

The Impact of Construction Apprenticeship Programs in Minnesota

A Return-on-Investment Analysis

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Executive Summary

Construction is the 3rd fastest growing industry in Minnesota. Over the next decade, construction employment is projected to expand by 9 percent in Minnesota, and 7-in-10 contractors already report difficulties in filling skilled craft positions.

For many young Minnesota workers, enrolling in a registered apprenticeship program is a better option than attending college.

- While most college options exceed \$13,000 in net costs for Minnesota students, the cost of apprenticeship training is typically covered by employers and trade unions.
- The annual income gain from participating in a registered apprenticeship program is about \$4,700, greater than the effect of having an associate's degree and many bachelor's degrees.

If all registered apprenticeship programs were combined, they would be the 3rd-largest private post-secondary educational institution in Minnesota.

- There are nearly 11,500 active apprentices in Minnesota, a 27 percent increase since 2015.
- 96 percent of all apprentices are training for careers in the skilled construction trades.
- Construction programs invest over \$30 million in upgrading worker skills each year.

Joint labor-management apprenticeship programs account for the vast majority of human capital investment in Minnesota's construction industry.

- Employer-only programs are funded through voluntary contributions from contractors, who have an incentive to forgo such investments in order to win bids.
- 93 percent of all active construction apprentices are enrolled in joint programs.
- Joint programs have significantly higher shares of participation among women, people of color, and veterans than employer-only programs.
- Joint programs offer apprentices more specialized training and significantly smaller class sizes.

Joint labor-management apprenticeship programs in construction boost the Minnesota economy.

- The 10 largest joint programs invest *100 times* more in worker training than the Associated Builders and Contractors of Minnesota and North Dakota.
- Over the long run, the 10 largest joint programs in Minnesota's construction industry provide \$617 million in economic value— a return on investment of \$21 per dollar invested.

To promote registered apprenticeship programs, the State of Minnesota should:

1. Boost funding for the Minnesota Apprenticeship initiative;
2. Expand access to child care programs to boost female participation;
3. Expand pre-apprenticeship programs in public high schools; and
4. Support policies that increase apprenticeship training and strengthen prevailing wage.

Construction apprenticeship programs have positive impacts on Minnesota. The programs support workers by improving their skills and growing incomes. The programs also help employers address skills shortages by supplying safe, productive workers. Funded almost entirely by a cents per hour contribution from employers and administered jointly with unions, apprenticeship programs in construction also provide value to taxpayers by ensuring high-quality infrastructure and a strong economy.

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Background Information

Introduction

Registered apprenticeships are training programs that help businesses in Minnesota find skilled workers who are in high demand. They offer structured, on-the-job training and certified classroom instruction tailored to the needs of employers. By developing skills and human capital, apprenticeship programs create pathways to middle-class careers for young adults and workers who are unable to receive a college degree. There are more than 11,500 active apprentices in Minnesota.

In 1937, Congress created the formal system of registered apprenticeship through the National Apprenticeship Act. Under this system, apprenticeship programs must meet state and federal standards for participants to become certified. Apprenticeship requirements are often competency- and time-based. Apprenticeships typically last about four years, but can range in duration from one to six years.

Registered apprenticeships are prominent in Minnesota's construction industry, which accounts for three out of every five active apprentices in the state. Nearly all registered apprenticeship programs are funded and operated by private entities. Employers, joint labor-management organizations, and unions all sponsor programs, covering tuition costs. Participating apprentices get the opportunity to "earn while they learn" with minimal or no out-of-pocket costs. In return for this significant investment, employers have access to a pool of skilled, productive, and safe workers to deliver vital services such as building high-quality infrastructure.

However, an August 2018 survey of Minnesota construction firms by the Associated General Contractors reported that 73 percent are having a difficult time filling craft worker positions. To address this shortage of skilled workers, 57 percent of contractors reported that they increased investments in training, demonstrating the importance of the apprenticeship system in meeting industry demand ([AGC, 2018](#)).

Despite the clear importance of registered apprenticeships to Minnesota's construction industry, little policy research has been conducted to analyze their economic and social impacts. This study, authored jointly by the Midwest Economic Policy Institute and the Project for Middle Class Renewal at the University of Illinois at Urbana-Champaign, investigates the effect of registered apprenticeship programs on the workers, businesses, and taxpayers of Minnesota.

Literature Review on Apprenticeship Programs

There is a general consensus in the economic research that registered apprenticeship programs have positive impacts on workers and "school-to-work" transitions ([Samek Lodovici et al., 2013](#)). Countries that have widespread usage of apprenticeship programs are more successful at

transitioning young workers into the labor market. For example, young workers in Denmark and Germany tend to have high employment rates in stable jobs due to apprenticeship programs. Conversely, their counterparts in Belgium, France, Italy, Portugal, and Spain— where training systems are weaker— are more likely to work in temporary jobs. In addition, compared to associate's degree equivalents, apprenticeship programs have been found to increase the probability of having a job in Switzerland, the United Kingdom, Germany, and France ([Bertschy et al., 2009](#); [Ryan, 1998](#)).

Registered apprenticeship programs provide substantial value to workers, employers, and taxpayers. On average, the future employment prospects, lifetime earnings, and work-life satisfaction of workers all improve upon completing an apprenticeship program. Employers benefit from reduced worker turnover, higher productivity, and lower injury rates. Because the majority of apprenticeship programs are privately funded, the public also benefits from better quality work and lower educational costs ([Samek Lodovici et al., 2013](#)).

Academic studies are nearly unanimous in finding that apprenticeships boost the earnings of workers with low levels of formal education ([Samek Lodovici et al., 2013](#)). The bulk of this research originates from economists and policy researchers in Europe. Studies have found that the average apprenticeship program increases a worker's wages by between 8 percent ([Clark & Fahr, 2002](#)) and 18 percent ([McIntosh, 2007](#)).

