



Skilled Construction Workforce Shortage: What Owners Can Do

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The premise of college for everyone is a philosophy that has resulted in many workers having significant delays entering the workforce, accumulating unnecessary debt, and leaving gaps in the skilled trades. This paper focuses on the nationwide shortage of skilled construction labor, examines the root causes, discusses the impact both individually and to the marketplace, and provides recommendations for Owners to correct and mitigate the consequences of this issue.

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I. Background

A National Academies of Science, Engineering and Medicine report estimates a shortfall of 3.4 million technical workers by 2022¹. This alarming metric is the result of several trends that have conspired over the last decades to reduce the skilled labor pool. Factors include dwindling vocational educational programs and union apprenticeship training, and the increased emphasis on a university education. Federal support for technical education has declined 29 percent since 2015². The decline in support has caused many technical education programs to close or be creative in finding ways to support operations and acquisition of expensive equipment needed to provide training. Union based apprenticeship programs have followed the decline in union representation, which has shrunk by 19 percent from 2008 to 2014³. Finally the continued emphasis on a university education by students and parents and the outdated perception of “shop” classes being for diminished careers has fostered the idea that technical education has lower value.

An additional root cause to this issue is the lack of coordinated policy towards workforce development. Unlike other advanced countries, the United States has no centralized mechanisms that require governments, educators, labor representatives, and employers to coordinate on development policies at a national level.

The United States is not competing with other nations in an international assessment of adult skills. Americans rank⁴:

- 16 out of 23 in literacy skills
- 21st in math skills
- 14th in technology problem solving



These statistics reflect that our educational system is not adequately preparing a sustainable workforce with the skills necessary for the nation to compete in the 21st century.

¹ Building America's Skilled Technical Workforce, 2017, National Academy of Sciences

² Preparing the next generation of skilled construction workers: Workforce Development Plan 2016, AGC of America

³ Preparing the next generation of skilled construction workers: Workforce Development Plan 2016, AGC of America

⁴ Megan Rogers, Troubling Stats on Adult Literacy (Inside Higher Ed, October 8, 2013)

II. Consequences

Success rates for first year full and part time students seeking a degree do not support the “college for everyone” credo. The National Student Clearinghouse reports on the 2011 cohort that by the fourth-year 23.5 percent of all full-time candidates are no longer enrolled. Part time student’s fair no better with 46.3 percent

of students dropping out by year 4⁴. The failed attempt at a college education for these students represents ‘lost years’ to the markets they will eventually enter. It is a missed opportunity for those entering the workforce and the employers who have lost vital time in training and apprentice programs. In addition, the failed graduate may have educational debt that needs to be repaid putting them even further behind economically than their counterparts who entered the workforce earlier.

These sobering statistics should be motivation for change and Owners must be part of the solution.

According to a 2018 report by the Federal Reserve Bank of New York, as many as 44.7 million Americans have student loan debt. The total student loan debt in the US is \$1.47 trillion - more than credit card and auto loans. The Federal Reserve also reports that 20 percent of people with outstanding loans are behind in their payments and those who did not complete their degree are the most likely to be behind.

Consequences of the construction skilled labor shortage impact Owners through increased cost and schedule overruns as well impacting job site safety performance. The Construction Industry Institute’s Restoring the Dignity of Work research team 335 concluded that moderate to severe levels of staffing difficulty could result in over 15 percent cost overruns and over 20 percent schedule overruns. Total Recordable Incident Rate (TRIR) performance can approach 1 with moderate to severe staffing challenges compared to an industry average TRIR of 0.37. Even slight difficulty in staffing has impacts with potential cost and schedule overruns of four percent and 12 percent, respectively.

There is no data to substantiate it (yet), but inevitably, quality will suffer, too, as less skilled workers attempt to perform or supervise work beyond the level of their training and experience. If the quality deficiencies are spotted, rework will compound the schedule adherence problem; if they are missed, new or renovated facilities will be inherently deficient on the first day of operation.

III. Opportunities

a. Short term strategies

Owners can begin today by selecting contractors who demonstrate a commitment to workforce development. One example of how to assess a firm's commitment to workforce development is through utilization of the Contractors Workforce Development Assessment (CWDA) score. The CWDA is an independent third-party assessment and results in a score of between 0 and 100. The CWDA score can be used much like TRIR is used to assess a companies' commitment to safety which becomes a significant factor in the selection of contractors in the prequalification and final selection phase of projects. This will begin to incentivize contractors to invest in this critical aspect of addressing the skilled labor shortage.

