton, S. F. (2019). We need a systemic approach to career pathways. *Phi Delta Kappan*, *101*(4), 38–42. https://doi.org/10.1177/0031721719892973

Hoffman, N., & Schwartz, R. (2015). *Gold Standard: The Swiss Vocational Education and Training System*. National Center of Education and the Economy. https://ncee.org/wp-content/uploads/2015/03/SWISSVETMarch11.pdf

Holland, B. (2016). Both sides now: Toward the dual customer approach under the Workforce Innovation and Opportunity Act in the United States. *Local Economy*, *31*(3), 424–441. https://doi.org/10.1177/0269094216640476

Jacob, B. A. (2017, October 5). *What we know about Career and Technical Education in high school*. Brookings. https://www.brookings.edu/articles/what-we-know-about-career-and-technical-education-in-high-school/

Jenkins, P. D. (2003). *The Potential of Community Colleges as Bridges to Opportunity for the Disadvantaged: Can it be Achieved on a Large Scale?* https://doi.org/10.7916/D8542KN8

Lindsay, J., Hughes, K., Dougherty, S., Reese, K., & Joshi, M. (2024). *What We Know About the Impact of Career and Technical Education: A Systematic Review of the Research | Career and Technical Education Research Network*. https://cteresearchnetwork.org/resources/2024-systematic-review

Lowe, N., Goldstein, H., & Donegan, M. (2011). Patchwork Intermediation: Challenges

and Opportunities for Regionally Coordinated Workforce Development. *Economic Development Quarterly*, *25*(2), 158–171. https://doi.org/10.1177/0891242410383413

McIlwain, V., & Barricklow, Z. J. (2024). *Rural Healthcare Partnerships Toolkit*. North Carolina Community Colleges. https://belk-center.ced.ncsu.edu/wp-content/uploads/sites/128/2024/12/RP3-Rural-Healthcare-Partnerships-Toolkit.pdf

McIlwain, V., Barricklow, Z., & Nichols, H. (2024, October 17). *Rural Partnerships and Collaboration*. State Board of Community Colleges Committee Meeting, Raleigh, NC. https://www.youtube.com/watch?v=2uBZ6Hzg0hM

McIlwain, V., & Jaeger, A. J. (2023). *Surry-Yadkin Works Playbook*. Belk Center for Community College Leadership and Research. https://belk-center.ced.ncsu.edu/research-and-insights/reports-and-briefs/surry-yadkin-works-playbook/

Meyer, K., Bird, K. A., & Castleman, B. L. (2022). Stacking the Deck for Employment Success: Labor Market Returns to Stackable Credentials. *Ed Working Papers*, 20–317. https://doi.org/10.26300/JZQ6-2Y24

Minnesota Dual-Training Pipeline | Minnesota Department of Labor and Industry. (n.d.). Retrieved March 24, 2025, from https://www.dli.mn.gov/pipeline

NCCCS. (n.d.). North Carolina Community Colleges. Retrieved November 8, 2024, from https://www.nccommunitycolleges.edu/students/what-we-offer/colleges/

North Carolina Community College System Launches Boost Program. (2025, February 5). NCCCS. https://www.nccommunitycolleges.edu/news/north-carolina-community-college-system-launches-boost-program/

North Carolina Family-Sustaining Wage. (2023). NC Educational Attainment Dashboard | MyFutureNC. https://dashboard.myfuturenc.org/workforce-alignment/family-sustaining-wage/

North Carolina's State of Educational Attainment Report (p. 28). (2024). [Report to Joint Legislative Education Oversight Committee of the North Carolina General Assembly]. MyFuture NC.

Nursing Instructor (12 months) | Job Details tab | Career Pages. (2025, January 23). Central Carolina Community College. https://www.schooljobs.com/careers/ccccedu/jobs/4799301/nursing-instructor-12-months?pagetype=jobOpportunitiesJobs

Our Organization. (n.d.). Surry-Yadkin Works. Retrieved February 22, 2025, from https://www.surryyadkinworks.org/our-organization.html

Randolph County (Attainment Profiles). (2024). MyFuture NC. https://dashboard.myfuturenc.org/wp-content/uploads/county-profiles/Randolph_County.pdf

Return on Investment. (n.d.). Surry-Yadkin Works. Retrieved February 22, 2025, from https://www.surryyadkinworks.org/return-on-investment.html

Reyes, V., Moutray, C., Hardin, K., Beckoff, D., & Dwivedi, K. (2022, March 30). *Competing for talent: Recasting perceptions of manufacturing*. Deloitte Insights. https://www2.deloitte.com/us/en/insights/industry/manufacturing/competing-for-manufacturing-talent.html

Roberton, M. (2025, February 17). [Personal communication].

