Catalyzing career success through sub-degree credentials

Lessons from the Industry Corps program at Wentworth Institute of Technology

RENNIE CENTER
EDUCATION RESEARCH & POLICY

Industry Corps
at Wentworth

Table of Contents

Introduction

On a crisp October morning outside the Tobin Community Center in the Mission Hill neighborhood of Boston, three students huddle around an electric saw, working together to cut precisely measured planks of wood. Nearby, their peers sand large wooden planks as a student leader reminds them of safety instructions when operating machinery. The young adults are immersed in the activity, making connections to their construction management coursework as they work collaboratively to use newly gained technical skills to build a community garden.

The students are participants in the Industry Corps program at Wentworth Institute of Technology. The four-semester program, offering credentials in construction management and information technology, provides alternative pathways to in-demand, high-wage careers for students from Boston and neighboring communities, many of whom are from low-income and historically excluded backgrounds. Housed in Wentworth's Division of Diversity, Equity & Inclusion, the program provides rigorous career preparation coupled with robust student support, equipping participants with the skills they need to land entry-level jobs in high-growth professions or continue on to complete an associate's and/or bachelor's degree. The program operates in close collaboration with industry partners who invest time and financial resources in the program to strengthen a pipeline of diverse candidates in fields in which white and male workers are significantly overrepresented.

Hands-on learning at the Tobin Community Center, which takes place weekly regardless of the weather, is designed to prepare construction management students for the demands of a worksite. In addition to applying technical skills, students practice career readiness competencies like communication, collaboration, and time management. They are responsible for completing assigned components of the community garden each week and tracking progress towards overall project completion. They must enforce the same safety standards expected on a commercial construction worksite. The project helps to prepare students for internships with industry partners in their second semester and offers an opportunity for students to apply skills gained in their college coursework.

The Industry Corps program model builds upon an innovative, growing trend in higher education. In recent years, increasing numbers of colleges have begun offering stackable, short-term credentials that provide on-ramps to skilled employment and can build towards traditional degrees. Students in these programs can earn a single credential and immediately enter skilled

work, earn additional credentials to prepare for more advanced positions with higher pay, or stack several credentials to earn an associate's or bachelor's degree.

This report explores the state of sub-degree credentialing programs in the United States, highlighting effective practices and pitfalls of these programs. It then provides a case study of the Industry Corps model, exploring best practices related to access, student support, and career preparation, describing the ways in which Industry Corps addresses common challenges faced in traditional sub-degree credentialing programs. The report concludes with lessons learned from Wentworth's pilot of Industry Corps, offering important takeaways for higher education institutions seeking to develop or improve innovative credentialing programs.

About Industry Corps

Wentworth Institute of Technology has a rich history of building programs designed to support postsecondary success and career development for Boston youth and young adults.[1] The Industry Corps program provides students with an opportunity to earn a sequence of industry-recognized sub-degree credentials in a college environment with robust support, while earning academic credits and participating in work-based learning. The program equips students to enter the workforce or enroll in further higher education and ensures access for students from diverse backgrounds. An overview of the program's core components is provided below.

Career pathways	The program offers two career pathways, each of which currently enrolls 15-20 new students per year: ▪ Construction management ▪ Data analytics and information technology
Duration	Four semesters
Student population	Residents of the City of Boston who graduated from high school within the past 10 years and hold no higher than an associate's degree
Academics	Students take eight credit-bearing college courses. Example courses are listed below. **Construction management** ▪ Introduction to Construction Management, Facilities Management, and Real Estate Development ▪ Building Construction ▪ Introduction to Building Information Modeling ▪ Introduction to Plan Reading & Specifications ▪ Construction Surveying ▪ Estimating ▪ Scheduling ▪ Building Systems **Data analytics and information technology** ▪ Computer Science I ▪ Fundamentals of IT ▪ Data Analytics for All ▪ Introduction to Networks ▪ System Administration ▪ Statistics & Applications ▪ Data Science Fundamentals ▪ Discrete Mathematics
Credentials	Students may earn two sequential certificates reflecting successful completion of coursework—one after the first two semesters and one after the second two semesters. Students may earn multiple professional certifications. Example certifications are listed below. **Construction management** ▪ OSHA 10 safety certification ▪ CPR/First Aid/AED certification **Data analytics and information technology** ▪ Excel Essentials certification ▪ Learning Cloud Computing certification ▪ PowerShell 7 Essentials certification

Career & classroom readiness	In their first semester, students take a paid, non-credit course titled "Foundations of Work," which supports students in building the knowledge and skills they need to succeed in demanding Wentworth coursework, internships, and their long-term careers. The course incorporates a focus on the elements listed below.

Career preparation
- Interests and skills assessment
- Industry exploration
- Resume and cover letter development
- Interview preparation
- Professional networking
- Job shadow opportunities

Professional competencies
- Workplace expectations and etiquette
- Time management
- Task prioritization
- Business writing
- Conflict resolution

Academic skills
- Classroom etiquette
- Study habits
- Managing deadlines
- Stress management

	The course also includes project-based learning, opportunities to earn professional certifications, and embedded academic support sessions.
Work-based learning	Students complete up to three part-time paid internships—one in each of their second, third, and fourth semesters.
Program schedule	**First semester:** two credit-bearing courses plus the non-credit Foundations of Work course **Second, third, and fourth semesters:** two credit-bearing courses plus a part-time internship
Cost	The program is tuition-free for most students. Students earn $18/hour for the Foundations of Work course in their first semester and a minimum of $18/hour for internships in subsequent semesters.
Student supports	The program includes robust supports for students, including embedded tutoring, individualized advising and case management, and connections to on-campus resources.

Project methodology

Reviewing the best practice landscape

Rennie Center researchers first conducted a literature review on postsecondary career and technical education, with a focus on sub-degree credentialing programs and stackable credentialing programs in the United States. The purpose of this review was to identify effective practices and common challenges in the sub-degree credentialing landscape.

Applying a local lens: Industry Corps in Boston

Having laid the groundwork by identifying best practices in sub-degree credentialing programs, we sought to apply a local lens to our research and engaged the Wentworth Institute of Technology to learn more about Industry Corps. To gain a deeper understanding of the Industry Corps model, the Rennie Center engaged in the following research activities:

- **Review of program documents and data:** This review included student-level data from the Industry Corps pilot as well as an internal evaluation and descriptions of program design.
- **Interviews and focus groups:** The Rennie Center conducted a series of interviews and focus groups with Industry Corps students, Wentworth faculty and staff, and industry partners. It is important to note that most student perspectives represented the construction management pathway, as this pathway was the focus of the first year of the Industry Corps pilot. Each interview and focus group provided insight into how the program meets student needs and prepares students for careers. Interviews and focus groups also provided information on lessons learned from the Industry Corps pilot that have influenced program design.

- **Student spotlights:** The research team conducted student spotlight interviews with a sample of Industry Corps students to hear directly from young people about their experiences with and journeys to and through the Industry Corps program.
- **Site visits:** The Rennie Center conducted a series of visits to Wentworth and to industry partner worksites to directly observe program activities.

Together, these activities provided a robust understanding of the national landscape of sub-degree credentialing programs, best practices being applied in the Industry Corps program, and ways in which Industry Corps has applied innovations that address common challenges in the sub-degree credentialing landscape.

Sub-degree credentialing programs:
Benefits, challenges, and best practices

In the United States, education-to-career pathways are undergoing a rapid evolution. Shortages of skilled workers in many industries have prompted renewed attention to strengthening existing education-to-career pathways, as well as innovating new ones.[2] At the same time, the notion that bachelor's degree programs should serve as the default pathway for all students has come into question. Employers and students increasingly prioritize skill development over degree attainment,[3] and the skyrocketing cost of college has motivated many students to seek alternate pathways.[4]

As a result, there has been a sharp rise in efforts to fortify education-to-career pathways through investment and innovation in postsecondary career and technical education (CTE)—an umbrella term for programs that blend education with workforce preparation to equip postsecondary students with technical knowledge and often at least one industry-recognized credential, such as a certification, license, or degree. Postsecondary CTE programs prepare students to meet workforce needs and achieve personal career success.

Many stakeholders, often in collaboration with one another, are driving investment and innovation in postsecondary CTE, including institutions of higher education (such as technical colleges, community colleges, and four-year colleges), industry leaders (such as companies, unions, and trade associations), workforce development organizations, and government agencies. Notable trends representing the growth of postsecondary CTE include:

- Increased enrollment in and funding for apprenticeship programs, especially shorter-term apprenticeships in non-construction fields;[5]

- Increased enrollment at universities offering cooperative ("co-op") education, where semesters alternate between full-time academics and full-time work experience;[6]

- A rise in certificate programs, bootcamps, and learn-and-earn programs, in which students complete skill-building training and often work experience while earning financial compensation;[7] and

- Momentum behind skills-based hiring and dropping degree requirements from job postings.[3, 8]

Among two- and four-year colleges, there is growing interest in offering ***sub-degree credentialing programs***—programs that provide students with the opportunity to earn at least one industry-recognized credential below the bachelor's degree level, often a certificate, typically while earning college credits that can be applied toward a degree.

Benefits

Sub-degree credentialing programs yield many benefits for students, employers, and the economy, including:

Promoting career success for students

- Equipping students with in-demand technical skills and career readiness skills that increase their employability[9]

- Helping students to forge stronger career identities, connecting students' interests and values to their professional goals[10]

- Increasing student engagement and motivation to achieve program completion[10]

- Preparing students to either enter the workforce or enroll in a college degree program[11]

Providing a means to address local skill shortages

- Bridging gaps between industry and education providers to ensure alignment around local workforce needs[12]

- Providing pathways that attract and train diverse talent[13]

Advancing economic equity

- Increasing students' earnings upon program completion[14, 15]
- Providing an accessible pathway to the middle class and beyond, especially for students from low-income backgrounds[7, 16]
- Closing opportunity gaps for students who face barriers in accessing higher education[11]

Challenges

Despite growing investment and innovation in sub-degree credentialing programs, challenges persist in these programs' ability to maximize outcomes for students and employers.

