

# **REGISTERED APPRENTICESHIP IN CONSTRUCTION: BUILT TO LAST?**

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# Registered Apprenticeship in Construction: Built to Last?<sup>1</sup>

## Introduction

Registered apprenticeships are an established institution in the workforce development space that provides young and even not-so-young workers with training and employment, a path to a family supporting career, future opportunities for advancement and even the prospect of owning one's own business. Reduced to its essence, registered apprenticeship is a structured training program where workers work for lower wages for a set period, in exchange for instruction on-the-job and in classroom settings where they are provided broad-based training in all aspects of their craft. Over the years, however, the types of registered apprenticeships within this universe have shifted with the changes in the larger American economy. In 1960, for example, out of a total of 80,316 registered apprentices in the US, 47.8% (38,389) were employed in manufacturing and 29.0% (23,318) were employed in construction. In 2020, by contrast, out of a total of 275,324 registered apprentices in the US, 68.4% (188,452) were employed in construction, while only 6.0% (16,510) were employed in manufacturing. This monograph focuses on registered apprenticeship in construction. It attempts to explain why more than half of all registered apprentices in the US are still employed in construction, while apprenticeship programs in other industries have withered over the past 60 years.<sup>2</sup>

Registered apprenticeship is a well-regarded institution that provides workers with job training and advanced skills, connects apprentices with employers, and provides solid middle-class wages and careers. A 2012 study by Mathematica reported that individuals who completed a registered apprenticeship program earned \$240,000 more over their working lives than similar non-participants.<sup>3</sup> Even those who did not complete their apprenticeship programs boosted their lifetime earnings by \$98,000 over non-participants. The gains from registered apprenticeship mean more than higher wages. Apprenticeship places the successful participant on a path of continuously improved skills, as well as opportunities for journey-level workers to move into supervisory and management positions. Most Building Trades unions, for example, provide the skills and knowledge needed for craftworkers to establish and own companies when they complete their Apprenticeship; these programs, in other words, provide explicit training to journey workers to support their moving into the ranks of managers and business owners.

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<sup>2</sup> Over the past three presidential administrations, there has been a conscious effort to implement new registered apprenticeship programs in industries other than construction, including advanced manufacturing, health services, banking, insurance, IT, cyber security, and childcare.

<sup>3</sup> Reed, D. Reed, Liu, A. Mastri, a Kleinman, R., D. Reed, S. Sattar, & J Zigler: An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States: *Oakland, CA: Mathematica Policy Research (2012) ds*

Apprenticeship is advantageous to employers in industries such as construction that require high levels of skill, but in which firms are small, employment can be intermittent, and where the industry is subject to volatile swings of the business cycle. In another benefit to participating employers, joint (meaning multi-employer, labor-management) apprenticeship programs share both the risks and costs of training among multiple employers and between employers and craft workers (journey workers and apprentices). This cost sharing, along with the sharing of a trained labor force and ability of firms to adjust the number of employees to meet project needs, makes the construction industry nimble in adjusting to swings in firms' project loads and industry demand. In an industry dominated by small firms, few individual firms could afford the costs of an apprenticeship program; but through shared training costs and a common workforce, signatory employers have found registered apprenticeship as a key to success in the construction industry.

### **The History of Registered Apprenticeship**

Apprenticeships as a means of training workers dates to the colonial era in the United States; however, this system of training and employment was fragmented and did not provide uniform skills. It was displaced in many industries by the rise of large-scale manufacturing and assembly lines, and then disrupted by the Great Depression. By the late 1930s there was agreement among business, labor, and civic leaders that, with the rise of national labor markets, employers and employees needed a new system for training and certifying larger numbers of workers than were available in the older, family-based training system, which would provide workers with increased mobility, and that would also provide high-quality training in the skills needed to obtain and hold good jobs while similarly aiding employers in finding uniformly skilled workers.

Congress's response was the National Apprenticeship, or Fitzgerald, Act of 1937, which established the federal apprenticeship system, as well as federal responsibility for the welfare of apprentices. The Act created the registered apprenticeship system and placed these programs on three pillars. The first was the requirement of a minimum of 144 hours of related (classroom) training.<sup>4</sup> This was designed to replace and modernize the individual instruction which characterized the older, family-based training system that was imported from Europe. The second was to require that each apprentice have a written agreement with their employer or the apprenticeship sponsor to establish labor standards, including designation of the trade in which the apprentice was to be trained, the length of the apprenticeship, a graduated wage scale that rose as the apprentice acquired skills, and rules on whether the apprentices would be paid for classroom training. The third pillar was a written agreement, which had to be approved by a third party to whom the apprentice or sponsor could go to adjust complaints or other issues. Third-party approval provides the apprentice and their parents with greater confidence in the program, with assurance that there is due process in the relationship and provides a central registry of the types and extent of training being undertaken. The "third parties" that grant