In the United States, the most influential and comprehensive research on registered apprentices was conducted by analysts at Mathematica Policy Research for the U.S. Department of Labor Employment and Training Administration ([Reed et al., 2012](#)). The study performed a cost-benefit analysis of registered apprenticeship programs in 10 states that differed across labor market characteristics, including usage of apprenticeship programs, region, and level of unionization. The analysis found that participants in registered apprenticeship programs have substantially higher earnings than nonparticipants. On average, apprenticeship participants earn \$167,552 more in wages and fringe benefits over their careers (after adjusting for inflation). In addition, apprenticeship training reduces a construction worker's chances of suffering a spell of long-term unemployment, saving government entities thousands of dollars per worker.

Female apprentices in the United States similarly express positive views on registered apprenticeship programs as pathways to career advancement ([Reed et al., 2012](#)). However, women only comprise 6 percent of all active apprentices in the United States ([Olinsky & Ayers, 2013](#)). To increase the number of women in apprenticeship programs, female apprentices say that there needs to be more targeted outreach, more assistance with child care, and more efforts to combat harassment ([Reed et al., 2012](#)). However, research has shown that joint labor-management programs with a partnership between employers and unions have higher female enrollments and lower attrition rates for women ([Glover & Bilginsoy, 2005](#)).

Apprenticeship training is particularly important to the construction industry in America. Apprenticeship training in the construction industry makes construction workers safer and more

productive, and creates stable middle-class jobs in an otherwise turbulent labor market (Philips, 2015). Each new building, industrial facility, road, dam, or sewage system “is in many ways a unique, one-of-a-kind, distinctive project” that construction workers need to know how to evaluate and build. Construction is also the most dangerous major industry in the United States. Investment in training and skill upgrading translates into fewer workplace injuries and fewer job interruptions (Philips, 2015).

Through registered apprenticeship programs, “construction operates the largest privately-financed system of higher education in the country” (Philips, 2014). Nearly all of this investment, however, comes from joint labor-management programs funded as a cents per hour contribution from employers that is negotiated with unions and administered jointly. For example, fully 95 percent of all construction training in Wisconsin is provided by joint labor-management programs (Philips, 2015). Similarly, joint labor-management programs in Illinois account for 99 percent of all apprenticeship training expenditures (Bruno & Manzo, 2016).

While partnerships between employers and unions help to institutionalize effective training programs in this seasonal and cyclical industry, prevailing wage laws also promote long-term apprenticeship training in construction. A prevailing wage law specifies compensation and training standards for taxpayer-funded construction projects. Prevailing wage is a local area minimum wage for different types of skilled construction work on public works projects that is based on what workers actually earn in a community, including a base wage, fringe benefits, and training contributions. The policy is intended to protect local construction market standards and apprenticeship programs by ensuring contractors are investing in both market-competitive jobs and development of the next generation of skilled workers (Manzo & Duncan, 2018).

Economic research has consistently found that the prevailing wage laws support registered apprenticeship programs in construction. After Colorado and Kansas repealed their prevailing wage laws in the mid-1980s, apprenticeship training fell by 42 percent and 38 percent, respectively (Philips, 1998). In 2012, states that had prevailing wage laws had 65 percent more enrolled apprentices and 60 percent more graduating apprentices per hour of construction work compared to states without prevailing wage laws. Due to a greater emphasis on skills training, research finds that construction workers in states with prevailing wage laws are between 21 percent and 33 percent more productive, as measured by per-worker value added to the economy (Philips, 2014).

Data and Methodology

Apprenticeship data from the Minnesota Department of Labor and Industry is available through a Minnesota Government Data Practices Act open records request. The data—covering the three-year period from July 2014 through July 2017—contains information on active apprenticeships, enabling comparisons between joint labor-management programs and employer-only programs.

Using this information, registered apprenticeship programs can be cross-referenced with Form 990 reports submitted to the Internal Revenue Service (IRS) by tax-exempt organizations,

nonexempt charitable trusts, and section 527 political organizations. Form 990s are publicly available and can be found on multiple online databases (e.g., [Foundation Center, 2018](#)). Among other items, Form 990 reports include annual program revenues, net assets and liabilities, and the number of workers employed by the apprenticeship program.

The data gathered from the FOIA and Form 990 reports were entered into an industry-standard economic impact analysis using IMPLAN. IMPLAN is an input-output software that uses U.S. Census Bureau data to account for the interrelationship between businesses and households in a regional market, following a dollar as it cycles through the economy. The IMPLAN model provides estimates on the impact of apprenticeship program spending on economic activity, employment, and tax revenues in Minnesota every year.

Finally, this study also uses data from the *American Community Survey* (ACS), in which the U.S. Census Bureau annually interviews one percent of the U.S. population ([Ruggles et al., 2018](#)). Data from the years 2014, 2015, and 2016 was primarily used to estimate the personal benefit of having specific bachelor's degrees in Minnesota. To compare the personal effect of participating in a registered apprenticeship program to the personal effect of various educational degrees, a standard ("ordinary least squares") regression analysis is performed which controls for an array of other important economic factors, such as demographics, employment variables, and county of residence in Minnesota.

Projected Employment Growth in Minnesota

Construction is the 3rd fastest-growing industry in Minnesota (Figure 1). Over the next decade, the construction industry is expected to expand by 9 percent in Minnesota, adding about 10,300 new jobs. Professional and technical services, which includes healthcare, are projected to be the fastest-growing jobs in the Minnesota economy (14 percent), followed by the agricultural sector (11 percent). Total employment in Minnesota is expected to grow by 6 percent over the next decade. Construction occupations are thus expected to grow 3 percentage-points faster than the overall state economy.