Ensuring alignment with industry needs

Some sub-degree credentialing programs struggle to meaningfully align with industry needs, limiting students' career growth and programs' impact on workforce skill shortages.[17]

- **Silos remain between education providers and industry:** Creating deep alignment between education providers and industry requires building robust, sustained partnerships. Developing and maintaining such partnerships is time-intensive, requires material investment from all parties, and necessitates a change in attitudes regarding the role of education providers and industry relative to one another.[17]
- **The needs of each industry differ greatly:** Industries differ tremendously from one another and tend to be hyper-localized, meaning every sub-degree credentialing program has to build its model from the ground up in lockstep with local industry partners.[18]

Strengthening program quality

The quality of sub-degree credentialing programs varies, reducing the overall perceived value of these programs in a way that stymies program access and investment.

- **Clear quality standards are lacking:** Although federal funding for postsecondary CTE programs is tied to accountability measures, such as reporting outcomes-based quality indicators and adhering to gainful employment rules, clear standards with which to assess program quality are not deeply established.[19] To remedy this, some states have developed quality rubrics for postsecondary CTE programs.[20] Further, most states lack processes for accrediting or verifying the value of specific postsecondary credentials, leading to variable credential quality, especially for certificates.[21] Third-party solutions such as Credential Engine are working to rectify this by publicizing standardized information on credentials, such as learning outcomes, cost, and market value.[22]
- **Research on evidence-based best practices is limited:** Research on the long-term outcomes of sub-degree credentialing programs for students and employers is lacking, and as a result, the evidence base is limited on practices that yield the most effective long-term outcomes.[23, 24]
- **Funding streams are inconsistent:** Federal funding for CTE was in a state of general decline from the 1980s until the mid-2010s, though it has resumed an upward trajectory, especially through the Strengthening Career and Technical Education for the 21st Century Act of 2018 (Perkins V).[24] Programs typically need to rely on braiding various funding sources from the state and local levels as well as from philanthropic partners to supplement federal funding.[23] Inconsistent funding limits the services that programs are able to provide for students, ultimately impacting program quality.

Creating springboards for economic mobility

While sub-degree credentialing programs provide higher wages and career growth for many students, many programs struggle to maximize the economic opportunity they provide, especially in terms of catalyzing long-term trajectories of upward mobility.

- **Wage premiums are highly variable:** Although programs give many students access to careers that earn middle-class wages, the wage premium a student gains depends greatly on the program they complete and the industry they enter, and wage premiums generally remain lower than those for bachelor's degree holders.[11] To ensure an adequate return on investment for students, programs must focus on in-demand industries.

- **Many programs provide only short-term career growth:** Sub-degree credentials often qualify students for entry-level roles but do not lay a foundation for career advancement. Students may hit a ceiling and be unable to advance further, especially if credentials are not part of a stackable sequence designed to promote career progression.[17]

- **Barriers exist in equipping students with college credits:** Some programs equip students with college credits that do not transfer to other institutions or degree programs, and some do not offer college credits for the training students complete. Non-credit programs offered by higher education institutions often prepare students to obtain a professional license or certification or to otherwise build vocational skills. Research shows that students who complete a non-credit program are more likely to enroll in additional non-credit programs than in for-credit programs, suggesting barriers in accessing degree-granting pathways.[17, 25] These challenges limit students' opportunities to make progress toward degrees and further credentials that could advance their careers.

Expanding equitable access

Sub-degree credentialing programs can be difficult to access, especially for students from historically excluded backgrounds, hindering programs' effectiveness at closing opportunity gaps.

- **Underserved students have variable access to effective sub-degree credentialing programs:** While some studies demonstrate that students of color and students from low-income backgrounds enroll in sub-degree credentialing programs at high rates and earn higher wages as a result, the evidence is mixed and industry-specific, pointing to a need to ensure more equitable access through recruitment, financing, and student supports.[11]

- **The sub-degree credentialing landscape is complex and difficult to navigate:** Given the range of stakeholders and types of programs in the postsecondary CTE landscape and the lack of clear quality standards, it is confusing for students to identify sub-degree credentialing programs that will be the best fit for them.[7] There is a need to inform students of their postsecondary options from a younger age and provide individualized advising.[17]

- **Stigma against postsecondary CTE remains:** Historically, postsecondary CTE, initially referred to as vocational education, was highly stigmatized and designed to funnel "low-performing" students into low-quality programs that did not lead to meaningful career growth.[12] While this stigma has improved significantly, it persists, making some students and their advisers hesitant to consider postsecondary CTE options such as sub-degree credentialing programs.[3, 26]

Best practices in program design

Addressing the above challenges requires coordinated action by policymakers, industry leaders, and education providers to create clear quality standards for sub-degree credentialing programs, strengthen funding streams, and articulate the value of these programs—all of which is underway in many states and at the federal level. On the part of sub-degree credentialing programs, adhering to an emergent set of best practices provides a means of addressing many of the above challenges. While there is limited research demonstrating specific evidence-based practices, several general strategies are known to be effective.

Effective practices for credential design

- **Offer stackable credentials to support long-term career advancement:** To build long-term trajectories of upward mobility for students, programs should ensure the credentials they offer "stack" in a vertical sequence that leads to career advancement.[27] Ideally, credentials should stack to the degree level. Creating effective stackable credentials requires close coordination with industry partners and potentially other higher education institutions.[18]

- **Engage industry partners in program design:** To produce value for students and the local economy, a program must equip students with skills and credentials that are industry-recognized and valued by employers. To this end, programs must partner closely with industry in a structured way, such as through an advisory board, to design the program curriculum.[28] Bringing industry partners to the table builds buy-in for program success and ensures alignment with local workforce needs.

- **Create an automatic matriculation process or transfer policy to promote degree attainment:** Building pathways to degree attainment is key to providing students with opportunities that support long-term career advancement. Programs should establish an automatic matriculation policy whereby students who attain a certain level of performance in the program receive automatic acceptance to the host college if they choose to continue their education. Programs may also establish articulation agreements with other institutions to ensure credits may be transferred.[18]

- **Build bridges between non-credit and for-credit programs:** Through partnerships with other higher education institutions and stakeholders, programs can increase access to credit-earning opportunities for students who have completed non-credit programs, such as those that prepare students to obtain a professional license or certification. For-credit and non-credit programs may ensure their credentials stack and may partner to provide advising to students to connect them with for-credit opportunities.[17]

- **Award credit for prior learning:** Awarding credit for previous learning experiences, including non-credit CTE programs, work experience, and military service, ensures that students' relevant skills count toward credential attainment and propel further attainment of credentials and degrees.[18]

- **Embed meaningful work-based learning opportunities:** Work-based learning experiences that actively encourage students to link theory with practice are critical for promoting students' skill development and increasing student engagement.[29] Work-based learning experiences should provide students with the opportunity to meaningfully connect with industry professionals and should be tailored to students' specific career goals.[28]

Effective practices for program accessibility

- **Partner with local school districts to create recruitment pipelines:** By partnering with local school districts, programs can make students more aware of postsecondary CTE opportunities and identify students whose interests align with the program. Building linkages to districts' secondary CTE programs can also create clear education-to-career pathways for students.[18]

- **Publicize clear information on the program and its value, especially for underserved students:** Given the complex landscape of postsecondary CTE, programs should provide clear information on the qualifications a student will obtain through the program, the jobs they will become qualified for, and how the program fits into a career pathway.[17] Providing career pathway maps can be a helpful tool to this end.[30] Programs may also provide advising to students who are considering applying.

- **Adopt equity-minded strategies that attract and support underserved students:** Strategies to support the enrollment and success of underserved students, especially students of color and students from low-income backgrounds, include:
  - Promoting equitable enrollment through the use of peer recruiters and community partners and by providing recruitment materials in multiple languages;[31]
  - Diversifying teaching staff;[13]
  - Pairing students with mentors who match their identity;[31]
  - Eliminating forms of bias in instructional materials and assessments;[28] and
  - Providing students with equity-centered supportive services during and after program participation.[31]

- **Improve affordability through financial aid and learn-and-earn models:** Providing financial aid to cover the cost of tuition as well as other program costs, such as books, equipment, and certification exam fees, greatly expands program access, especially for students from low-income backgrounds. Adopting a learn-and-earn model where students earn wages for certain program components (such as internships or project-based learning experiences) also expands access and motivates program completion.[18]

- **Develop a program schedule that accommodates student needs:** Programs should work with students and employers to design a schedule that accommodates the needs of the target student audience. For instance, working students may benefit from a program that is part-time and thus longer in duration, while students who have recently graduated from high school may benefit from a program that is full-time and shorter in duration.[21] Some students may prefer programs held during the day when childcare is easier to find, while others may prefer evening and/or remote programs that accommodate a working schedule.[18]

Effective practices for student success

- **Provide comprehensive student support:** Student supports lay the foundation for success and are especially important for underserved students. Supports may include:
  - Individualized advising on career goals and academic success,[32] which may promote student motivation and self-confidence;[10]
  - Academic supports, such as tutoring, learning communities, and study skills development;[33]
  - Mentorship opportunities;[18] and
  - Case management to assist with housing, transportation, childcare, food security, and other needs.[21]

- **Foster a sense of belonging among students:** Ensuring that students feel a sense of belonging within their program and the wider college community increases students' motivation, self-confidence, engagement, and achievement.[34] To promote student belonging, programs can foster strong student-teacher relationships,[35] provide access to campus programming,[36] and create opportunities for students to share their stories with their peers and instructors.[37]

- **Promote general career skill-building:** Nurturing students' development of skills such as problem-solving, critical thinking, teamwork, communication, and workplace etiquette can enhance student success in work-based learning experiences and future employment.[28] Fostering a growth mindset in students can also increase students' motivation and resilience in the face of academic or professional challenges.[38]

- **Create data collection systems to track outcomes and support continuous improvement:** Consistently collecting data on program access, student competencies, and student outcomes is critical to identifying areas for improvement, addressing equity gaps, and adapting to evolving labor market needs.[28] Data collected should align with quality assurance metrics[20] and be shared with students and stakeholders.[28]

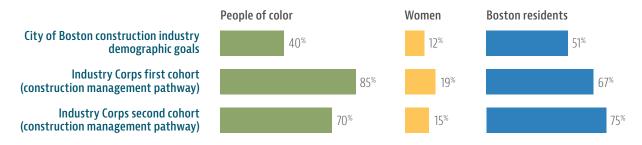# Practices worth sharing from the Industry Corps program

Data collected on the Industry Corps program point to a number of effective practices that contribute to positive outcomes for students and industry partners. As sub-degree credentialing programs continue to grow in popularity, these practices provide a useful model for institutions of higher education seeking to build out new programs or increase the quality of existing ones. Six effective practices from Industry Corps are detailed below.