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<sup>4</sup> Registered apprenticeship programs combine classroom and on-the-job training. Apprentices complete 2000 hours of training, including a minimum of 144 hours of classroom training. Apprentices receive an additional 1856 hours of on-the-job training to earn their annual credit toward completion.

approval (registration) of apprenticeship programs are the Office of Apprenticeship (OA) of the U.S. Department of Labor or its state apprenticeship agency counterparts. These agencies assure the uniformity of training provided by apprenticeship programs, further enhancing the mobility of trained workers. The OA, and its state counterparts, moreover, approve the content and curriculum of registered apprenticeship, track and review data on admissions and completions, and monitor racial, ethnic, and gender equity among apprentices.

Thus, the contemporary registered apprenticeship system in construction joint apprenticeship programs is a privately funded, publicly monitored training system.<sup>5</sup> Governments at the state and federal level provide oversight to assure that apprentices receive high-quality training in their craft; guarantee that the apprenticeship program is teaching up-to-date methods, that training funds are used for appropriate training and that apprenticeship programs provide a supply of skilled workers with readily identifiable standardized skill. Most of the financial support for registered apprenticeship programs, however, comes from direct investment from the Building Trades and their signatory, private sector contractors through collective bargaining.

In the contemporary construction industry, the largest number of registered apprentices are enrolled in joint programs, meaning those sponsored by employers and labor organizations working together through joint labor-management committees. Non-joint programs are sponsored by a training school, employer association or community college, as well as single-employer programs<sup>6</sup>. Training through registered apprenticeship programs sponsored by a Joint Apprenticeship Training Committees (JATCs) provides comprehensive classroom and on-the-job training to apprentices over a 3-to-5-year period, depending on the locale and the trade. It is supported by an assessment on the working hours of the craft workers covered by the collective agreement; Building Trades apprentices do not pay directly for their training.<sup>7</sup> Rather, they earn as they learn, complete their program without college debt, and have earnings that compare favorably to many new college graduates.<sup>8</sup> Since 1937, the US apprenticeship model has been successful in moving construction apprentices into lifetime careers and providing the skilled labor force needed by employers. It has also been effective in adapting to technological innovation, to changing employer needs, and to the evolution of the labor force.<sup>9</sup>

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<sup>5</sup> The federal government provides limited direct support through the U.S. Department of Labor

<sup>6</sup> Of the 577,004 individuals enrolled in registered apprenticeship programs in 2015-2020, 387,871 are registered in Office of Apprenticeship programs, 189,133 are registered in state apprenticeship programs (citation).

<sup>7</sup> Apprentices earn an increasing proportion of the journey workers rate as they progress through the apprenticeship program. They are also participate in pension, health care and other benefits earned under the collective agreement. The entry rate for new apprentices is typically 50% of the journey worker hourly rate.

<sup>8</sup> The Apprenticeship Alternative: Enrollment, Completion Rates, and Earnings in Registered Apprenticeship Programs in Illinois Manzo and Bruno, ILEPI (2020). <https://illinoisepi.files.wordpress.com/2020/01/ilepi-pmcr-the-apprenticeship-alternative-final.pdf>

<sup>9</sup> The text of the revised Labor Standards for the Registration of Apprenticeship Programs can be found at <https://www.ecfr.gov/current/title-29/subtitle-A/part-29>.

## Registered Apprenticeship Today: The Numbers

Across all industries, there were 636,000 apprentices in federal or state registered apprenticeship programs in 2019; 222,243 new apprentices were enrolled (registered) while 82,379 completed their apprenticeship.<sup>10 11</sup> Construction apprenticeship account for sixty percent of registered apprenticeships.

Data on the distribution of apprenticeships by trade in construction is found in Table I. Limiting the analysis to the 37 states that participate in the Registered Apprenticeship Partners Information Management Data System (RAPIDS) of the US Department of Labor, the electrical industry, and the mechanical industry (pipe trades, sheet metal, boilermaker, and HVAC) account for the largest number of apprentices with 173,485 and 116,453 respectively in 2016-2020.<sup>12</sup> Carpentry, trowel trades, laborers, and iron workers had 85,612, 53,293, 51,172 and 29,172 respectively. Roofing, operating engineers, and painters had between 14,842 and 21,512 active apprentices over this period. The substantial number of apprentices in electrical and mechanical trades reflect licensing requirements for workers in these trades in many states. Earning a license may require a year or more of industry experience, passing written and practical examinations and, in some cases, completing a registered apprenticeship. Licensing makes formal training more necessary relative in these trades than in other construction crafts.