Minnesota is better positioned to address the demand for skilled construction workers than the rest of the nation. Across the country, 80 percent of contractors are having a hard time filling hourly craft positions, and many expect it to become harder over the next year. However, nearly half of U.S. contractors (47 percent) rate the quality of their local pipeline for supplying craft workers as "poor." Conversely, while Minnesota's contractors are experiencing similar difficulties in finding qualified workers (73 percent), a much smaller share (26 percent) report dissatisfaction with the local pipeline for supplying craft workers. This may be because 84 percent of Minnesota contractors employ union workers on all or most of their projects, compared to 32 percent nationwide ([AGC, 2018](#)). The strong partnership with construction labor unions helps construction employers in Minnesota institutionalize training through joint apprenticeship programs, and provides contractors with a stable supply of qualified, skilled workers.

Figure 1: Projected Employment Growth in Minnesota by Occupation, 2014-2024

Rank	Occupation	New Jobs: 2016 - 2026	Growth Rate: 2016-2026
<i>MN</i>	<i>Total, All Occupations</i>	<i>181,600</i>	<i>5.8%</i>
1	Professional and Technical Services	22,000	13.9%
2	Agriculture, Forestry, Fishing & Hunting	2,600	10.6%
3	Construction	10,300	8.9%
4	Mining	400	7.7%
5	Administrative and Waste Services	7,400	5.4%
6	Educational Services	12,100	5.0%
7	Transportation and Warehousing	5,100	5.0%
8	Finance and Insurance	6,900	4.8%
9	Management of Companies	3,500	4.4%
10	Real Estate and Leasing	1,200	3.5%
11	Wholesale Trade	3,700	2.7%
12	Utilities	100	0.6%
13	Retail Trade	900	0.2%
14	Information	-600	-1.1%
15	Manufacturing	-5,400	-1.6%

Source(s): Minnesota DEED (2018a) – “Employment Outlook – Long-Term Industry Projections (2016-2026).” All job growth estimates are rounded to the nearest hundred.

Figure 2: Workforce Survey Results of Members of the Associated General Contractors, 2018

Question	Minnesota	United States
Have a hard time filling hourly craft positions	73%	80%
Expect it to become harder to hire craft workers over the next 12 months	43%	48%
Rate the local pipeline for supplying craft workers as “poor”	26%	47%
Firm employs union workers on most or all of its projects	84%	32%

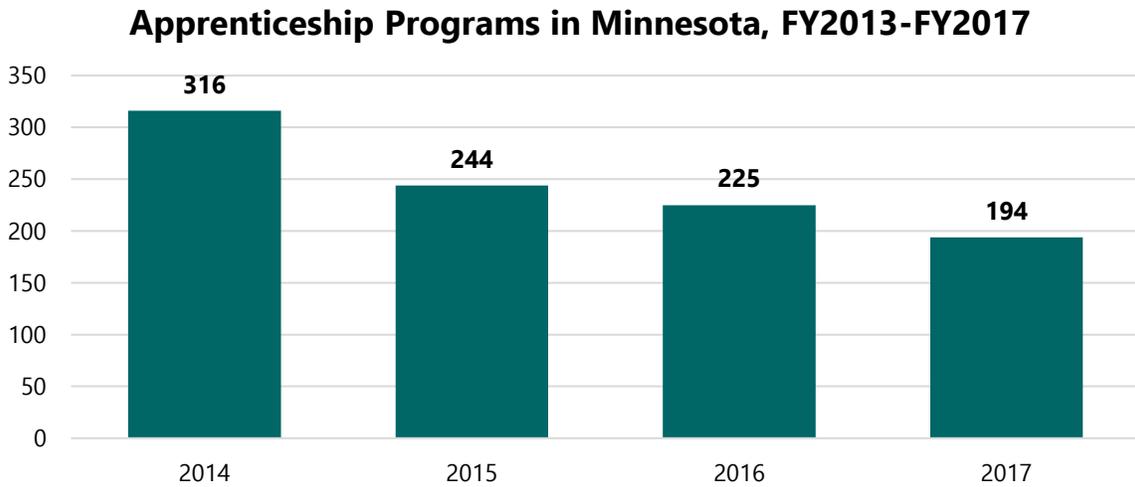
Source(s): AGC (AGC, 2018) – “Eighty Percent of Contractors Report Difficulty Finding Qualified Craft Workers to Hire as Association Calls for Measures to Rebuild Workforce.”

The Impact of Apprenticeship Programs in Minnesota

Overview of Registered Apprenticeship Programs

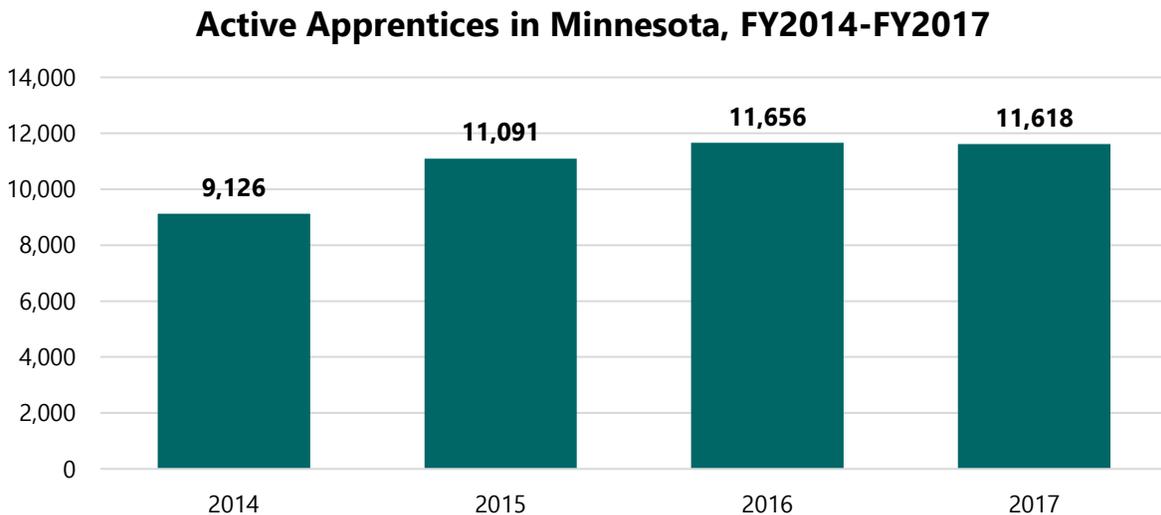
According to data from the U.S. Department of Labor Employment and Training Administration, the number of active registered apprenticeship programs is decreasing in Minnesota (DOLETA, 2018). There were over 300 active apprenticeship programs in the state in Fiscal Year (FY) 2014 (Figure 3). By FY2017, however, the number of active programs had dropped below 200. Overall, there has been a decline of 122 programs (-39 percent) since FY2014. Despite rising demand for construction workers and other apprenticeable occupations, many programs have closed across the state.