1. In order to attract diverse talent, Industry Corps reduces barriers to entry and empowers students from diverse backgrounds.

Many industries face a critical challenge that runs parallel to the widespread shortage of skilled labor: a lack of diversity in their workforce. Recognizing the importance of diversity initiatives in attracting new talent, boosting productivity, and promoting social equity, companies in many industries have set diversity targets for hiring–but they often struggle to meet them.

In the City of Boston, the construction industry lags behind workforce diversity quotas set by municipal government in 1983 and updated in 2017.[39] Programs like Industry Corps offer a remedy: Boston residents, students of color, and women participate in the program at rates that exceed the City's targets. The program's racial diversity exceeds the overall diversity of construction-related postsecondary programs in Massachusetts, in which 53% of participants are students of color.[40]

Industry Corps Demographic Information: Construction Management Pathway

	People of color	Women	Boston residents
City of Boston construction industry demographic goals	40%	12%	51%
Industry Corps first cohort (construction management pathway)	85%	19%	67%
Industry Corps second cohort (construction management pathway)	70%	15%	75%

The success of the Industry Corps program model in creating a pipeline for diverse talent hinges on two effective strategies, described below.

Reducing barriers to entry to attract diverse talent

The Industry Corps program model mitigates obstacles that dissuade students from pursuing opportunities in higher education, including:

- **Cost:** Industry Corps is a tuition-free program where students receive compensation for several program activities, making it an appealing option for students who are unable or reluctant to invest in higher education. For the Foundations of Work course, students receive $18 per hour for 16 hours each week during the first semester, paid by Wentworth via philanthropic investments in the program. For internships, which begin in the students' second semester on a part-time basis and continue for their third and fourth semesters, students receive a minimum of $18 per hour paid by the company. To further reduce financial barriers to entry, Industry Corps provides students with essential equipment they need to succeed in the classroom and on internship sites, including laptops, textbooks, and (for students in the construction management pathway) work boots.

- **Commitment:** Industry Corps lasts only four semesters, making it an appealing option for students who are hesitant to commit to a four-year degree program. Further, because the program offers two certificates earned in sequence, students have the ability to leave the program early with at least one industry-recognized credential that can advance their career.

- **Support:** Industry Corps offers individualized, holistic support, as well as embedded academic support sessions, making it an appealing option for students who are apprehensive about the rigor of college-level coursework.

- **Learning style:** Industry Corps offers a blend of traditional coursework and hands-on learning experiences, making it an appealing option for students who do not feel engaged by traditional classroom learning.

Industry Corps students have voiced that the opportunity the program provides to receive schooling for free and earn compensation for workforce training is incredibly valuable, motivating them to carry on even when the program is challenging. Some students previously applied for degree programs but did not receive sufficient financial aid, and Industry Corps provided them with an otherwise inaccessible opportunity to enroll in higher education.

The program's commitment to reducing barriers to entry also translates to its recruitment and admissions procedures. Industry Corps leverages Wentworth's strong relationships with Boston Public Schools and Boston area community partners that support underserved young adults to conduct student outreach. The community-focused recruitment process improves access for students who will benefit most from the program. Further, while the program has created an admissions process that mirrors Wentworth's undergraduate admissions process, Industry Corps administrators also meet with all applicants in order to learn more about their high school experience, challenges they faced in high school, and their career goals. This whole-person approach expands program access to students who are worthy applicants but may be overlooked in traditional admissions processes.

Empowering diverse talent through representation and advocacy

Industry Corps' program model is intentional in how it uplifts the identities of students in order to enhance retention and promote student success in the classroom and in internships:

- **Representation:** Industry Corps brings industry leaders from diverse backgrounds to speak during Foundations of Work sessions so that students can see themselves represented in their field of interest and seek mentorship. Further, by attracting a diverse student population, Industry Corps allows students to see their identities reflected among their peers and provides students with ample opportunity to make lasting connections with others who share their background and career goals.

- **Advocacy:** Industry Corps staff conduct regular one-on-one check-ins with students, which helps staff to both advocate on behalf of students and encourage students' self-advocacy skills. During check-ins, students often raise issues that staff elevate to university deans and professors to ensure student voices are heard. Staff also support students in drafting emails to their professors or dean as needed.

2. In order to maximize the value created for both employers and students, Industry Corps engages industry partners in program design and improvement.

Central to the effectiveness of any sub-degree credentialing program is its alignment with industry needs. In this way, programs equip students with in-demand skills, which improve students' success in the job market while addressing skill shortages faced by employers.

To achieve alignment, Industry Corps engages industry partners deeply and consistently throughout program design, execution, and continuous improvement. This level of engagement has garnered strong industry buy-in, leading employers to invest time and resources to support the program's success.

Engaging industry partners in program design

Industry Corps leveraged Wentworth's long-standing relationships with the local construction industry to recruit companies to serve on the program's Advisory Board, which meets quarterly. Members of the board were involved in designing the program's curriculum, including selecting the slate of Wentworth courses and creating workforce readiness workshops, such as safety training for students in the construction management pathway. This involvement ensured that the program's design aligns with industry needs and that students are employable upon program completion.

Engaging industry partners in program execution

Industry Corps engages industry partners in several aspects of the program's execution, including the Foundations of Work course and internships. As part of the Foundations of Work course, industry partners conduct workshops and trainings with students, host job shadowing visits, and carry out mock job interviews. Their involvement gives the course a real-world connection, helping students to learn more about the field while gaining exposure to professionals who can answer their questions and provide mentorship.

Industry partners' involvement in providing paid internship opportunities to students is a critical strength of the Industry Corps program. Students are supported in finding a part-time internship in their second, third, and fourth semesters and may opt to seek a full-time internship during the summer after their second semester. Many students receive return offers and complete subsequent internships with the same industry partner.

Students recognize that the ability to jump into an internship with only one semester of coursework under their belt is an incredible opportunity to build their skills and resume, one that is only possible because of the strong buy-in the program has cultivated among industry partners. Since securing a good internship early on could lead to a job offer down the road, students stay motivated to continue the program. Especially for those who prefer real-world, hands-on learning, internships keep student engagement high, offering a chance to see how concepts learned in the classroom play out in the field. Some internship supervisors intentionally ask their interns what concepts they are learning in their courses so that the supervisor can provide exposure to those concepts in a work setting.

The internship component is also critical for student employability, especially in the construction industry, where on-site experience weighs more heavily on a resume than classroom learning. Students who completed multiple internships at the same company reported that their skills and confidence grew immensely from spending so much time engaged in hands-on learning. In some cases, this experience led to job offers from industry partners even before program completion.

In general, industry partners' investment in Industry Corps internships is a win-win for students and employers, providing students with valuable experience and employers with access to new talent. Industry partners report that Industry Corps students are as prepared for their internships as students from undergraduate degree programs, so employers have not needed to create new training systems and approaches to support Industry Corps students.

Engaging industry partners in continuous improvement

Recognizing the importance of industry partners' feedback in strengthening and expanding Industry Corps, the program provides numerous opportunities for partners to contribute to continuous improvement, including:

- Consulting Advisory Board members on programmatic changes;
- Disseminating surveys to collect feedback on partners' experiences with Industry Corps interns; and
- Hosting industry roundtables to gather input on evolving industry needs, including in new industries the program hopes to encompass in the future.

Creating these formal channels for feedback supports continued buy-in for the program and ensures that it consistently adapts to meet industry needs.

3. In order to enable students to pursue their own visions of postsecondary success, Industry Corps facilitates career exploration and offers flexible on- and off-ramps.

Given growing recognition of the need to expand the definition of postsecondary success beyond attainment of a four-year college degree, a key feature of high-quality sub-degree credentialing programs is the flexibility they offer students to pursue their own professional pathways.

Industry Corps has adopted an intentional, whole-person approach to postsecondary success. The program aims to support each student in identifying their goals and selecting whatever next step is best for them. Program completion is not viewed as the only metric of student success, with the program opting for a more individualized definition. By facilitating career exploration and offering flexible on- and off-ramps, Industry Corps prepares students for a tailored pathway that will be most rewarding for them.

Facilitating career exploration

Industry Corps regularly encourages students to reflect on their passions and goals:

- The Foundations of Work course includes a module on career exploration, focused on identifying personal interests, values, and skills and considering various career paths;
- Program staff prompt student reflection on their goals during weekly group support sessions and periodic one-on-one check-ins; and
- Internships provide ample opportunity for students to try out different roles and companies across three semesters.

Because of these practices–and the broad exposure Industry Corps provides to the construction or information technology industry–students expressed that the program helped them to hone in on their career interests. Even students who had an internship experience that was ultimately misaligned with their interests valued the experience because it taught them which roles did and did not appeal to them. Many students' career goals have transformed through time spent in the program, and students have been able to seek support from staff in finding internships and networking connections that align with their refined goals.