Table I also distinguishes between joint and non-joint programs. The former is sponsored by employers and labor organizations working together, most often through joint labor-management committees organized through Taft-Hartley trusts. Non-joint programs are most often sponsored by a training school, employer association or community college; this category also includes single-employer program. Excepting the electrical and mechanical industries, joint programs enroll between 86% (laborer) and 96% (structural iron) of all apprentices. The higher proportion of enrollment accounted for by non-joint programs in electrical and mechanical trades, 45% and 64% respectively, reflects the state and municipal licensing requirements and the formal training and knowledge required to be licensed in these industries.<sup>13</sup>

Overall, 41% of construction registered apprentices complete their apprenticeships and earn journey worker status. Most apprentices complete their program by successfully working through a three-to-five-year structured program of on-the-job and classroom training. Some apprentices, however, achieve journey-level status by demonstrating competency through a combination of testing and documented work experience. Completion rates vary between joint

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<sup>10</sup> <https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2020>

<sup>11</sup> This data is from the Registered Apprenticeship Partners Information Management Data system (RAPIDS); it was analyzed and was provided to the author by Professor Cihan Bilginsoy. RAPIDS data is collected annually by the Office of Apprenticeship Training of the U.S. Department of Labor and from State Apprenticeship offices. RAPIDS data distinguishes between jointly sponsored programs and non-joint programs. More information about RAPIDS data can be found at <https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2020>.

<sup>12</sup> Data on the occupational breakdown of the apprentices for the thirty-seven states which are not included in the RAPIDS is not readily available.

<sup>13</sup> There were 1,650 joint registered apprenticeship programs, and 5,984 non-joint programs. Non-joint programs typically have lower enrollments than joint programs

and non-joint programs. Forty-four percent of apprentices in joint programs complete their apprenticeships as against 33 percent of those in non-joint programs. The varying completion rates reflect distinct factors, including business cycle volatility, which limit apprentices’ ability to meet annual work-hour requirements, and personal circumstances, which sometimes hamper completion.<sup>14</sup> Some new apprentices find that the trade is not for them – too insecure, too dangerous, too hard, too subject to hot and cold weather. Women and people of color may also encounter a lack of sufficient support and a hostile work environment, although the contemporary Building Trades have programs in place to address these barriers to completion.

**Construction Registered Apprentices: Compensation**

To encourage employers to hire apprentices and reflecting their status as individuals learning a trade, the apprenticeship agreement specifies the proportion of the journeyworker rate paid to apprentices as they move through their program. These “graduated or progressive” wages vary from about 50% for new apprentices to 90% for an apprentice approaching the end of their program. Registered apprentices in construction also qualify for all benefits: health insurance, pension, workers’ compensation, VA education benefits and unemployment insurance earned by journey workers. The lesser earnings of apprentices are recognized in the federal Davis-Bacon Act of 1931; apprentices are the only craft workers working on a project who are legally paid less than the federal prevailing wage.

Table I provides estimates of apprentice median earnings when they complete their program, using RAPIDS data on apprenticeship completions in 2019 and 2020 for three of the largest trade programs.

**Table I**

**Earnings of Apprenticeships completed in 2019 & 2020 Median Wage on Exit**

Occupation:	Median	Joint	Non-Joint
Electrician	\$28.81	\$34.85	\$21.25
Carpenter	\$31.79	\$32.64	\$22.95
Plumber	\$29.23	\$36.60	\$21.20

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<sup>14</sup> Sponsor interest in apprentices not completing their program comes from the favorable treatment of apprentices under prevailing wage laws, and the advantages of limiting employee mobility. Only apprentices can legally be paid less than the federal prevailing wage. Employers’ can lower their costs by using large numbers of apprentices to work on prevailing wage projects. Sponsors of non-joint programs may be reluctant for apprentices to complete their training as certified journeyman is more mobile between employers. Absent a credential, the partially trained apprentice lacks documentation of his or her skills and has a more difficulty convincing new employers to hire him/her at a rate commensurate with their skills.