Figure 3: Number of Registered Apprenticeship Programs in Minnesota, FY2014-FY2017



Source(s): DOLETA (2018) – “Data and Statistics: FY 2017, FY 2016, 2015, FY 2014, FY 2013.”

Figure 4: Number of Active Apprentices in Minnesota, FY2014-FY2017

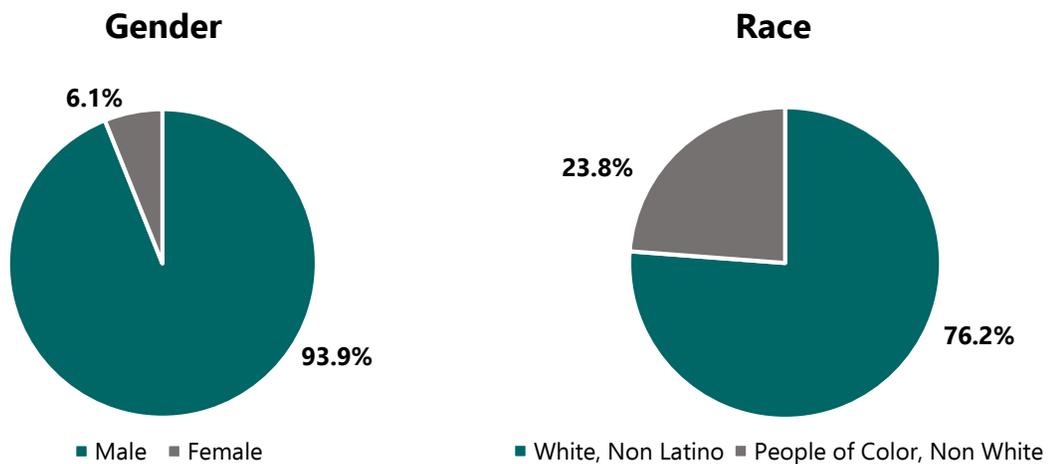


Source(s): DOLETA (2018) – “Data and Statistics: FY 2017, FY 2016, 2015, FY 2014, FY 2013.”

At the same time, the number of active apprentices in Minnesota have increased significantly (Figure 4). While there were only 9,126 active apprentices in FY 2014, enrollment exceeded 11,000 apprentices in the three following years. As of FY2017, the number of active apprentices totaled 11,618, and increase of 2,492 apprentices (27 percent) since FY2014. The rise in total enrollment and the drop in total programs means that active apprenticeship programs are getting bigger and training more individuals per year.

On average, apprenticeship programs in Minnesota trained 11,455 workers annually between FY2015 and FY2017 (Figure 4). Through a Minnesota Government Data Practices Act open records request, comparable apprenticeship data was obtained for the construction industry between FY2015 and FY2017. This program-level data reports that there were 33,106 total active construction apprentices during this time– or approximately 11,035 per year, accounting for 96 percent of the active Minnesota apprentices reported by the U.S. Department of Labor.

Figure 5: Gender and Race of Active Apprentices in Minnesota, FY2015-FY2017



Source(s): Minnesota Department of Labor and Industry's "Gender/Ethnicity/Veteran Reports" from July 2014 through July 2017.

However, the registered apprenticeship data acquired through the open records request includes additional information on active apprentices by gender identification, racial or ethnic background, and veteran status. Information is also available by program type, illustrating the differences between the non-joint (or employer-only) and the joint labor-management segments of the construction industry. In the employer-only sector, apprenticeship programs are sponsored by a single contractor or by groups of employers who provide voluntary funding, unilaterally determine program content, set entry requirements, select apprentices, and monitor trainee progress. Employer-only programs have a financial incentive to underinvest in training in order to cut costs and win bids in the short term. By contrast, apprenticeship training programs undergirded by a jointly administered set of standards are financed by a cents per hour contribution that is negotiated privately between contractors and workers.

The bulk of active registered apprentices in Minnesota are white men (Figure 5). According to three years of state data, 76 percent of registered apprentices are white, non-Latino while 24 percent are people of color. In addition, 94 percent of active apprentices are male compared to just 6 percent that are female. Historically, “apprenticeable occupations” like construction and manufacturing have been male-dominated workforces.

A significant majority of registered apprentices in Minnesota are enrolled in joint programs (Figure 6). From FY2015 through FY2017, an average of about 10,200 active apprentices were enrolled in joint labor-management programs compared to just over 800 trainees in employer-only programs. In total, 93 percent of all registered apprentices are enrolled in joint labor-management programs (Figure 6).

Figure 6: Characteristics of Joint Labor-Management Apprenticeship Programs and Employer-Only Training Programs in Minnesota, FY2015 to FY2017 Average

Minnesota Registered Apprenticeships: Characteristic, FY2015-FY2017 Average	Total for All Registered Programs	Joint Labor-Management Programs	Employer-Only Programs	Joint Labor-Management Share
Number of active apprentices	11,035	10,219	816	93%
Male apprentices	10,292	9,634	658	94%
Female apprentices	743	585	158	79%
White non-Latino apprentices	8,917	8,208	709	92%
African American apprentices	742	683	59	92%
Latino or Latina apprentices	687	651	36	95%
Apprentices of other racial backgrounds	689	677	12	98%
Veteran apprentices	606	506	100	83%

Source(s): Minnesota Department of Labor and Industry's "Gender/Ethnicity/Veteran Reports" from July 2014 through July 2017.