Offering flexible on-ramps

Industry Corps extends program eligibility to students with a range of experience levels, so long as they hold no higher than an associate's degree. Some students applied for the program with previous higher education experience, sometimes in an unrelated field, while others had no higher education experience. Some had related work experience, while others applied immediately after high school with minimal work experience. Students also applied with a range of career goals. Because

Industry Corps individualizes student support and teaches general career skills through the Foundations of Work course, the program is able to provide flexible on-ramps for participants, regardless of their specific background and interests.

Offering flexible off-ramps

By equipping students with two sequential certificates, academic credits, work experience, and skills that are broadly applicable in their chosen field, Industry Corps opens up numerous pathways to students as they identify and refine their career goals. The program provides students with a strong foot in the door for both higher education and vocational opportunities, including:

- **Vocational opportunities accessed prior to program completion:** Three students in the program's first cohort decided to leave the program early to pursue vocational opportunities. One of these students decided that they were more interested in the trades than in construction management, so program staff collaborated with the industry partner that provided the student's internship to help the student to secure a spot in a union apprenticeship program. Another student was offered a position by the industry partner that provided their internship and opted to enter the workforce.

- **Vocational opportunities accessed after program completion:** Because Industry Corps provides students with at least three internship opportunities and two certificates designed with input from industry partners, students who complete the program are highly employable. With their work experience, Industry Corps graduates may possess a hiring advantage over associate's degree holders, according to industry partners. In industries like construction where most training must be carried out on worksites, Industry Corps graduates can even compete with bachelor's degree holders for entry-level jobs, though bachelor's degree holders will likely spend less time at the entry level before advancing.

- **Opportunities in higher education:** Industry Corps provides students with academic credits they can carry into a two- or four-year degree program. Because the program provides a high level of student support, it builds students' academic confidence. Students have voiced that the program is a great option for those who are unsure about their ability to succeed in college, and some reported realizing that they are more capable of academic success than they previously believed based on their high school experience. Many students intend to stay on at Wentworth following program completion to pursue their bachelor's degree, while others intend to join the workforce but would consider a return to higher education if it would advance their career.

4. In order to create a solid foundation for student success, Industry Corps builds a strong community within the program and facilitates a sense of belonging at the university.

Given that many students who enroll in sub-degree credentialing programs feel intimidated by higher education and are entering industries in which their identities are underrepresented, establishing a sense of belonging is essential to boosting students' confidence and promoting peer-to-peer support, both of which can improve program retention.

Through its design, Industry Corps both builds a strong community within the program and facilitates a sense of belonging at Wentworth, which students cite as among the program's greatest strengths.

Building a strong community within the program

Many aspects of Industry Corps' program design lend themselves to the creation of a strong community among students, including:

- **Small cohort size:** With each pathway currently having no more than 20 students per cohort, students are able to get to know all of their peers on a deep level.

- **Shared schedule:** Because students in each pathway take all of their classes together and have the same schedule (apart from internships), they spend a lot of time together and share experiences daily. Many classes early in the program consist only of Industry Corps students.

- **Shared backgrounds:** Students in each pathway share similar career interests, and the majority are students of color from the Boston area. This gives students a shared foundation on which to relate to one another.

- **Vulnerability during group sessions:** In many of the program's group sessions, including orientation, the Foundations of Work course, and weekly support sessions, students are encouraged to voice how they are feeling and what challenges they are facing in the program or in their personal lives. Students noted that this vulnerability brought them closer together and prompted them to support one another.

- **Ethos of program staff:** Program staff actively nurture a "we're all in this together" mentality through the guidance they provide to students. They encourage collective problem-solving when the group faces a communal challenge and seek to instill in students a sense of pride in the program's values.

As a result of these aspects of program design, students report feeling very close to their peers and describe their cohort as tight-knit. One student stated that he felt as if he had known his peers for years when it had only been weeks. Because of their close bonds, students provide each other with extensive peer support. They initiate group study sessions, answer each other's questions on course content, encourage each other when the program feels difficult, and remind each other about upcoming assignments and exams. Students also report that their Industry Corps community serves as a valuable means of networking, as they all intend to work in the same industry in the future.

Facilitating a sense of belonging at the university

Industry Corps has taken steps to ensure that participating students feel like members of the Wentworth community. By introducing students to professors and deans and providing access to resources like the on-campus tutoring center and career development office, staff help to integrate students into the academic life of the university. Ensuring that students have access to campus amenities such as the gym, library, study rooms, wellness center, and student clubs helps to connect students to the social life of the university.

During the second year of the construction management pathway, Industry Corps students take classes alongside undergraduate Wentworth students, which further facilitates a sense of belonging within the university. Industry Corps students reported feeling like typical college students, and they found it validating to see that Wentworth undergraduates

also struggled with the material at times. Further, sitting alongside other Wentworth students gave them access to more peers who could provide academic support.

This sense of belonging is important to bolster students' confidence and reinforce their ability to succeed in higher education. Still, some challenges remain, as some students reported feeling that they belonged to a Wentworth subpopulation that sat apart from the broader campus community.

5. In order to maximize student outcomes, Industry Corps offers robust supports for students, including individualized advising and mentorship from program staff.

Providing robust support services is a critical best practice for sub-degree credentialing programs as they seek to ensure that students are primed for success in their coursework and internships. By building out supports that focus on the whole student, from academic performance to employability skills to general well-being, programs can accommodate the individual needs of students from various backgrounds.

Central to Industry Corps' mission is a desire to help any student succeed who is motivated to do so. The program does not make coursework simpler for Industry Corps students or set arbitrarily rigorous admissions criteria to exclude students who have struggled academically in the past, but rather invests heavily in student support. As a result, students report feeling like there are abundant resources available to them, and because of this, they feel like program success is highly attainable so long as they show up and engage.

Industry Corps' approach to student support relies on three effective practices, described below.

Embedding support sessions into the program schedule

Industry Corps support sessions take place either as part of the Foundations of Work course or as regular weekly events. Sessions are run by:

- An academic advisor and focus on general concepts related to the field of study;
- A student tutor and focus on specific concepts covered in coursework; or
- Industry Corps staff and focus on academic, vocational, and personal challenges.

These sessions are framed as integral to the program, not supplementary, and in the case of sessions integrated into the Foundations of Work course, students receive a stipend to attend. Students cited the support sessions as immensely helpful for keeping them on track in their coursework and noted that they offered a more comfortable avenue to seek assistance than reaching out to professors.

Industry Corps partnered with Wentworth's tutoring center, the Success Studio, to set up recurring, well-attended tutoring sessions specifically for Industry Corps students. Staff reported that these were especially helpful in supporting students' math proficiency. The program also scheduled a math bootcamp prior to the first semester to refresh students' competency in math. Additionally, Industry Corps participants have the option to access general tutoring offerings through the Success Studio, and many do so. Finally, Industry Corps employed a student from the first construction management cohort to run weekly tutoring sessions for students in the second cohort, and students have expressed that it is highly beneficial to learn from the tutor's firsthand experience in the program.

Offering individualized advising

To ensure students' academic and personal challenges do not slip through the cracks, Industry Corps offers individualized advising on a regular basis. Program staff check in one-on-one with students every few weeks, providing a space for students to talk through challenges and receive personalized guidance. During check-ins, program staff may connect students with on-campus resources, provide counseling, elevate student concerns to relevant faculty, and empower students to advocate for their needs. Check-ins are an especially useful vehicle to support students whose test scores reflect academic challenges.

Program staff also conduct targeted outreach to students whose engagement in the program has been waning. After students miss a couple of class periods in a row, program staff reach out to set up a check-in to figure out the root cause of their absence, even going so far as to contact a student's family if they are unable to get in touch with the student directly.

Additionally, Industry Corps has implemented a Holistic Student Assessment (HSA) with help from Partnership in Education and Resilience (PEAR) that serves as a powerful tool for individualizing student support. The HSA, administered at the start of the program, evaluates each student's proficiency in various behavioral competencies–such as emotional regulation, critical thinking, and optimism–and identifies their greatest strengths and weaknesses. This data can then be used to pinpoint which students will benefit from which types of support. The program is working to compile resources for specific student needs and to create guides for students and staff on how to use HSA data to catalyze personal growth.

Tasking program staff with providing mentorship

Students across the first and second cohorts of the program emphatically reported that their relationships with Industry Corps staff were one of their primary sources of support. Through their dedication and consistent interactions with students, program staff have established themselves as invaluable mentors to promote student success. Effective strategies used by program staff include:

- **Maintaining open lines of communication:** Program staff make themselves available for student meetings on a drop-in or scheduled basis and make clear to students that their doors are always open. Staff are often present during program sessions, and they spend time checking in informally with participants about coursework, the internship process, and student life. Because of these efforts, program staff have built strong rapport with students, who report feeling comfortable approaching program staff with any concern or challenge.

- **Responding to student needs:** When program staff receive word from students about a particular challenge that has arisen, they are responsive and follow through. For example, when students in the first construction management cohort voiced a need for more assistance with their estimating course, program staff set up a weekly support session on the topic. Throughout the Industry Corps experience, staff take student feedback seriously and act to address it.

- **Expressing belief in student abilities:** Program staff encourage students through an asset-based mindset, motivating students to work hard and assuring them that they will be successful. For example, when one cohort collectively performed poorly on an exam, program staff urged students not to feel dejected and reassured them that with time and support, they would get back on track.

Industry Corps also employs several part-time staff to lead tutoring sessions, project-based learning sessions, and general support sessions. These part-time staff have become mentors to students, and all have shared that central to their pedagogical approach is a desire to foster trust, mutual respect, and genuine care for students. Students report that staff tell them they will have students' backs for life.

Additionally, the program's extensive work-based learning component allows many students to find a mentor in an internship supervisor. Industry partners in the construction field expressed that mentorship is critical to student success on a worksite and can accelerate students' career advancement.