The median earnings of completing apprentices in these three crafts varied from almost \$29 to \$32 per hour. On an annual basis, and assuming a 2,000-hour work year, apprentice annual earnings would fall in a range from \$58,000 to \$64,000. There are major differences between those completing joint programs and those completing non-Joint programs. Electricians completing a joint program earn an average of \$13.60 per hour more than their non-joint counterparts (\$34.85 vs. \$21.25; plumbers completing joint program earn \$15.40 more per hour (\$36.60 vs.\$21.20); carpenters completing a joint program earn \$9.69 for than those completing non-joint programs (\$32.64 vs. \$22.95). These estimates do not include the value of pension and health benefits which can be an additional \$20 per hour or more into the compensation. Robust benefit packages are more common in joint than non-joint programs. The Bureau of Labor Statistics also publishes an annual report on the difference in median weekly earnings between union and non-union construction workers in all crafts; in 2021, union construction workers earned \$422 more per week than their non-union counterparts.<sup>15</sup>

### **Construction Registered Apprenticeship: The Curriculum**

The goal of registered apprenticeship is to provide those who finish the program with the complete knowledge, skills and attitudes needed to complete ~~most of~~ the work in the trade without direct supervision or instruction; in other words, to prepare them for a career as an autonomous craft worker. Success requires a wide range of knowledge about a trade and an ability to coordinate with other journey workers on a project. Increasingly, journey workers are being trained to assume some management tasks by looking ahead several days to determine the supplies, tools and engineering specifications needed to keep work progressing efficiently. A graduate of a registered apprenticeship program is not simply providing labor on a job site, they are increasingly an active member in the mid-level management of a project.

Success is increasingly measured not just by technical competence but also by journey workers' ability to work with clients, suppliers, co-workers, and others on the site. Most Building Trades registered apprenticeship programs now incorporate training on professional workplace standards and in interacting with others on and off the job site. All the building trade unions, to cite one example, have implemented codes of conduct or excellence over the past 15 years, which spell out the professional obligations of all members – including apprentices. Several building trades joint-labor management apprenticeship programs also provide training on serving as foreman or supervisors on projects.

Depending on the trade and occupation, registered apprenticeship programs in construction take from 36 to 60 months to complete. Programs combine 32 hours of on-the-job training (OJT) with eight hours of classroom training a week.<sup>16</sup> The OJT is done under the supervision of a trade journey worker. The journey worker instructs the apprentice on how tasks are done, on the use of tools, on performing work correctly and safely, and inspects the apprentice's work when it is completed. Journey workers also provide the apprentice with instruction on the expectations about their behavior on the work site, including timeliness and

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<sup>15</sup> Bureau of Labor Statistics, *Construction at a Glance*; <https://www.bls.gov/iag/tgs/iag23.htm>

<sup>16</sup> Some trades have moved to a block training model in which apprentices work on a job for four weeks and then spend a week in the classroom.



productivity. Journey workers regularly provide oral and written evaluations of apprentice's performance to the director of their apprenticeship program.

The classroom part of the apprentices' training, also known as Related Technical Instruction (RTI), consists of mastering the knowledge required to perform tasks safely and efficiently. For example, a first-year electrical apprentice receives Level 1 training on reading blueprints, five levels of theory pertaining to direct current installations, training in codes and standards, splicing conductors and bending conduit, among other topics. The second year includes additional training in codes, alternating current theory, transformers, Level 2 blueprint reading and additional applications, including threading and installing several types of metal conduit. By the third year's classroom training, apprentices are introduced to Level 3 blueprint reading, rigging, motors, test instruments, hazardous locations training, building automation and initial leadership preparation. The fourth year includes digital electronics and programmable controllers, introduction to instrumentation, power quality and electrical installation in health care facilities. The fifth year covers topics including lighting, digital electronics, programmable controls, instrumentation, health care facilities electrical systems, power quality, distribution generation and photovoltaics. More details about the content of the curriculum are provided in Appendix A, which reproduces the Core Curriculum: Course Level and Credit Summary for the Electrical Alliance Registered Apprenticeship Program. The Core Curriculum is notably specific about required materials, about the credits required each year, the core credits (142 including core and advanced credits), topics by year and credits earned, required materials, the specific lessons for each part of the course, and distinguishing between required and advanced materials. For example, the Level 1 course on DC theory has eight distinct lessons with supporting materials, while the photovoltaics curriculum has ten distinct lessons with supporting materials.<sup>17</sup>

Many of the joint programs have developed certifications by 3<sup>rd</sup> party groups to ensure standards and certifications ensure that the skill sets are validated to prepare individuals for a successful career in their industry.

### **Construction Registered Apprenticeship: Training Investment**

As we have established above, the registered apprenticeship system in construction is a privately funded system with federal and state oversight. The signatory construction unions and their contractor partners, the leading purveyors of construction craft training in North America, operate over 1,900 apprenticeship training centers across the United States and Canada (1,600 in the U.S. alone) via an investment of almost \$2 billion per year. The United Brotherhood of Carpenters alone spends \$250 million annually on apprenticeships and has 164 regional training centers, in addition to its national training center in Las Vegas, Nevada.<sup>18</sup>

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<sup>17</sup> See Appendix A.