Regardless of racial or ethnic background, more than nine-in-10 Minnesota apprentices are enrolled in joint labor-management programs (Figure 6). These programs also account for a greater share of people of color than white trainees. Specifically, while joint labor-management programs train 92 percent of all white and African American apprentices, they train 95 percent of all Latino and Latina apprentices and 98 percent of apprentices from other racial backgrounds in Minnesota.

The two other demographic characteristics reported by the Minnesota Department of Labor and Industry are gender identification and veteran status. Once again, joint labor-management programs account for a clear majority of active apprentices from these groups. By gender identification, about 94 percent of all male apprentices and 79 percent of all female apprentices are enrolled in joint labor-management programs. Additionally, of the more than 600 veterans enrolled in registered apprenticeship programs each year, over 500 are enrolled in joint labor-management programs (83 percent).

Registered Apprenticeship Programs in Construction

Most construction apprenticeship programs are tax-exempt nonprofit organizations. As a result, they publicly disclose financial information on Form 990 reports submitted to the Internal Revenue Service (IRS) (ProPublica, 2017). Figure 7 presents financial data for the 10 largest joint labor-management apprenticeship programs– sorted by active apprentices– and the employer-only apprenticeship program for the Associated Builders and Contractors (ABC) of Minnesota and North Dakota.

The ABC’s training program in the state is called the Construction Education Foundation of Minnesota. The training programs associated with ABC chapters are typically characterized by task-driven and modular training with a lower priority placed on the full-scope craft training. In FY2015, the ABC’s apprenticeship program had approximately \$297,000 in annual revenue, \$290,000 in total assets, and reported one employee (CEF, 2015). The Construction Education Foundation of Minnesota had 150 active apprentices from July 2014 through July 2017, or an average of 50 per calendar year (Figure 7).

By contrast, the 10 joint labor-management programs with the highest enrollments had a combined \$29.8 million in annual revenue, \$68.5 million in total assets, and 252 employees in FY2015. These resources are used to train nearly 6,700 active apprentices per year (Figure 7).

Figure 7: Financial Information of the 10 Largest Joint Labor-Management Programs Compared to the ABC’s Employer-Only Program in Minnesota

Program Sponsor	Type	Total Revenue	Total Assets	Total Employees	Average Apprentices*
Construction Laborers Education JAC	Joint	\$3,815,458	\$9,089,178	22	2,986
Carpenters and Joiners JAC	Joint	\$7,531,357	\$10,451,716	59	931
Metro Area Roofers Local 96 JAC	Joint	\$599,009	\$1,830,149	4	535
Metro Sheet Metal JAC	Joint	\$1,946,606	\$4,664,418	24	488
Minneapolis Electrical JATC	Joint	\$3,711,851	\$6,578,581	32	473
Operating Engineers Local 49 JAC	Joint	\$6,320,862	\$19,978,166	31	298
St. Paul Pipefitters JAC	Joint	\$2,386,737	\$9,473,542	35	281
Limited Energy System JAC	Joint	\$853,451	\$929,734	15	256
Bricklayers Local 1 Minnesota JAC	Joint	\$1,289,201	\$2,865,315	27	241
Minneapolis Plumbers JAC	Joint	\$1,311,469	2,685,332	3	187
10 Largest Joint Programs	Joint	\$29,766,001	\$68,546,131	252	6,676
Construction Education Foundation	Employer	\$296,803	\$289,640	1	50

*Source: Authors’ analysis of Form 990 tax information submitted to the Internal Revenue Service and listed publicly at ProPublica (2017). Data from Minnesota Department of Labor and Industry’s “Gender/Ethnicity/Veteran Reports” are cross-referenced with Form 990 financial information from FY 2015. *July 2014 through July 2017 data divided by three years.*

By total assets, the program operated by the International Union of Operating Engineers Local 49 and the Associated General Contractors (AGC) of Minnesota is the largest in the state, with \$20 million in total assets and over \$6 million in annual revenue (IUOE 49, 2015). The program operated by the North Central States Regional Council of Carpenters and signatory contractors is

the 2nd-largest, with \$10 million in total assets but nearly \$8 million in annual revenue. The Construction Laborers Education JAC program has the most apprentices, with 2,986 active apprentices enrolled on average per year. The key takeaway from Figure 7 is that all ten of the largest apprenticeship programs are joint programs funded through private investments by employers and unions. This data illustrates the significant disparity in training resources between joint labor-management training programs and the program offered by the local ABC chapter.

Apprenticeship training for construction workers is dominated by joint labor-management programs in Minnesota. Compared to the 10 largest joint labor-management programs, the ABC’s Construction Education Foundation of Minnesota has just 1 percent of the annual revenue and 0.4 percent of the total assets. Put another way, the 10 largest joint labor-management apprenticeship programs (\$29.8 million) invest 100 times more in worker training every year than the Associated Builders and Contractors of Minnesota and North Dakota (under \$297,000). Likewise, the 10 largest joint programs annually train 134 times more apprentices every year than the local ABC chapter. As a result, the top 10 joint programs have 252 total employees while the ABC chapter has only 1 paid employee. While nonunion contractors may allege a large share of the construction market, joint labor-management apprenticeship programs account for the vast majority of human capital investment in Minnesota’s construction industry (Figure 8).

Figure 8: Apprenticeship Program Operations and Assets in Minnesota

Program Sponsor	Total Revenue	Total Assets	Total Employees	Average Apprentices*
10 Largest Joint Labor-Management Programs	\$29,766,001	\$68,546,131	252	6,677
Construction Education Foundation of Minnesota (ABC)	\$296,803	\$289,640	1	50
Top 10 Joint Programs vs. Largest Employer-Only	100.3 x	236.7 x	252 x	134 x

Source(s): Authors’ analysis of IRS Form 990 using data from DOL (2017) – Freedom of Information Act (FOIA) Request.