Because of these various modes of student support, Industry Corps embodies a robust whole-student approach that encourages student voice and delivers the tools and systems students need to succeed.

6. In order to promote career readiness and increase student engagement, Industry Corps provides general career skill-building sessions and ample hands-on learning experiences.

Instruction in course concepts alone is insufficient to prepare students for success in the workforce. Any sub-degree credentialing program needs to be grounded in the realities of career readiness, with opportunities to put course concepts into practice and develop personal and interpersonal skills that lead to effective workplace performance. Not only does this grounding align with what employers value, but it also increases student engagement by helping students to see how their studies will prepare them for success in the "real world." Some students reported applying for Industry Corps because they felt it would be a more hands-on experience than their previous experiences in higher education.

Industry Corps infuses career readiness into its curriculum and various program components through the strategies highlighted below.

Providing general career skill-building sessions

Industry partners have commented that when searching for new hires, they value general career skills like problem-solving, communication, and initiative over technical skills, since the latter are easier to teach. In light of this, Industry Corps provides a full series of career skill-building sessions through the Foundations of Work course.

The course covers a range of topics, from career exploration to classroom and workplace etiquette to financial literacy. In particular, sessions cover three critical aspects of career readiness:

- **Employability skills:** The course includes sessions focused specifically on time management, conflict resolution, business communication, and stress management, all highly valuable skills in a workplace setting. Further, by including sessions in which students identify their learning style and explore their personal values and goals, the program empowers students to take ownership over their studies and find an intrinsic sense of motivation. Industry partners emphasized that motivation is by far the most valuable quality in an intern or job candidate, followed by skills like problem-solving, asking questions, and taking initiative.

- **Career preparation:** The course helps students to write their resume and LinkedIn profile, craft a personal elevator pitch, prepare for interviews, and learn job search strategies. Many students mentioned how helpful these sessions have been for their career preparation, especially the workshop focused on resume writing and LinkedIn. In addition to these skill-building sessions, the course includes site visits so that students can gain exposure to a working environment.

- **Certifications:** The course provides time for students to earn industry certifications that are required to take on an internship or otherwise increase their employability, including those related to workplace safety and fundamental concepts in their chosen industry. For students in the construction management pathway, this means earning the OSHA 10 safety certification and CPR/First Aid/AED certification. For students in the information technology pathway, this means earning certifications in Excel Essentials for Microsoft 365, Learning Cloud Computing, and PowerShell 7 Essentials.

Overall, these general career skill-building sessions enhance students' preparation for coursework, internships, and eventual employment. They also promote students' confidence in their ability to succeed in the workplace, especially as some students worry about how they will be perceived on worksites as young people, people of color, and/or women.

Providing ample hands-on learning experiences

To enable students to apply both their technical skills and employability skills, Industry Corps centers hands-on learning through project-based experiences, Foundations of Work sessions, lab classes, and internships. Many students expressed that they find the hands-on components to be the most engaging and well-aligned with their learning style. Especially for students who are apprehensive about classroom learning, hands-on learning provides an effective counterbalance to traditional lectures.

Project-based learning experiences have been especially engaging for students. As part of the Foundations of Work course, construction management students meet at a local community center every Friday for 10 weeks to participate in a group construction project. The project gives them direct experience with safety protocols and power tools and allows them to see a project through from design to execution. As a result, students are more excited about the program and motivated in their studies because they immediately practice applying their coursework in the field. Further, because students show up on Fridays in rain, snow, or shine, the project prepares them for working conditions on a regular worksite.

In general, students report that the balance of classroom work and applied learning is favorable, and that taking only two classes per semester provides sufficient bandwidth for the hands-on components of the program. Students appreciate that their classroom studies are focused on topics relevant to their field rather than general education requirements, as this allows them to focus their attention on concepts that complement their real-world learning experiences.

Looking to the future:
Challenges, lessons learned, and opportunities

The challenges faced during the Industry Corps pilot represent important learning opportunities for the field as more institutions seek to implement sub-degree credentialing programs and diversify their education-to-career pathways. This section includes an analysis of challenges faced in the Industry Corps pilot alongside strategies to address them.

Strengthening academic and college readiness skills

CHALLENGE: Some students participating in sub-degree credentialing programs face significant academic difficulty with college-level coursework.

OPPORTUNITY: Expand early academic intervention at the start of the program, strengthen students' employability skills, and promote student-professor connections to increase student success in the classroom.

Industry Corps is designed to expand access to high-wage, high-growth careers for students who have faced challenges on their pathways to college and career. In some cases, students join the program having experienced difficulty in their high school coursework. Others join after spending a few years in the workforce and need to re-acclimate to an academic environment. Despite robust support offered by Industry Corps, difficulties with academic preparedness or college readiness skills have prevented some students from remaining in the program. The following strategies draw on lessons learned from Industry Corps, offering recommendations for robust academic and college readiness support.

KEY STRATEGIES

1. **Offer proactive academic support to address gaps before students begin coursework.** Sub-degree credentialing programs like Industry Corps can use academic data from early student cohorts to identify courses in which students tend to face difficulty and plan proactive interventions accordingly. Programs can also use individual student academic data, such as a pre-assessment at the beginning of the program, to identify areas where students may struggle. Industry Corps uses this strategy to assess math preparedness and has offered a bootcamp on foundational math concepts prior to the program's start. Expanding on this approach, programs can offer intensive, short-term interventions to preview course content and address gaps before classes begin. For example, programs may provide a summer bridge program prior to the start of credit-bearing courses.

2. **Expand targeted tutoring focused on college-level math skills.** Students in Industry Corps, and many others pursuing postsecondary education, frequently encounter barriers related to math readiness and comprehension. In instances where gaps in content knowledge cannot be addressed proactively, programs can provide targeted just-in-time tutoring. For example, if an assessment shows that four students have similar challenges related to algebra, these students can be assigned to small-group tutoring to address this gap right away. Using real-time academic data to purposefully group students and intervene at the first sign of a challenge builds upon other academic supports, such as weekly whole-group tutoring sessions offered by Industry Corps, and can improve student success.

3. **Provide targeted interventions for students with time management challenges.** Students who exited the Industry Corps program due to academic ineligibility cited issues related to time management as a central source of their difficulty. Research shows that time management, and similar college readiness skills, impact students' academic success in higher education.[41] Programs can support students by providing robust, differentiated time management support. In addition to workshops focused on time management offered to all students, such as those provided during Industry Corps' Foundations of Work course, programs can create student-specific support plans for those experiencing particular challenges. This may include

tailored resources for students who have a long commute to the program or face limited time due to working additional jobs. These plans are most effective when designed in collaboration with the individual student.

4. **Promote relationship-building with professors.** Positive student-faculty interactions promote classroom engagement, which is critical to academic success.[42] Both students and professors can benefit from assistance with strengthening these relationships. For example, some Industry Corps students report that they prefer to receive support from peers or tutors rather than attending office hours. Program staff can inform students of the benefits of attending office hours, including strengthening relationships with professors, and facilitate relationship-building through "take a professor to lunch" programs or related initiatives. In addition, staff can provide professors with training on creating inclusive classroom environments for students from diverse backgrounds.

Supporting industry partners to enhance the internship experience

CHALLENGE: Some industry partners face difficulty providing sub-degree credentialing students with a robust internship experience given scheduling challenges and limited resources.

OPPORTUNITY: Work with industry partners to create an effective internship schedule, strengthen workplace inclusion, and outline clear responsibilities to maximize the quality of the internship experience.

Practical work experience is a critical component of sub-degree credentialing programs. However, providing robust internship experience is a challenge. Industry partners must invest considerable time and resources to support interns, particularly those with limited experience in the field. As a result, some industry partners struggle to provide students with meaningful, relevant internship tasks that align with students' career goals. In addition, students of color, female-identifying students, and students with other identities that are underrepresented in their field may face difficulties related to workplace inclusion. The following strategies are designed to strengthen the practical work component of sub-degree credentialing programs.

KEY STRATEGIES

1. **Develop an internship schedule that facilitates meaningful work experience.** In fields like construction management, employees advance tasks on the worksite every day. When student schedules oscillate frequently between classroom learning and working on-site, it can be challenging for employers to assign meaningful tasks that fully immerse students in the workplace. Sub-degree credentialing programs must partner with employers to jointly determine an internship schedule that will enable students to perform meaningful on-site work. This may entail scheduling two to three consecutive days per week for part-time internships, carving out weeks-long periods for full-time micro-internships, or utilizing a cooperative education model where semesters alternate between full-time academics and full-time work experience.

2. **Support workplace inclusion and belonging for students of color.** Some students of color reported having to self-advocate and work harder than their Industry Corps peers to gain respect on the worksite. Program leaders can foster workplace inclusion by encouraging employers to match students with mentors who share their diverse identities. In addition, programs can offer training for internship supervisors who work directly with students. This type of training is especially important for smaller companies that may require external resources to strengthen workplace inclusion.

3. **Formalize internship responsibilities for all parties.** While most Industry Corps students and internship providers reported a positive, mutually beneficial relationship, some internship providers felt that students would benefit from a clearer understanding of general workplace responsibilities, and some students felt that internship providers would benefit from clearer guidelines around desired intern duties and supports. By formally setting expectations for all parties to the internship, including the role of program staff in supporting internship providers, programs can standardize internship quality and garner more buy-in from industry partners.

Facilitating campus integration

CHALLENGE: Students in a sub-degree credentialing program may feel disconnected from the broader college community given the unique nature of the program.

OPPORTUNITY: Facilitate connections with degree-seeking students and the university community to support student success and continued interest in higher education.

When sub-degree credentialing programs are housed at colleges and universities, as is the case with Industry Corps, students may struggle with integration into the greater university community. Student schedules, learning experiences, and (in many cases) demographic backgrounds will differ from that of the general college population. Feeling connected to the broader campus community may increase students' likelihood of enrolling in additional credentialing programs, including degree programs, following program completion. Within Industry Corps, some students report feeling secluded from their Wentworth peers, in part due to limited opportunities to engage in campus-wide activities. The following strategies can help to facilitate campus integration.