The state of Arizona has included the below language in their contract announcements to incentivize contractors to support local apprenticeship programs:

E. Apprenticeship: The CM@RISK and each Major Subcontractor are required to contribute an amount equal to one percent (1%) of the CM@Risk's or Major Subcontractor's gross payroll for Construction Work in the Project to fund training for Arizona residents in State of Arizona registered apprenticeship programs. The continuation of a prior practice of funding such apprenticeship programs will be counted against this requirement to the extent of the continuing funding. Apprenticeship programs need to be a State of Arizona registered apprenticeship program(s) that the CM@RISK recommends be the recipient(s) of the funds to be donated to apprenticeship programs.

The amount in Item E will be included in the Guaranteed Maximum Price for the Project as a separate line item. The CM@RISK will indicate, on item #8 of the monthly certification page, the amount to be contributed to a registered apprenticeship program for that month. Owner will have the right to audit the CM@Risk's and each Major Subcontractor's payroll amounts. If Major Subcontractors do not have a designated registered apprenticeship program, the CM@RISK will impound the amount in Item E and will make payment to the State of Arizona registered apprenticeship program(s) selected by the CM@RISK and the Major Subcontractors.

Along with supporting apprenticeship programs, there are mitigation opportunities to offset the need for craft labor. The advancement of Building Information Modeling in design and construction has advanced the capabilities of off-site prefabrication. Many electrical sub-contractors are employing some level of off-site prefabrication. Large electrical contractors, such as MC Dean in northern Virginia, are prefabricating entire electrical rooms in off-site manufacturing facilities and transporting them to the site for installation. Offsite prefabrication

offers several advantages to on site fabrication: offsite fabrication is usually conducted in an environmentally controlled environment that reduces weather delays and improves quality; safety is enhanced by providing easier access to the equipment. In addition, fewer craft trades are needed as robotics can take the place of tradespeople, lowering costs.

Owners can incentivize or mandate pre-fabrication to mitigate skilled labor shortages. The 2020 *SmartMarket Report* from Dodge Data & Analytics found that workforce shortages influenced 43% of general contractors and construction managers to use prefabrication in their projects. In addition to mitigating labor shortages, pre-fabrication and modular construction techniques have positive effects on reducing construction cost and schedules, in some cases by more than 10%, and improving safety.

The University of Delaware's Science Technology and Advanced Research Campus was a case study in the SmartMarket Report, specifically addressing pre-fabrication as a mitigation to construction skilled labor shortage risks. The use of pre-fabrication allowed the general contractor to outsource building components to areas outside the project location where more labor was available. They were also able to modularize mechanical racks consisting of supply duct, exhaust duct, lab services, high pressure steam, chilled and hot water into 25-foot-long 3,000-pound assemblies. This methodology was projected to have saved five months of installation time.

b. Long term strategies

Organizations like **Build Your Future** are working to change perceptions of technical skills and craft labor.

They offer partnerships from industry or education and provide partnership packages to assist with recruitment needs. There is an annual fee, however all proceeds are used to expand BYF's recruitment efforts. Their website provides a wealth of information and guides for career day exhibits, social media tools, and partnership agreements.

The Architecture – Construction – Engineering (ACE) Mentor program is another example. Founded in 1994, ACE is an afterschool program designed to attract high school students to careers in architecture, construction, or engineering. The

“Build Your Future aims to be the catalyst for recruiting the next generation of craft professionals. We provide a collaborative grassroots approach to construction workforce forecasting and development that includes recruitment, training, placement, retention, and image enhancement strategies”

federation has more than seventy affiliates operating in thirty-seven states. The group has over ten thousand student participants annually, four thousand volunteer mentors, and provides \$2.5 million in scholarships.

California is spending \$6 million to revive the reputation of technical education and \$200 million to improve delivery⁵. The State of Michigan is leading the Midwest in registered apprenticeship programs which makes it the third nationally. The state was awarded a \$4 million federal grant to expand its already 1,000 apprenticeship programs⁶.

Owners can also contribute to rebuilding skilled labor's reputation and support it as a high paying career alternative to a university education. For Owners who have their own construction or technical staff, supporting and partnering with organizations such as Build Your Future would be a start. Even Owners without direct technical staff can support the effort. By incentivizing awards to contractors who support apprenticeship programs Owners can influence the marketplace. Offering shadowing opportunities to local technical schools and supporting apprenticeship programs of their own are all actions that Owners may take to begin being part of the solution rather than dealing with the consequences of the craft trade shortage.