Joint labor-management training programs also have smaller “class sizes” than the employer-only programs in Minnesota’s construction industry. This is because the typical large joint apprenticeship school has multiple full- and part-time employees, many of whom have significant experience working and teaching in the relevant trade. On average, there are 26.5 registered apprentices for every one program employee in the 10 largest joint labor-management programs. By contrast, non-joint programs have 50 registered apprentices per employee. A lower apprentice-to-training employee ratio means that active apprentices are likely to receive more attention in classroom instruction and more support while performing on-the-job training if they are in joint programs.

These findings are consistent with the preponderance of research indicating that joint labor-management apprenticeship programs are characterized by larger numbers and more training resources. Across the United States, 73 percent of all apprentices are enrolled in joint labor-

management programs (Bilginsoy, 2005). In the Midwest, joint labor-management programs have an even larger role in training construction workers. The shares of active apprentices in joint labor-management programs are 98 percent in Illinois, 95 percent in Wisconsin, and 82 percent in Ohio (Manzo & Bruno, 2016; Philips 2015; Onsarigo et al., 2017). In Illinois, joint programs account for 99 percent of all privately-funded apprenticeship expenditures and return \$11 in economic and tax benefits per dollar invested over the long run (Manzo & Bruno, 2016).

The Economic Impact of Joint Apprenticeship Programs in Construction

While the previous section analyzed, compared, and contrasted apprenticeship programs, this section evaluates the broader impact of joint labor-management programs on the Minnesota economy. On average, construction apprenticeship programs increase the annual earnings of program participants. Figure 9 uses data from the 2014, 2015, and 2016 *American Community Surveys* from the U.S. Census Bureau to show annual earnings for men aged 35 years old or younger with only a high school degree or equivalent in Minnesota. These workers earn nearly \$11,700 more in annual wages per year than comparable workers with the same education. These higher incomes boost consumer spending, creating jobs in the Minnesota economy. In addition, the investment of joint labor-management apprenticeship programs helps to employ instructors and administrative staffers, pay for modern equipment, and cover the costs of operating the training sites.

Figure 9: Annual Earnings of Young Men with Only a High School Degree or Equivalent in Construction Occupations and All Other Occupations in Minnesota, 2014-2016

Occupation	Observations	Annual Income from Wages
Construction Occupations	544	\$38,513
All Other Occupations	3,500	\$26,858
Annual Difference		+\$11,655

Source(s): Authors' analysis of 2014-2016 ACS data (Ruggles et al., 2018) for employed workers with positive earnings who identify as males, are 35 years old or younger, and have a high school degree, GED, or some college experience but no degree.

This section utilizes IMPLAN to measure the impact of joint labor-management apprenticeship programs in construction on economic activity and employment in Minnesota every year. Considered the "gold standard" for economic impact modeling, IMPLAN is an input-output software that estimates the multiplier, or ripple effect, of changes in industry spending or household expenditures (Vowels, 2012). Two "events" are entered into the analysis– the \$29.8 million invested in training by the 10 largest construction apprenticeship programs and \$77.8 million in estimated net earnings by Minnesota’s construction apprentices over one year.¹

The largest joint labor-management apprenticeship programs in Minnesota’s construction industry generate substantial economic benefits to the state every year (Figure 10). The economic impact analysis estimates these registered apprenticeship programs save or create 1,450 total jobs

¹ This estimate is the multiplication of 6,676 average active construction apprentices in the 10 largest joint labor-management programs (Figure 8) by \$11,655 in net earnings per construction worker (Figure 9).

in Minnesota from program expenditures and net on-the-job earnings of apprentices. The cumulative impact of the 10 largest joint apprenticeship programs is a \$79.1 million boost to the state economy and \$6.5 million generated in state and local tax revenues every year. Comparing the impact on annual GDP to annual revenue reveals that the economic return on investment is \$2.66 per dollar spent by joint labor-management programs.

Figure 10: Annual Impact of Joint Labor-Management Apprenticeship Programs in Construction on Minnesota’s Economy

Metric	Impact
Employment (Jobs)	1,450
GDP (Value Added)	\$79,112,000
State and Local Tax Revenue	\$6,510,000

Source(s): Authors’ analysis of IMPLAN (2018) ; Form 990 data (ProPublica, 2017); 2014-2016 ACS (Ruggles et al., 2018). A local purchasing percentage of 95.18% is assumed because it is the share of construction work completed by in-state contractors (Manzo, 2017).

Registered apprenticeship programs have even larger impacts over an entire working career. Mathematica Policy Research reports that the average registered apprentice conservatively earns \$167,552 more in earnings and fringe benefits over the course of his or her career (in current dollars) due to his or her participation in a program. In addition, apprenticeship training reduces a construction worker’s chances of suffering long-term unemployment spells, reducing social safety net spending such as unemployment insurance and food stamps for skilled construction workers (Reed et al., 2012).

The economic return on investment from joint labor-management apprenticeship programs in construction is substantial (Figure 11). The aggregate impact of the 10 largest registered apprenticeship programs in Minnesota’s construction industry is a \$456.4 million increase in economic output to the state. As a result, while each cohort of apprentices returns \$2.66 per private training dollar invested over one year, the long-run impact is much higher. The economic return on investment from these joint labor-management construction programs is \$20.73 per dollar spent on worker training over 36 years. That is, every dollar contributed by a construction worker or contractor to skills development generates \$21 in long-run economic production for the Minnesota economy.

Figure 11: Long-Run Impact of Joint Labor-Management Apprenticeship Programs in Construction on Minnesota’s Economy

Metric	Economic Impact
Long-Run Effect on GDP (Value Added)	\$617,085,000
Annual GDP Return Per Dollar Invested	\$2.66
Long-Run GDP Return Per Dollar Invested	\$20.73

Source(s): Authors’ analysis of IMPLAN (2018) ; Form 990 data (ProPublica, 2017); 2014-2016 ACS (Ruggles et al., 2018). A local purchasing percentage of 95.18% is assumed because it is the share of construction work completed by in-state contractors (Manzo, 2017).