Ross, M., & Muro, M. (2024, January 4). *How federal, state, and local leaders can leverage the CHIPS and Science Act as a landmark workforce opportunity*. Brookings. https://www.brookings.edu/articles/how-federal-state-and-local-leaders-can-leverage-the-chips-and-science-act-as-a-landmark-workforce-opportunity/

Ross, S. L., Brunner, E., & Rosen, R. (2021). Identification and Counterfactuals for Program Evaluation of Career and Technical Education. *Career and Technical Education Research*, *46*(3), 15–36. https://doi.org/10.5328/cter46.3.15

Scavette, A. (2024). Aerospace Place-Based Policy: The Impact of Boeing on South Carolina's Aerospace Industry. *Economic Development Quarterly*, 08912424241268284. https://doi.org/10.1177/08912424241268284

Senate Bill 240 (2025-2026 Session)—North Carolina General Assembly. (2025, March 5). North Carolina General Assembly. https://www.ncleg.gov/BillLookup/2025/S240

Strader, J. (2023, November 30). *South Carolina Counties Investing in Workforce Development | Richmond Fed*. https://www.richmondfed.org/press_room/our_news/2023/20231130_community_conversation_sc

Surry County Budget: Fiscal Year 2020-2021. (n.d.). Surry County, NC. Retrieved February 22, 2025, from https://www.co.surry.nc.us/document_center/Finance/Budgets/FY21%20Expenditures%20and%20Revenues.pdf

Surry County Budget: Fiscal Year 2024-2025. (n.d.). Surry County, NC. Retrieved February 22, 2025, from https://www.co.surry.nc.us/document_center/Finance/Budgets/Pie%20Chart%20FY25.pdf

The White House. (2022, November 2). *FACT SHEET: President Biden Celebrates New Commitments toward Equitable Workforce Development for Infrastructure Jobs*. The White House. https://www.whitehouse.gov/briefing-room/statements-

releases/2022/11/02/fact-sheet-president-biden-celebrates-new-commitments-toward-equitable-workforce-development-for-infrastructure-jobs/

The White House. (2024, January 23). *FACT SHEET: Biden-Harris Administration Highlights New Commitments Toward Equitable Workforce Development in Advanced Manufacturing*. The White House. https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/23/fact-sheet-biden-harris-administration-highlights-new-commitments-toward-equitable-workforce-development-in-advanced-manufacturing/

Thomas, P. (2024, March 26). *Wolfspeed on track to finish Siler City semiconductor site by end of year*. Spectrum News. https://spectrumlocalnews.com/nc/charlotte/news/2024/03/26/wolfspeed-reveals-progress-on-2nd-manufacturiing-site--gives-tour

Toyota Powers On New North Carolina Automotive Battery Plant | Corporate | Global Newsroom. (2025, February 5). Toyota Motor Corporation Official Global Website. https://global.toyota/en/newsroom/corporate/42193203.html

Toyota USA. (2022a, September 24). *Toyota Invests $1 Million to Enhance Workforce Readiness in North Carolina*. Toyota USA Newsroom. https://pressroom.toyota.com/toyota-invests-1-million-to-enhance-workforce-readiness-in-north-carolina/

Toyota USA. (2022b, September 24). *Toyota Operations Map | Design, Engineering & Marketing*. Toyota USA Newsroom. https://www.toyota.com/usa/operations/map/tbmnc

Vice, T. M. (2019). *Can apprenticeships alleviate a regional skills gap? : A case study of programs at Trident Technical College in Charleston, SC* [Thesis, Massachusetts Institute of Technology]. https://dspace.mit.edu/handle/1721.1/121753

Workforce Innovation and Opportunity Act. (n.d.). DOL. Retrieved February 9, 2024, from http://www.dol.gov/agencies/eta/wioa

WorkforceGPS - WIOA Youth Program Fact Sheet. (n.d.). Retrieved March 13, 2025, from https://youth.workforcegps.org/resources/2017/08/29/08/48/FactSheet

Zigrino, K. (2023, March 2). *MVCC receives $976K workforce development grant for Fast Track training program | Education | wktv.com*. WKTV News. https://www.wktv.com/news/education/mvcc-receives-976k-workforce-development-grant-for-fast-track-training-program/article_0c0ccc32-b94a-11ed-bbaf-dbb55518c4d6.html