In the National Academy of Sciences report, Recommendation 2 calls for "An Alliance of industry, trade, academic and civic association and labor unions in cooperation with the U.S. Departments of Labor and Education, should organize a nationwide public-private communications campaign to raise awareness of the value of and demand for skilled technical workers and the return on investment for individuals preparing for these careers."

A leader in the arena of addressing the misconceptions of skilled labor has been the Loudoun County Public School System (LCPS) in Northern Virginia. The school system has increased efforts to educate both students and parents alike in opportunities other than college. Hosting fairs and informational breakfasts they have increased awareness of other options. Partnering with the Loudoun County Chamber of Commerce's annual State of Innovation in Education, they hosted a Chamber Breakfast. LCPS Superintendent Dr. Eric Williams and Steven Partridge, vice president of strategic partnerships and workforce education at Northern Virginia Community College, discussed employment alternatives. Stories were shared about successful avenues other than college. Of note was the story of a graduate welder earning \$4,700 per week. Partridge also noted that only 60 percent of students who start college graduate within

⁵ The Hechinger Report, after decades of pushing bachelor's degrees, U.S. needs more tradespeople, Matt Krupnick, August 29, 2017

⁶ Michigan.gov, Michigan leads Midwest in total registered apprenticeship programs, third nationally for active registered apprentices, Nov 12, 2019

six years. This leaves 40 percent unaccounted for. LCPS has started as early as elementary school to have students begin to think about career paths. At the middle school level, career and technical education (CTE) are organized into four paths: business and information technology, family and consumer sciences, marketing education, and technology and engineering education. More than a thousand students applied for a new cyber security course during its first year. Loudoun County Public Schools can serve as a model for other school systems in steering students to productive careers that do not require a college education.

In April of 2019, LCPS held a Career and Apprenticeship Fair sponsored by ManTech. The fair included two presenters provided by Amazon Web Services, Yanyu Zheng and Patti Shoefstall, who discussed women in STEM. The fair connected apprenticeship participants with entities such as M.C. Dean, a major electrical contractor in northern Virginia, and the International Brotherhood of Electrical Workers Local 26. These firms along with 62 other apprenticeship sponsors were identified.

Events like this provide an example of the sort of alliance recommended by the National Academy of Sciences, while also informing both parents and students of alternative paths to productive and lucrative employment.

Another leader in supporting apprenticeship programs is the University of Virginia (UVA) Facilities Management department. This example is especially relevant for Owners who perform their own maintenance. The UVA apprenticeship program was established in 1982 and offers candidates an opportunity to learn skilled trade through a combination of on-the-job training, technical education, and classroom instruction in a four-year program. Each year approximately seven to thirteen new apprentices are accepted into the program. Each apprentice is a full time University employee with salary and benefits and has the possibility to learn from the following trades: plumbing, electrical, carpentry, masonry, plastering and HVAC. The program is registered through the Commonwealth's Department of Labor and Industry and provides an avenue for entry into the trades with opportunities for promotion.

Starting salary for apprentices is \$31,000 plus a full benefits package. Upon graduation salary is in line with other journey level UVA staff at between \$38,000 and \$40,000. Apprentices are required to work 40 hours per week and complete 400 hours of classroom instruction with one or two classes per semester. Over the course of the four-year program it is expected that apprentices will complete over 8,000 hours of on the job training.

IV. Conclusion

Owners can influence other factors impacting the skilled construction labor shortage, such as state and federal policies regarding education, immigration, and funding. These are much longer-term solutions that cannot be discounted but require a different approach and strategy for Owners to be successful.





In conclusion, the skilled labor shortage presents several challenges for the construction Owner: project cost increases, schedule delays, worsened safety performance, and degradation of quality. For the occasional builder, these challenges may appear insignificant, but industry-wide they represent a drain on total resources. Redirecting resources to technical education, supporting workforce development, and implementing pre-fabrication are ways that Owners can influence and mitigate the labor shortage in the short term. Using longer term solutions such as changing the perception of technical education, redirecting students to the trades, and creating internal apprenticeship programs, Owners can and should play a significant role in reducing the skilled labor shortage.

Extensive research and literature are available for those seeking a deeper understanding of the root causes and possible solutions. The referenced material in this paper would be a start to understanding this complex issue.

Construction Owners Association of America (COAA)

COAA promotes facility Owner leadership and continuous improvement in the planning, design, and construction process through education, collaboration, and information exchange.

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