Construction Apprenticeships Compared to College Education in Minnesota

Through registered apprenticeship programs, the construction industry “operates the largest privately-financed system of higher education in the country” (Philips, 2014). In fact, if all registered apprenticeship programs were combined, they would be the 6th-largest post-secondary school in Minnesota, and the 3rd-largest private post-secondary educational institution after two online colleges (Figure 12). There are 11,455 active participants in Minnesota’s registered apprenticeship programs on average. This matches the total student enrollment at the public University of Minnesota Duluth (11,168 students) and exceeds the total student enrollment at the University of St. Thomas (9,878 students), a private college.

Figure 12: Registered Apprentices vs. Largest 4-Year Universities in Minnesota

Rank	Registered Apprenticeships vs. 4-Year Universities in Minnesota	Total Enrollment	Net Price Per Year (After Average Aid)	Private Rank
1	University of Minnesota Twin Cities	51,848	\$16,808	-
2	Walden University	49,680	\$14,706	1
3	Capella University	36,284	\$15,667	2
4	Saint Cloud State University	14,975	\$13,684	-
5	Minnesota State University, Mankato	14,712	\$13,704	-
6	Registered Apprenticeship Programs	11,455	\$0	3
7	University of Minnesota Duluth	11,168	\$16,381	-
8	University of St. Thomas	9,878	\$31,470	4
9	Metropolitan State University	8,148	\$13,954	-
10	Winona State University	7,981	\$16,678	-

Source(s): “Data and Statistics – Registered Apprenticeship National Results” (DOLETA, 2018); College Navigator (NCES, 2018).

The most important difference between a registered apprenticeship program and the pursuit of a bachelor’s degree is the cost of education assumed by the student (Figure 12). The average net price after federal, state, local government aid, institutional grants, and scholarships is nearly \$17,000 per year to attend the University of Minnesota-Twin Cities. Even the least-expensive major universities displayed in Figure 12 have annual costs of about \$13,700. Meanwhile, a registered apprentice in Minnesota has his or her instruction covered by employers and fellow workers.

For many young Minnesota workers, enrolling in a registered apprenticeship program is a better option than attending college or university. The opportunity to earn-while-they-learn, free from debt, entices thousands of young adults to enter the trades every year. Over the course of his or her career, the average registered apprentice improves his or her total earnings by \$167,552 after accounting for small out-of-pocket training costs in constant 2016 dollars. Assuming that any given individual works 36 years on average over the course of his or her lifetime, the net income gain from a registered apprenticeship program is \$4,652 annually (Figure 13).

The average apprentice in Minnesota earns \$4,654 in additional annual income from participating in a registered apprenticeship program. In Minnesota, this impact on earnings is greater than the average effect of many bachelor’s degrees. In particular, compared to a high school diploma,

bachelor's degrees in area, ethnic, and civilization studies (\$3,380), liberal arts and humanities (\$3,124), and fine arts (\$2,784) produce smaller annual income gains on average than registered apprenticeship programs. Furthermore, an apprenticeship program is typically a better financial decision than an associate's degree (\$2,199 per year). Note that the ranking of registered apprenticeships is compared to workers who have a bachelor's degree only in the specific field. For example, many teachers in Minnesota have master's degrees, which statistically returns another \$15,881 in additional in lifetime earnings. Nevertheless, economic data suggest that an apprenticeship program may be the best career path for many young individuals (Figure 13).

Figure 13: Income Gain from Registered Apprenticeship vs. Various Degrees, 2014-2016

Rank	Bachelor's Degree or Other Level of Educational Attainment	Annual Gain
1	Engineering	\$32,816
2	Mathematics and Statistics	\$30,962
3	Business and Economics	\$24,966
4	Physical Sciences	\$24,653
5	Computer and Information Sciences	\$22,735
6	Social Sciences	\$20,906
7	Biology and Life Sciences	\$19,425
8	Agriculture	\$18,929
9	Communications	\$14,816
10	Environment and Natural Resources	\$12,625
11	Medical and Health Sciences	\$11,421
12	Psychology	\$10,332
13	English and Literature	\$10,326
14	Public Affairs, Policy, and Social Work	\$9,893
15	Criminal Justice and Fire Protection	\$7,931
16	Linguistics and Foreign Languages	\$6,162
17	Education	\$5,459
18	Family and Consumer Sciences	\$5,101
19	Apprenticeship Program	\$4,654
20	Area, Ethnic, and Civilization Studies	\$3,380
21	Liberal Arts and Humanities	\$3,124
22	Fine Arts	\$2,784
--	Associate's Degree	\$2,199
--	<i>Master's Degree (net)</i>	<i>+\$15,881</i>
--	<i>Professional or Doctorate Degree (net)</i>	<i>+\$54,597</i>

Source(s): Authors' analysis of 2014-2016 ACS (Ruggles et al., 2018).

Implications

Apprenticeable Occupations in Other Industries

While the construction industry accounts for almost all registered apprentices in Minnesota, the economic benefits of registered apprenticeships could be expanded into many other sectors (Figure 14). The U.S. Department of Labor Employment and Training Administration lists over 1,000 “apprenticeable occupations,” of which only 121 are in construction (11.4 percent) (DOLETA, 2016). An apprenticeable occupation is any skilled trade that: “is (a) customarily learned in a practical way through a structured, systematic program of on-the-job supervised training; (b) is clearly identified and commonly recognized throughout an industry; (c) involves manual, mechanical or technical skills and knowledge that require a minimum of 2,000 hours of on-the-job supervised training; and (d) requires related instruction to supplement the on-the-job training” (OregonLaws, 2016).