<sup>18</sup> An interactive map of the NABTU centers is available at <https://nabtu.org/apprenticeship-and-training/>). A list of United Brotherhood of Carpenters training centers can be found at <https://www.carpenters.org/training-center/>.

It is difficult to locate information on training expenditures on non-joint programs, as the leading organizations do not publish this data. Professor Peter Philips, a labor economist at the University of Utah, has proxied expenditures with program assets report by the IRS-990 form for small tax-exempt organizations.<sup>19</sup> In 2014, non-signatory (meaning non-labor-management or typically non-union) organizations involved in construction training had \$242 million in assets. In contrast, and again using the IRS 990 forms, training providers associated with signatory (meaning union or labor-management) organizations had \$2.7 billion in assets.

Although the U.S. Department of Labor and its state apprenticeship partners do not directly provide apprenticeship training, federal and state governments provide the framework, technical support, and oversight for the registered apprenticeship programs. In 2022, \$285 million of the \$3.66 billion budget of the Employment and Training Administration of the U.S. Department of Labor was allocated for apprenticeship and training. This is 8% of the federal employment and training allocation and 12% of the total public and private expenditures on apprenticeship.<sup>20 21</sup>

### **Construction Registered Apprenticeship: Instructor Training**

To successfully train young workers in a craft, apprenticeship instructors need to remain abreast of developments in their craft, master them and then effectively teach these skills and knowledge to the apprentices. Effective teaching methods have always been part of the registered apprenticeship system; this purpose was codified in 2008 in 29CFR29.5 (b)(4), which added standards for competency and hybrid-based (competency and time) instructional methods in addition to traditional time-based programs<sup>22</sup> This was an important step in the modernization of registered apprenticeship, making the programs more flexible while retaining the centrality of on-the-job training and classroom training. The movement to modernization was supported by three leading sponsors of construction training, North America's Building Trades Unions (NABTU), the Associated Builders and Constructors (ABC), and the Independent Electrical Association (IEA).

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<sup>19</sup>Elird Haxhiu and Philips P; The Role of Collective Bargaining, Remuneration Strategies and Regulations in Fostering Apprenticeship Training in US Construction (unpublished manuscript)

<sup>20</sup> FY 2022 congressional Budget Justification Employment and Training Administration Training and Employment Services (<https://www.dol.gov/sites/dolgov/files/general/budget/2022/CBJ-2022-V1-03.pdf>)

<sup>21</sup> The amounts spent by state governments is not readily available.

<sup>22</sup> Discussion of traditional, competency and hybrid programs are found in paragraph 29.5 (b) (2) parts (ii) and (iii) of <https://www.ecfr.gov/current/title-29/subtitle-A/part-29>.

(ii) The competency-based approach measures skill acquisition through the individual apprentice's successful demonstration of acquired skills and knowledge, as verified by the program sponsor. Programs utilizing this approach must still require apprentices to complete an on-the-job learning component of Registered Apprenticeship. The program standards must address how on-the-job learning will be integrated into the program, describe competencies, and identify an appropriate means of testing and evaluation for such competencies.

(iii) The hybrid approach measures the individual apprentice's skill acquisition through a combination of specified minimum number of hours of on-the-job learning and the successful demonstration of competency as described in a work process schedule.

One example of a successful Building Trades apprenticeship instructor training program, among the many offered by the NABTU affiliates, is the United Association of Plumbers and Pipefitters (UA) Instructor Training Program. Here the UA and its partner contractors work together on the development and delivery of their apprenticeship program through the International Pipe Trades Joint Training Committee (IPTJTC). The curriculum for the apprenticeship instructors' program, shown in Appendix B, requires two hundred hours of classes, takes five years to complete and involves both in-person training at the national training center and on-line training in adult and technical education. Great emphasis is placed on instructors' effectiveness in conveying technical skills and in using contemporary teaching techniques, including a full range of in-person and distance learning methods. Pre-Covid, the UA and its contractor partners would annually convene 2,000 apprentices, apprenticeship coordinators and instructors, instructor trainers, apprenticeship contest judges and others as part of their Instructor Training Program (ITP).