KEY STRATEGIES

1. **Address imposter syndrome by facilitating peer connections.** Industry Corps students expressed feeling great pride in their program, but many felt hesitant to identify with the program in the company of Wentworth undergraduates for fear of feeling othered. They worried there might be a stigma associated with participating in a tuition-free sub-degree credentialing program and that others would not view them as regular college students. This fear reflects a feeling of imposter syndrome, a common obstacle for students of color and other students from underrepresented backgrounds. When students feel that their presence in the classroom is fraudulent and their achievements undeserved, they become less likely to connect with the individuals and services that can help them to attain their educational goals.[43]

   To reinforce to students that they belong and are capable of success, programs can offer mentorship opportunities, including peer mentorship, as well as stress and time management support.[44] Facilitating connections with other students–for example by scheduling shared classes with bachelor's degree students and encouraging participants to access on-campus resources like tutoring, two practices used by Industry Corps–may also promote cross-campus relationship-building in a way that alleviates imposter syndrome.

2. **Expand access to campus extracurricular activities and events.** Students in sub-degree credentialing programs often have different schedules and responsibilities than students enrolled in bachelor's degree programs. Industry Corps students report an interest in accessing extracurricular clubs and campus-wide events but often find it difficult to accommodate them within their schedule. Programs can, to the extent feasible, seek to design their schedules to accommodate extracurricular involvement and integrate campus-wide events, such as guest lectures, into program activities.

Conclusion

The Industry Corps program demonstrates the promise of sub-degree credentialing programs to accelerate student success while meeting critical workforce needs. When designed in close partnership with industry leaders and through a student-centered lens, these programs are highly effective at strengthening education-to-career pathways for underserved students in high-demand industries.

While challenges remain, the Industry Corps model holds great potential to reshape the higher education landscape to provide more access and opportunity to a greater range of students. Through widespread implementation of sub-degree credentialing programs that adopt Industry Corps' effective practices and build on the lessons learned through the program, institutions of higher education can radically expand who succeeds in our economy and fortify our nation's workforce training systems long into the future.

As innovation continues across these programs, evidence-based best practices will continue to be identified and refined, positioning sub-degree credentialing programs as an increasingly potent force for closing opportunity gaps and spurring the growth of a diverse workforce in the 21st century economy.

Voices of Industry Corps:
Student spotlights

Samuel Mullen

The whirring of power tools echoes across the Tobin Community Center while the chatter of first-year construction management students is audible in between the sawing of wood pallets. Samuel Mullen, a returning Industry Corps student, is making his rounds, ensuring that workstations have been properly cleaned up. He sets aside a stack of construction plans sprinkled with sawdust and reminds a project team to be consistent with their sanding. For his internship this semester, Sam serves as an assistant field supervisor and academic tutor for Industry Corps, providing mentorship to the cohort of new students. He expressed that he felt driven to pursue this Wentworth-sponsored internship for a simple reason–Industry Corps works.

"We have something special here. It's about meeting people where they're at."

Sam experienced firsthand the strength of the Industry Corps model. In Sam's prior learning experiences, support was limited and relationships with teachers felt impersonal, making it difficult for Sam to realize his full potential. In Industry Corps, supports are embedded into the program design, and staff members aim to foster a sense of belonging for each student while supporting their individual strengths and needs. As a result, Sam believes his academic talents are far greater than he thought previously, and he has subsequently achieved great success in his college studies.

Sam largely attributes his success to the dedicated mentorship he has received from Industry Corps staff. He admires that there is commitment among staff to cultivating each student's growth regardless of their starting point. This individualized, person-centered support resonated deeply with Sam and ignited in him a passion to support others in the same way, as he does now through his work with the new construction management students.

Becoming a mentor was not in Sam's original plan when he joined Industry Corps. Initially, he applied for the program hoping to enter the commercial construction industry, where he could work on major development projects. However, through his coursework and internship experiences, he discovered that his true passion lies in meeting individuals' needs–whether that be through smaller-scale, hands-on work like furniture building or through teaching and mentoring others.

In his internship as an assistant field supervisor and academic tutor, Sam prioritizes building mutual respect between himself and the new students in the program. With this foundation, he is able to get to the heart of the challenges students face and then encourage them to continue moving toward whatever goal aligns with their passions. After advising students on a worksite or leading a tutoring session, Sam feels a distinct sense of fulfillment, especially when students line up for fist bumps on their way out the door.

As Sam prepares to graduate from Industry Corps, he has become a champion for the program and its approach to closing opportunity gaps for underserved students. Whether he goes on to pursue a career in carpentry or in teaching, he is confident that the technical, interpersonal, and leadership skills gained through Industry Corps have prepared him for success. Sam hopes that all those joining the program in the coming years are able to realize their full potential and feel at home, just as he does.

Ligia Barrow Madrid

In a conference room at Leggat McCall Properties, a leading real estate development firm, Ligia Barrow Madrid concludes a presentation on the skills she gained during her recent internship at the company, and the room is all smiles. Peppered throughout the audience are members of the company's leadership team. They congratulate Ligia on a job well done, impressed by the knowledge and confidence she displays despite serving as an intern at the company for only a few short months. Hearing their praise, Ligia feels a sense of pride.

As a 20-year-old woman of color, Ligia says she is used to being overlooked. She never imagined she would have an opportunity so early in her career to present to higher-ups at a construction firm, let alone feel so confident doing so. She credits this achievement to the Industry Corps program, which not only afforded her this internship opportunity but also provided a springboard to success by empowering her in her identity as a young Hispanic woman in the construction management field.

"As Industry Corps students, we look out for each other and support each other. I feel like I belong."

In Ligia's previous educational experiences, she did not see her identity reflected in her peers. She attended a predominantly white high school and went on to complete some courses at a small college in New York City that was far less diverse than the city surrounding it. In Industry Corps, Ligia appreciates that the majority of her peers are students of color, and she has benefited tremendously from their camaraderie. When her cohort meets for weekly support sessions with Industry Corps staff, students are encouraged to openly discuss the challenges they face in the program, providing Ligia and her fellow students of color with a forum to relate to one another and elevate their shared needs. The responsiveness of program staff to these needs has made Industry Corps an inclusive environment in which Ligia feels unconditionally supported.

Industry Corps' focus on inclusivity extended to Ligia's internship experience at Leggat McCall. On-site, Ligia was assigned a mentor, a young man of color to whom Ligia could turn for counsel on how to navigate the construction industry with an underrepresented identity. For example, Ligia recalls instances when she arrived on a worksite wearing makeup and was not taken seriously by men on-site. In these instances, her mentor was able to relate deeply to the feeling of being underestimated, as he had experienced it himself on his path to becoming an assistant project manager. His guidance and encouragement showed Ligia that by having confidence in her abilities and advocating for herself, success is possible. Thanks to her mentor, and her own efforts to connect with other women of color on-site, Ligia's confidence grew immensely, and she now feels empowered to bring her whole self to her work.

Industry Corps' ethos of empowerment has inspired Ligia to reflect on her true passions and set ambitious career goals. By keeping an open mind in her classes and internships and seizing every opportunity to explore potential roles, Ligia has discovered a keen interest in architecture and interior design. Industry Corps staff have supported her in seeking opportunities to explore this budding passion. While Ligia is uncertain exactly where the journey will take her, she one day hopes to achieve a leadership position, much like the higher-ups in the Leggat McCall conference room, where she is able to inspire other young women of color to succeed. Because of Industry Corps, she is confident that nothing will stand in her way.

Dakari Cox

As Dakari Cox makes his way down the dirt path to the center of Consigli's construction site in the Jamaica Plain neighborhood of Boston, he exchanges greetings with every worker he passes: he waves to a backhoe operator, asks a journeyman how his day is going, and banters with a team of subcontractors preparing to pour concrete.

Dakari, DC for short, explains that greeting workers is as much about safety as it is about relationship-building, as communication and situational awareness are the cornerstones of an incident-free worksite. He jokes that as an intern and one of the youngest workers on-site, he tends to be the strictest about safety, but his colleagues respect him for it. He acts like a regular member of the team–and soon, he will be. In a matter of weeks, DC will begin a full-time job with Consigli as an assistant superintendent.

"Every month of this program, going through internships, I feel like I've been progressing."

Looking around the site, DC explains the work being done in various areas and details the history of recent challenges they have overcome, including a water main deficiency and a vent shaft dispute. He signals an area that is scheduled for a concrete pour in the coming weeks–he knows this because he has taken the initiative to label his set of blueprints with the expected start date of each stage of the project. The way DC speaks about the project reflects a deep practical knowledge of construction practices, knowledge he has gained through only one year in the Industry Corps program.

DC was not always confident about his ability to succeed in the construction industry. When he began at Industry Corps, though he had carpentry experience through a previous training program and some prior college experience in accounting, he knew little about the construction field and found the coursework difficult in the first semester. With help from the program's embedded supports, his peers, and his own personal motivation, DC completed the first semester and began a part-time internship with Consigli in the second.

Initially, he was shy on-site and unsure whether the internship would be a fit. But as the weeks went on, he saw his skills grow rapidly and began to discover his leadership potential. Looking to further this growth, he undertook a full-time internship at Consigli in the summer and returned for another part-time internship in the fall.

DC's growth in skills and in confidence reflect the effort he invested in his career. When his internship had a 6:30 am start time, he showed up at 5:45 am. He talked with everyone on-site that he could, learning about the role of subcontractors and gaining new networking connections. He leaned into his relationship with his supervisors, asking thoughtful questions and probing how concepts he learned in class played out on-site. His relationships with his supervisors led to powerful mentorship that helped him to excel out in the field. When DC's supervisor asked him to temporarily fill in for an assistant supervisor on-site, DC came to see that he could perform the duties of a full-time employee.