Most of the listed apprenticeable occupations involve similar hours of training as a construction trade (Figure 14). The average hours needed to complete a construction apprenticeship is 6,120 hours, while the average time to complete an accredited non-construction program is 5,631 hours. Examples of apprenticeable occupations include paralegals (6,000 hours), laboratory testers (4,000 hours), nurse assistants (2,000 hours), veterinary technicians (2,000 hours), and corrections officers (2,000 hours).

Figure 14: “Apprenticeable Occupations” By Occupation Type and Program Term

DOLETA Determination	Construction	Non-Construction
Number of Apprenticeable Occupations	121	937
Average Hours of Training Required	6,120	5,630
Median Hours of Training Required	6,000	6,000
Construction Share of Apprenticeable Occupations	11.4%	

Source(s): DOLETA (2016) – “Available Occupations.”

Four Policy Recommendations

There is substantial opportunity and an increasing need for apprenticeship programs in Minnesota to improve worker productivity and provide middle-class employment opportunities for workers who are unable to go to college. Construction apprenticeship programs return \$3 in annual economic output per dollar invested and \$21 per dollar in long-run economic benefits. To advance entire industries and grow the state economy, steps should be taken to encourage employers to privately finance registered apprenticeship programs.

The reason why apprenticeship programs are not more widespread in Minnesota, and in the United States more broadly, is that there are significant barriers (Olinsky & Ayers, 2013). One barrier is an information problem: many Americans mistakenly think that apprenticeship programs are only appropriate for the construction trades and other historically male-dominated

occupations. Another is the long-term decline in union membership. As demonstrated throughout this report, unions have played an important role in offering training programs. In fact, there has been a very strong correlation (0.87) between active apprenticeship programs and union membership rates in America (Olinsky & Ayers, 2013). Declining unionization has coincided with weaker apprenticeship systems. Finally, a third major barrier is the high startup and operational costs to employers of having an apprenticeship program. Employers may also worry that a worker who completes their registered apprenticeship program will leverage their new skills into a better position at a competing firm.

The State of Minnesota can enact at least four policies to promote apprenticeship programs:

1. **Boost funding for the Minnesota Apprenticeship Initiative** – This initiative expands and builds new registered apprenticeship programs in five industries: advanced manufacturing, agriculture, healthcare, information technology, and transportation (Minnesota DEED, 2018b). Future campaigns should engage businesses, demonstrating the value that an initial investment in human capital can have on worker productivity, worker morale, and the bottom line. The state should also target women and people of color in disadvantaged neighborhoods to educate them on the personal benefits of becoming an apprentice.
2. **Expand access to child care programs** – Female apprentices report that the lack of access to affordable child care is a barrier to participating in registered apprenticeship programs. In construction, for example, apprentices often wake up very early to travel to a worksite, receive on-the-job training all day, and then attend classroom instruction after work (Reed et al., 2012). Expanding publicly-provided child care has also been found to support parents entering the workforce overall, so this policy change would have broader economic benefits to Minnesota (Kleven, 2014).
3. **Expand pre-apprenticeship programs in public high schools** – The State of Minnesota should work with existing apprenticeship programs to increase pre-apprenticeship training course offerings at public high schools, especially in low-income communities. These partnerships would offer workplace skills training, information about careers in apprenticeable occupations, and occupation-specific training (Olinsky & Ayers, 2013).
4. **Support policies that increase apprenticeship investment** – Trades unions have historically been at the forefront of worker apprenticeship programs. Joint labor-management programs in Minnesota train 93 percent of the state's construction apprentices and provide nearly all of the investment in the industry. Similarly, state prevailing wage laws are associated with increased apprenticeship training and improved worker productivity. As union membership has declined nationally and prevailing wage laws have been weakened or repealed, apprenticeship training has fallen. The State of Minnesota should promote unionization and seek to strengthen prevailing wage in order to boost participation in joint labor-management apprenticeship programs because career technology education and government initiatives are neither scalable nor sufficient to meet workforce development needs (Littlehale, 2019).

Conclusion

For many young Minnesota workers, enrolling in a registered apprenticeship program is a better option than attending college or university. The annual income gain from participating in a registered apprenticeship program is about \$4,700, greater than the average effect of having an associate's degree (\$2,200 per year) and many bachelor's degrees— including liberal arts and humanities (\$3,100 per year) and fine arts (\$2,800 per year).

If all registered apprenticeship programs were combined, they would be the 3rd-largest private post-secondary educational institution in Minnesota. There are more than 11,000 active apprentices in Minnesota. In construction, these programs invest over \$30 million in worker skills upgrading and development.

Joint labor-management apprenticeship programs account for the vast majority of human capital investment in Minnesota's construction industry. Fully 93 percent of all active construction apprentices are enrolled in joint programs. The 10 largest joint programs invest 100 times more in worker training than the Associated Builders and Contractors of Minnesota and North Dakota.

Joint labor-management apprenticeship programs in construction industry boost the Minnesota economy. The 10 largest joint programs create nearly 1,500 jobs and annually grow the economy by \$79 million per year— a \$3 return on investment. Over the long run, the 10 largest joint programs in Minnesota's construction industry provide \$617 million in economic value— an economic return on investment of \$21 per dollar invested.

The economic benefits of registered apprenticeships could be expanded into many sectors other than construction. Only 11 percent of the 1,060 "apprenticeable occupations" are in construction. From fast-growing occupations such as nurse assistants and laboratory testors to traditional occupations like machinists and corrections officers, there is substantial opportunity and an increasing need for apprenticeship programs to improve worker productivity, support the middle class, and grow the economy.

To promote registered apprenticeship programs, the State of Minnesota should boost funding for the Minnesota Apprenticeship initiative, expand access to child care programs to boost female participation, expand pre-apprenticeship programs in public high schools; and support policies that increase unionization and strengthen prevailing wage.

Apprenticeship programs have positive impacts on Minnesota. The programs support workers by improving their skills and growing their incomes. The programs also benefit employers by addressing skills shortages through a supply of safe, productive workers. Finally, apprenticeship programs in construction provide value to taxpayers by ensuring high-quality infrastructure and a strong economy.

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