The UA's Instructor Training Program (ITP) is designed to:

- Increase UA instructors' proficiency in instructional techniques and materials:
- Acquaint instructors with the philosophy and principles of education, especially trade, industrial, and technical education.
- Provide learning experiences in the principles and the fundamentals of the applied knowledge subjects; and
- Expand the understanding of our instructors in the technical aspects of the crafts and convey information to the instructors about the latest developments in this area.<sup>23</sup>

The UA's ITP courses are taught through "the UA University" at Washtenaw Community College in Ann Arbor, Michigan. UA Instructors become adjunct faculty at Washtenaw and the courses offered to apprenticeship instructors and coordinators bear college credit. In 2022, the mandatory 100-hour professional education training program included courses in education and classroom teaching – Planning, Teaching, and Assessing Effective Lessons; Beginner, Intermediate, & Advanced Course Planning; and Problem Solving and Public Speaking – as well as more than eighty applied and technical courses oriented to the various UA sub-Trades:

- Methods in Teaching Drawing Interpretation and Plan Reading
- Laser Scanning: Reality Capture for Construction Applications
- Pipefitting Layout
- Troubleshooting Residential HVACR Systems
- Opioids in the Workplace: Prevention and Response
- Robotic Total Station Layout – Trimble®
- Methods in Teaching Advanced Gas Tungsten Arc Welding (GTAW)
- UA/MCAA Foreman Certification

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<sup>23</sup> 2022 Instructor Training Manual; International Training Week August 13 -19, 2022: International Training Fund, Annapolis Maryland.

The IPTJATC has also pioneered the use of virtual training in apprenticeship programs; because of Covid-19, the entirety of the ITP training program was delivered over Zoom in 2020 and 2021. In addition, there is movement towards incorporating augmented reality technologies on the job to allow craft workers to locate systems that are behind walls to speed work and minimize collateral damage caused by repairs.<sup>24</sup>

### **Construction Registered Apprenticeship: Challenges and Opportunities**

The current need for skilled crafts workers in the construction industry, which is estimated to require between 1.5 and 2 million workers in 2025, provides a unique opportunity for registered apprenticeship programs to bring in a new generation of more diverse workers into the industry and rebuild the market share of employers who provide family-supporting employment.<sup>25</sup> Even with this opportunity, barriers remain to the expansion of Registered Apprenticeship in construction. These barriers include attracting qualified youths to consider careers in construction, bringing underrepresented groups including women and people of color into the apprenticeship system, and reducing the volatility of construction industry employment.

A central challenge facing the construction industry involves the changes in the goals of public education. Vocational training and careers lost popularity in educational circles in the late 20<sup>th</sup> century. The trend toward directing all graduating high school students to college, the decline in vocational education in public schools, and the increasing stigma attached to blue-

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<sup>24</sup> The registered apprenticeship programs and construction training centers of open shop, non-signatory employers, are not as well documented. They appear in the RAPIDS data and in the IRS 990 forms, but less is known about their content and effectiveness. Both the Associated General Contractors and the Associated Builders and Contractors (ABC) have non signatory apprenticeship programs; information on these programs can be found at <https://www.agcsdatt.org/> and <https://www.abc.org/Workforce/Craft-Training-Apprenticeship>.<sup>24</sup> This web site provides information on the Effective Educator Certification Program of the Associated Builders and Contractors and includes eight 90-minute webinar sessions per class plus discussion groups, supporting videos, individual presentations with feedback. The topics include:

- Module 1 - The latest adult learning principles
- Module 2 - Teaching tips and tricks, meaningful activities and learning motivation
- Module 3 - Classroom management
- Module 4 - The best teaching styles for your topic
- Module 5 - Edutainment: Creating stories, examples, analogies, effective visuals, and demonstrations
- Modules 6-8 - Presentations and feedback

The virtual instructor training program includes 60-minute online seminar sessions per class plus discussion groups, and individual presentations with feedback. The topics covered include:

- Module 1: Translating from in-person education to virtual
- Module 2: Virtual tools and making them work for you
- Module 3: Testing, evaluating, and coaching to make it stick
- Module 4-6: Presentations and feedback

<sup>25</sup> Although construction employment is projected to grow more rapidly than most employment, forty-one percent of current industry employees are expected to retired by 2031 (<https://www.nccer.org/docs/default-source/pdfs/nccer-cornerstone-fall-winter-2017-final.pdf>, full citations needed)

collar employment each worked to reduce the number of qualified young workers moving into registered apprenticeship.

Today, however, policy makers, educators and apprenticeship advocates are making inroads in rolling back these changes in what is now called Career and Technical Education (CTE) in the public schools. As the career advantages of high-quality vocational education become clearer, and as students and parents rebel against the high debt load many students acquire at colleges and universities, many educators are rethinking the exclusive emphasis on “college for all.”<sup>26</sup> Educators and advocates of registered apprenticeship in construction are also rethinking the pathways from secondary education to registered apprenticeship programs – accompanied by efforts to also improve the understanding of the career trajectories for talented craft workers among students and parents. One example is the Building Trades’ Multi-Craft Core Curriculum (MC3), an educational program which has been developed for use in different educational settings, including adult re-entry programs, justice involved programs, and CTE high schools, to prepare students for entering registered apprenticeship programs.