With his success in Industry Corps and a job offer in hand, DC is proud to consider himself a trailblazer for students of color seeking to enter the construction industry in Boston. More than once, residents near the construction site who share DC's identity have approached him to shake his hand and express enthusiasm for his work. DC wants to use his experience to show other young people of color from Boston what is possible. He has spoken with the newer Industry Corps students to encourage them and share the secret of his success: "Just put the time in, and put the passion into it."

As he enters the field in a full-time capacity, DC hopes to represent the effectiveness of the Industry Corps model and prove to employers that an employee doesn't need a four-year degree to be an invaluable asset. He hopes that as Industry Corps continues to grow, more companies will recognize the potential of students of color and give them the opportunity to succeed. As DC puts it, "Everybody deserves a chance."

Labor market data and pathway maps

The following section includes labor market data and career pathway maps for select positions within the construction management, information technology, and biotech industries. Construction management and information technology are current Industry Corps focus areas, and Wentworth has considered biotechnology for program expansion in future years. Significant growth is expected in each of these industries in the next decade. In addition, these industries offer high-wage, high-growth jobs in which people of color are significantly underrepresented. As a result, they are important areas of focus for Industry Corps and similar sub-degree credentialing programs.

About career pathway maps

Career pathway maps provide an overview of the sequence of educational and professional experiences that guide individuals from initial exploration to the attainment of the knowledge, skills, and education/credentials necessary for growth in a particular field. The pathway maps in this section provide examples of typical steps for individuals progressing from entry-level positions to more senior roles in fields of interest to Industry Corps participants.

Construction management

The United States faces a significant deficit of skilled construction workers, which is projected to increase over the next decade, with new workers needed to replace an aging workforce. Even as demand for construction workers has slowed due to high interest rates and lower demand in residential construction, the Bureau of Labor Statistics still estimates 723,000 occupational openings per year in the construction industry over the next several years.[45]

Demand for construction managers, the focus of the Industry Corps program, is projected to grow by 4.5% between 2022 and 2032. This outpaces the national average for all occupations (2.8%), as well as projected growth for construction trades workers, which matches the national average.[45]

In the construction industry, there are a range of career pathways depending on an individual's area of specialization. The table below provides an example career pathway in construction management. It is informed by both labor market data and information shared by industry partners during interviews.

	ENTRY-LEVEL POSITION	NEXT STEP	NEXT STEP	NEXT STEP
Role	**Field Operations Specialist**	**Assistant Superintendent**	**Superintendent**	**Senior Superintendent**
Core responsibilities	Administers the project safety program; provides technical assistance on construction projects; and assists with reports, safety walks, and schedule updates	Assists superintendent with managing all construction activities, ensures compliance with contract documents, and administers the project safety program	Oversees day-to-day construction site operations, which includes managing employees, ensuring compliance with safety protocols, and coordinating with all stakeholders (architects, engineers, etc.)	Monitors all construction and financial activities for one or more projects; oversees day-to-day construction site operations; leads worksite safety, quality control, and project schedule; and provides employee supervision and mentorship
Estimated pay	$55,000+ per year	$71,000+ per year	$95,000+ per year	$120,000+ per year

Basic qualifications	Workforce credential in a field related to construction management or engineering	Bachelor's degree in construction-related field or equivalent experience	All assistant superintendent qualifications plus an additional 2-3 years of experience	All superintendent qualifications plus an additional 5 years of experience

Data sources: Glassdoor, Ziprecruiter

Information technology and data science

Across the United States, employment in the technology sector has grown steadily year-over-year, accounting for 8.8% of the direct economic value of the overall U.S. economy. According to projections from the U.S. Bureau of Labor Statistics, the technology workforce is projected to grow at double the rate of the overall U.S. workforce in the next decade. Median wages in technology occupations far exceed average wages in all professions. In Massachusetts, there is an urgent need to diversify the technology workforce as Black and Latino workers are severely underrepresented, each representing 4% of the Commonwealth's overall technology workforce.[46]

Particular occupations within the technology sector are expected to grow at rates significantly beyond the national average over the next 10 years.[46] These include:

- **Data Scientists and Data Analysts:** Projected to grow **266% more** than overall employment across the economy.

- **Cybersecurity Analysts and Engineers:** Projected to grow **242% more** than overall employment across the economy.

- **Software Developers and Engineers:** Projected to grow **180% more** than overall employment across the economy.

These areas represent impactful opportunities for credentialing programs given significant projected demand for skilled workers. The table below provides a sample career path, progressing from a sub-degree credential to a senior role in the technology industry.

	ENTRY-LEVEL POSITION	NEXT STEP	NEXT STEP
Role	**Web Developer**	**Senior Developer**	**Director of Web Development**
Core responsibilities	Builds website components or full websites, tests web applications, and troubleshoots problems with website performance	Designs and develops front-end website user interfaces and/or website code, supervises a team of web developers, and manages project budgets and schedules	Leads team responsible for developing and maintaining websites, prioritizes tasks across a team of developers, and coordinates with web vendors on aspects including content and search engine optimization
Estimated pay	$50,000+ per year	$65,000+ per year	$85,000+ per year
Basic qualifications	Web development certificate or credential	Usually requires a bachelor's degree alongside web development experience; some companies accept candidates without a degree, provided they have significant work experience	Bachelor's degree plus significant web development and managerial experience; those without a bachelor's degree may access internal company promotion with demonstrated experience and success

Data sources: ZipRecruiter, Glassdoor, Zippia, Indeed

Biotechnology

The biotechnology industry in the United States is experiencing significant growth, with projections indicating an average annual growth rate of more than 9.2% through 2027.[47] This expansion can primarily be attributed to the growth of the healthcare and research industries. Specifically in Massachusetts, the state's strong government relationships, venture capital investments, and increase of lab space and biomanufacturing facilities have led to significant growth in the industry. For instance, local trade group MassBio projects a need for up to 40,000 new employees by 2024 to match the industry's demand.[48] This influx of jobs underscores the critical need for a skilled workforce to support ongoing innovation and advancements within the biotechnology sector.

The table below provides a sample career path from a sub-degree credential to an advanced role in the field of lab operations.

	ENTRY-LEVEL POSITION	NEXT STEP	NEXT STEP	NEXT STEP
Role	Lab Operations Associate	Lab Operations Manager	Senior Lab Operations Manager	Director of Lab Operations
Core responsibilities	Supports the daily operations of a laboratory, maintaining lab equipment, managing inventory, and assisting with experiments	Oversees the operations of a laboratory, ensuring that all testing and analysis is performed according to protocol, and develops new procedures or techniques to improve efficiency or accuracy	Often responsible for leading projects and mentoring junior managers; may be involved in more strategic decision-making processes	Responsible for project teams and the design, implementation, and maintenance of complex laboratory systems
Estimated pay	~$50,000 per year	~$75,000 per year	$80,000-$100,000 per year	$110,000+ per year
Basic qualifications	Associate's degree, relevant credential, or equivalent experience in biology, chemistry, chemical engineering, or a related discipline; those with a high school diploma may begin as a laboratory technician and progress to the associate role	Usually requires a bachelor's degree and 3+ years of experience in lab operations; some companies accept 5+ years experience in lieu of a bachelor's degree	Bachelor's degree and 5+ years of experience in lab operations	Usually requires a bachelor's degree or higher plus several years of experience in lab operations, strong leadership skills, and team management experience

Data sources: Glassdoor, Biotech-Careers.org, Indeed

Endnotes

1. Rennie Center for Education Research & Policy. (2020). *Bridging the gap: How Wentworth provides a personalized and local approach to college and career readiness.* Rennie Center for Education Research & Policy. https://www.renniecenter.org/sites/default/files/2020-08/Wentworth_Bridging_the_Gap_1.pdf

2. Ferguson, S., & Hoover, M. (2023, November 14). *Understanding America's labor shortage: The most impacted industries.* U.S. Chamber of Commerce. https://www.uschamber.com/workforce/understanding-americas-labor-shortage-the-most-impacted-industries

3. American Student Assistance & Jobs for the Future (2022). *Degrees of risk: What Gen Z and employers think about career-to-education pathways...and how those views are changing* [White paper]. https://expandopportunities.org/wp-content/uploads/2022/10/ASA_JFF_Degrees-of-Risk-.pdf

4. Baum, Sandy, and Jennifer Ma. (2014). *College affordability: What is it and how can we measure it?* Lumina Foundation. https://www.luminafoundation.org/wp-content/uploads/2022/05/college-affordability-what-is-it-and-how-can-we-measure-it.pdf

5. O'Donnell, P. (2023, April 18). *Apprenticeships on the rise.* Education Next. https://www.educationnext.org/apprenticeships-on-the-rise-burgeoning-alternative-challenges-college-for-all-mentality/

6. Nordman, D. (2023, February 02). *Northeastern receives record number of undergraduate applications for fall 2023.* Northeastern Global News. https://news.northeastern.edu/2023/02/02/record-undergrad-applications-fall-2023/#:~:text=Northeastern%20received%2096%2C327%20applications%20for,officer%20and%20senior%20vice%20chancellor

7. Brown, J. & Kurzweil, M. (2017). *The complex universe of alternative postsecondary credentials and pathways.* American Academy of Arts & Sciences. https://www.amacad.org/sites/default/files/publication/downloads/CFUE_Alternative-Pathways.pdf

8. Fuller, J., Langer, C., Nitschke, J., O'Kane, L., Sigleman, M., & Taska, B. (2022). The emerging degree reset: How the shift to skills-based hiring holds the keys to growing the U.S. workforce at a time of talent shortage. The Burning Glass Institute. https://www.burningglassinstitute.org/research/the-emerging-degree-reset

9. Albert, K. (2019). *What we know about non-degree credentials: A literature scan.* Non-Degree Credential Research Network. https://gwipp.gwu.edu/sites/g/files/zaxdzs6111/files/downloads/06.23.19%20NCRN%20Literature%20Scan.pdf