North America’s Building Trades Unions (NABTU) and their contractor partners developed the MC3 as a curriculum that could be used in the public CTE schools to expand the numbers and diversity of the pipeline from secondary schools to construction registered apprenticeship. NABTU’s MC3 program is an apprenticeship readiness program that provides a mixture of hard and soft skills to prepare participants for successful entry into registered apprenticeship, to acquaint them with the crafts which have registered apprenticeship programs, and to provide exposure to help participants decide whether construction is a good fit for their long-term career goals. This program has been recognized with the Registered Apprenticeship Innovator and Trailblazer Award of the US Department of Labor.

The MC3 includes an introduction to the construction industry, tools, and materials, construction health and safety, blueprint reading, basic math for construction, heritage of the American workers, diversity in the construction industry, green construction, and financial literacy. The MC3 requires a minimum of 120 classroom hours. This curriculum is currently available in several settings, including high schools, community colleges, adult re-entry programs and in programs for the justice involved. The MC3 can be taught face-to-face, but it is also available to all approved Apprenticeship Readiness Programs (ARP) programs in a web-based learning management system. All the student and instructor materials for the updated MC3 are available in one integrated learning management system (LMS), modeled on the Blackboard platform used at many colleges and universities. Using the MC3 program, and accessing its materials, requires the support of a local building trades council and permission from the National Building Trades office.<sup>27</sup>

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<sup>26</sup> NABTU affiliates have pioneered the development of college credit for their registered apprenticeship programs. Each has worked with groups such as the American Council on Education (ACE) or the National College Credit Recognition Service (NCCRS) to assess their registered apprenticeship programs for college credit.

<sup>27</sup> The MC3 is supported by instructor training supported by the building trades

Approximately 50 CTE high schools and community colleges across the US have adopted the MC3 as part of their CTE curriculum. NABTU has received formal approval for the MC3 by State Education Departments in California, Maryland, Michigan, Ohio, and Louisiana. State approval is pending in Texas, Florida, and New York. How the MC3 fits into a school's CTE curriculum and academic calendar is up to the school district and the local Building Trades Council, which has local jurisdiction over the MC3. NABTU and building trades councils have taken a flexible, adaptive approach to this question when working with school districts: in most schools, CTE construction teachers teach the MC3. In some schools, building trades instructors supplement the work of the faculty, teaching some of the trades content. This is worked out by the school administrators and teachers in cooperation with the local building trades councils and their contractor partners.

In addition to providing a greater number of CTE high school students with an introduction to construction registered apprenticeship, NABTU's (MC3) also plays a key role in introducing registered apprenticeship to a more diverse population of young workers, both in CTE high school and adult programs. Here the challenge is clear. Women, Asian, Native American, and African American workers are underrepresented in the construction trades and have been for decades. The construction sector remains one of the few industries where an individual without a college degree can earn a "living wage" and build a career. Underrepresentation equates to lost opportunities for non-traditional workers to secure jobs with middle-class earnings and benefits that have long represented the economic backbone of communities across the United States. The inequality of opportunities—and even inequality within the industry—also contributes to the nation's overall sizeable and persistent gender and racial pay gaps.

Effective initiatives to recruit non-traditional workers exist on the local and national level as the result of top-down initiatives of regional building trades councils and grassroots, bottom-up programs initiated by workers themselves. A significant component of these initiatives is in pre-apprentice training programs like the MC3, which include substantial partnerships with community-based organizations, unions, industry leaders, and/or government agencies.

Equally important are efforts to retain and develop diverse apprentices and journey workers. Mentoring from more experienced tradespeople from the same underrepresented group is considered essential as younger workers grapple with work-related issues and seek opportunities for professional growth. Careful monitoring and tracking of work hours (including overtime) and training opportunities are seen as imperative to ensure the equality of opportunities, the retention of existing employees, and continued growth of diversity on the jobsite. Policies such as the Ironworkers' paid maternity leave benefit—which includes six months of pre-delivery and six-to-eight weeks of post-delivery support—also increases the viability of retaining skilled journeywomen. Finally, decisive action in investigating and adjudicating discrimination and harassment complaints is central to the retention of a diverse workforce.

After a slow start due to the Great Recession and the limited availability of apprenticeship placement opportunities, in recent years the building trades, contractors,

educators and leaders of community-based organizations have rapidly increased the number of what NABTU calls “apprenticeship readiness programs,” or ARPs, which teach the MC3 across the US. Since 2017, the 200 NABTU ARPs have seen 10,000 men and women successfully complete the MC3 from coast to coast. Across this five-year period, the percentage of MC3 graduates who were from communities of color averaged between 75 and 80 percent, while the percentage of women averaged 20 – 25 percent.<sup>28</sup>

This contrasts with diversity in the non-union construction sector, for which hard data is hard to come by. What the available data shows is that the joint labor-management (union) apprentice training committee programs enroll far more apprentices than the non-union programs, train apprentices in a broader range of trades, have higher aggregate completion rates than the non-union programs and have participation from many more construction contractors. While the aggregate demographic data for these two systems is quite similar, the relative difference in the size of the two systems – joint-labor management vs. non-union apprenticeship programs means that the actual number of women and people of color enrolled in the JATC programs is much larger than those enrolled in the non-union programs.<sup>29</sup> According to a NABTU review of DOL apprenticeship data, over the last 20 years, the Building Trades joint apprenticeship programs have registered 40,000 more women and nearly 300,000 more people of color than the non-union apprenticeship programs.<sup>30</sup>

### **Construction Registered Apprenticeship: Addressing Demand Fluctuations**

As with other industries dependent on private and public investment, demand for construction services, and for construction labor, is highly volatile. Over the course of the Great Recession, construction expenditures fell from \$1,201 billion in 2006 to \$791 billion in 2011. Expenditures did not return to the 2006 level until 2015.<sup>31</sup> Employment followed a similar roller coaster, peaking at 7.7 million in January 2007 before falling to 5.4 million in January 2011. It almost reached its 2007 peak in February 2020 when the Covid-19 recession caused it to fall to 6.5 million employees, a decline of more than one million employees, in April 2020.

Over the course of American history, the construction industry and its institutions have been disrupted by these large swings. The apprenticeship system is particularly vulnerable to these fluctuations. The success of the apprenticeship systems requires that apprentices work the sponsors required minimum (example 1,700-2000) annual hours to advance through the system. Large declines in employment delay apprenticeship completion and result in higher rates of non-completion. In addition, sponsors of registered apprenticeship programs may stop admitting new apprentices during periods of high unemployment. This slows the development of the skilled labor force needed in the future, underlies ongoing craft labor shortages, and discourages young workers from entering the industry.

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<sup>28</sup> NABTU Research Department

<sup>29</sup> See Cihan Bilginsoy, Demographic Data from DOL RAPIDS data, copy of registrations.xls, 12-24-2021, shared by author.

<sup>30</sup> Conversation with Thomas Kriger, Research and Education Director of NABTU

<sup>31</sup> [https://www.census.gov/construction/c30/historical\\_data.html](https://www.census.gov/construction/c30/historical_data.html)

In the history of the modern construction industry, there have been a few notable attempts at identifying solutions to the fluctuations in construction labor demand. One example was the 1975 Construction Industry Collective Bargaining Act, which, had it not been vetoed by President Gerald Ford, would have authorized both a national committee on construction bargaining and local committees in major metropolitan areas to make recommendations that would facilitated regional bargaining structures, improved productivity, apprenticeship development and training, provided for an equitable determination of wages and benefits and otherwise promoted the stability and improve dispute settlement in the construction industry. A principal element of this bill was creating legal structures to limit local union's ability to strike. There was also discussion of using the local and national committees established by this Act to shift major federal construction projects in time to provide counter cyclical support to the industry. This would have partially counterbalanced the employment fluctuations within construction due to swings in both private and public construction spending. It would also reduce costs by shifting federal [public] contracting to a period in which construction prices were declining.

The question today is whether the recently passed Infrastructure Investment and Jobs Act (IIJA), which commits more than one trillion dollars to public construction spending over the next ten years, will have a similar effect on the construction workforce and particularly the registered apprenticeship programs in construction. The IIJA is projected to generate hundreds of thousands of new construction jobs – at a time when many in the Baby Boom heavy construction workforce is headed into retirement in what has been called the “Silver Tsunami.” The interesting part about the IIJA is that the current Administration has placed a heavy emphasis on creating high-road jobs with this increased infrastructure spending, including labor standard provisions that include prevailing wage provisions, project labor agreements with specific community workforce provisions, and, most importantly, registered apprenticeship utilization requirements in the federal agency construction spending that will occur under this legislation. Thus, it will be interested to see if the Biden Administration can use the IIJA to rationalize demand for construction labor, expand the registered apprenticeship system in construction, and increase the diversity of the construction workforce, as we work to rebuild our nation's crumbling infrastructure.



## Sources

Liu, A. Mastri, a Kleinman, R., D. Reed, S. Sattar, & J Zigler: An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States: *Oakland, CA: Mathematica Policy Research (2012)*