10. Mobley, C., Sharp, J. L., Hammond, C., Withington, C., & Stipanovic, N. (2017). The influence of career-focused education on student career planning and development: A comparison of CTE and non-CTE students. *Career and Technical Education Research, 42*(1), 57–75. https://doi.org/10.5328/cter42.1.57

11. Daugherty, L. (2023). *Stacking certificates and degrees.* The RAND Blog. https://www.rand.org/pubs/commentary/2023/08/stacking-certificates-and-degrees.html

12. Malkus, N. (2019). *The evolution of career and technical education: 1982-2013.* American Enterprise Institute. https://www.aei.org/wp-content/uploads/2019/04/The-Evolution-of-Career-and-Technical-Education.pdf?x91208

13. Estes, A., & McCain, B. (2019). *Four strategies to address equity in CTE.* National Association of State Boards for Education. https://files.eric.ed.gov/fulltext/EJ1229646.pdf

14. Strada Education Network, Gallup, & Lumina Foundation. (2019). *Certified value: When do adults without degrees benefit from earning certificates and certifications?* Lumina Foundation. https://www.luminafoundation.org/resource/certified-value/

15. Dadgar, M., & Trimble, M. J. (2015). Labor market returns to sub-baccalaureate credentials: How much does a community college degree or certificate pay? *Educational Evaluation and Policy Analysis, 37*(4), 399–418. https://doi.org/10.3102/0162373714553814

16. Daugherty, L., Bahr, P. B., Nguyen, P., May-Trifiletti, J., Columbus, R., & Kushner, J. (2023). *Do low-income students benefit from stacking credentials?: Descriptive evidence from Colorado and Ohio.* RAND Corporation. https://www.rand.org/pubs/research_briefs/RBA2484-2.html

17. Daugherty, L., Bahr, P. B., Nguyen, P., May-Trifiletti, J., Columbus, R., & Kushner, J. (2023). *Stackable credential pipelines and equity for low-income individuals: Evidence from Colorado and Ohio.* RAND Corporation. https://www.rand.org/pubs/research_reports/RRA2484-1.html

18. Center for Occupational Research and Development. (2021). *Introduction to stackable credentials.* Perkins Collaborative Resource Network. https://cte.ed.gov/initiatives/stackable-credentials-tool-kit

19. Murphy, S. M. (2023). *A typology and policy analysis of state investments in short-term credential pathways*. HCM Strategists. https://hcmstrategists.com/resources/a-typology-and-policy-landscape-analysis-of-state-investments-in-short-term-credential-pathways

20. Cruse, L. R., Stiddard, J., Taylor, R., & LaPrad, J. (2023). *The non-degree credential quality imperative.* National Skills Coalition. https://nationalskillscoalition.org/wp-content/uploads/2023/07/The-NDCQ-Imperative-report_fnl2-1.pdf

21. Daugherty, L., Nguyen, P., Kushner, J., & Bahr, P. B. (2023). *How to build stackable credentials. The* RAND Blog. https://www.rand.org/pubs/commentary/2023/10/how-to-build-stackable-credentials.html

22. Credential Engine. (2023). *Bringing credential transparency through technology.* Credential Engine. https://credentialengine.org/about-us/

23. U.S. Government Accountability Office (2022). *Career and technical education: Perspectives on program strategies and challenges.* U.S. Government Accountability Office. https://www.gao.gov/assets/gao-22-104544.pdf

24. Edgerton, A. K. (2022). *Career and technical education: A primer.* Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R47166/3

25. Bahr, P. B., Columbus, R., Cepa, K., May-Trifiletti, J., & Kaser, S. (2022). *Investigating the hidden college: A study of community college noncredit education in five states.* University of Michigan and Opportunity America. https://www.dropbox.com/s/onjls43csc5y2b4/Bahr%20et%20al.%202022%20Noncredit%20in%20Five%20States.pdf?dl=0

26. Ackehurst, M., Chan, L., & Erzinger, T. (2022). *What if we could eliminate the stigma of VET?* VOCEDplus. http://hdl.voced.edu.au/10707/606189

27. Meyer, K. E., Bird, K. A., & Castleman, B. L. (2022). Stacking the deck for employment success: Labor market returns to stackable credentials. *Journal of Human Resources, 58*(6). https://doi.org/10.3368/jhr.1120-11320R2

28. Imperatore, C., & Hyslop, A. (2018). *Quality CTE: Program of study framework.* Association for Career & Technical Education. https://www.acteonline.org/wp-content/uploads/2019/01/HighQualityCTEFramework2018.pdf

29. Buster, B. (2023, May 25). *'Learn and earn' is the future of everything education and work.* Forbes. https://www.forbes.com/sites/brandonbusteed/2023/05/25/learn-and-earn-is-the-future-of-everything-education-and-work/?sh=28d596b724bb

30. Issa, A. A., & Anglin, L. (2019). *Career pathways mapping toolkit.* Career Ladders Project. https://www.careerladdersproject.org/wp-content/uploads/2019/12/FINAL-Toolkit-Mapping-Steps.pdf

31. Dalporto, H. & Tessler, B. (2020). *Voices from the field: How community colleges are advancing equity in career and technical education.* MRDC. https://www.mdrc.org/sites/default/files/Equity_in_CTE_brief.pdf

32. Valentine, J. L., & Price, D. (2019). *Enhancing student supports to improve completion of non-degree credentials for adult learners.* DVP-PRAXIS. https://www.luminafoundation.org/wp-content/uploads/2019/11/impacts-of-key-community-college-strategies-on-non-degree-credential-completion-by-adult-learners.pdf

33. Manhattan Strategy Group. (2016). Career pathways toolkit: An enhanced guide and workbook for system development—Element three: Design education and training programs. U.S. Department of Labor. https://careerpathways.workforcegps.org/resources/2016/10/20/10/11/Enhanced_Career_Pathways_Toolkit

34. Pedler, M. L., Willis, R., & Nieuwoudt, J. E. (2022). A sense of belonging at university: Student retention, motivation and enjoyment. *Journal of Further and Higher Education, 46*(3), 397–408. https://doi.org/10.1080/0309877X.2021.1955844

35. Mowreader, A. (2023, September 13). *Report: Gaps in student belonging in academic, co-curricular services. Inside* Higher Ed. https://www.insidehighered.com/news/student-success/academic-life/2023/09/13/survey-how-increase-belonging-among-college-students

36. Hittepole, C. (n.d.). *Non-traditional students: Supporting changing student populations.* University of Denver. https://naspa.org/images/uploads/main/Hittepole_NASPA_Memo.pdf

37. Exposito, S., & Bernheimer, S. (2012). Nontraditional students and institutions of higher education: A conceptual framework. *Journal of Early Childhood Teacher Education, 33*(2), 178–189. https://doi.org/10.1080/10901027.2012.675942

38. Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist, 47*(4), 302–314. https://doi.org/10.1080/00461520.2012.722805

39. City of Boston. (2023, November 29). *Boston resident jobs policy.* City of Boston. https://www.boston.gov/government/cabinets/equity-and-inclusion-cabinet/supplier-diversity/boston-residents-jobs-policy-construction-projects

40. Massachusetts Department of Elementary and Secondary Education. (2021). *CVTE enrollment trend by race/ethnicity: Architecture & construction.* Massachusetts Department of Elementary and Secondary Education. http://tinyurl.com/2u8sa3hh

41. Adams, R. V., & Blair, E. (2019). Impact of time management behaviors on undergraduate engineering students' performance. *SAGE Open, 9*(1). https://doi.org/10.1177/2158244018824506

42. Kim, Y. K., & Lundberg, C. A. (2016). A structural model of the relationship between student–faculty interaction and cognitive skills development among college students. *Research in Higher Education, 57*(3), 288–309. https://doi.org/10.1007/s11162-015-9387-6

43. Ramsey, E., & Brown, D. (2018). Feeling like a fraud: Helping students renegotiate their academic identities. *College & Undergraduate Libraries, 25*(1), 86–90. https://doi.org/10.1080/10691316.2017.1364080

44. Collins, K. H., Price, E. F., Hanson, L., & Neaves, D. (2020). Consequences of stereotype threat and imposter syndrome: The personal journey from STEM-practitioner to STEM-educator for four women of color. *Taboo, 19*(4), 161–180. https://digitalscholarship.unlv.edu/taboo/vol19/iss4/10

45. U.S. Bureau of Labor Statistics. (2023, September 6). *Occupational projections and worker characteristics*. U.S. Bureau of Labor Statistics. https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm

46. CompTIA. (2023). *State of the tech workforce.* CompTIA.org. https://www.comptia.org/content/research/state-of-the-tech-workforce

47. Global Market Insights. (2021, May). *Biotechnology market size: Industry growth report 2027.* Global Market Insights. https://www.gminsights.com/industry-analysis/biotechnology-market/market-size

48. Massachusetts Biotechnology Council. (2022). *2022 Massachusetts life sciences workforce analysis report.* Massachusetts Biotechnology Council. https://www.massbio.org/wp-content/uploads/2022/05/2022-MA-Life-Sciences-Workforce-Analysis-Report.pdf

About the Rennie Center

The Rennie Center for Education Research & Policy's mission is to improve public education through well-informed decision-making based on deep knowledge and evidence of effective policymaking and practice. As Massachusetts' preeminent voice in public education reform, we create open spaces for educators and policymakers to consider evidence, discuss cutting-edge issues, and develop new approaches to advance student learning and achievement. Through our staunch commitment to independent, non-partisan research and constructive conversations, we work to promote an education system that provides every child with the opportunity to be successful in school and in life.

Suggested citation

Rennie Center for Education Research & Policy. (2024). *Catalyzing career success through sub-degree credentials: Lessons from the Industry Corps program at Wentworth Institute of Technology.* Boston, MA: Rennie Center for Education Research & Policy.

www.renniecenter.org   @therenniecenter