Apprenticeship Training in Iowa

Enrollment, Completion Rates, and Earnings of Registered Apprentices in Iowa

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Executive Summary

Registered apprenticeships are training programs in which participants get the opportunity to "earn while they learn" with tuition costs covered by employers or joint labor-management organizations, who gain access to a stable pool of skilled workers. Apprenticeship training is particularly important in construction.

Joint labor-management apprenticeship programs account for the majority of registered apprentices in Iowa's construction industry.

- Joint labor-management programs are cooperatively administered and have standards, wages, and "cents per hour" contributions that are negotiated privately between contractors and unions.
- Between 2010 and 2017, nearly 6,300 construction apprentices (55 percent) were enrolled in joint labor-management programs compared to about 5,100 in employer-only programs (45 percent).
- Joint construction programs enrolled 70 percent of all women, 68 percent of all Black or African American apprentices, 63 percent of all Latinx or Hispanic apprentices, and 61 percent of all veterans.

Joint construction apprenticeship programs require 30 percent more hours of training to graduate than bachelor's degree programs and 161 percent more hours than associate degree programs.

- On average, apprentices in joint construction programs are required to complete more than 7,500 hours of on-the-job and classroom training.
- By contrast, a bachelor's degree at Iowa's three public universities requires about 5,800 hours and a 60-credit associate degree from Iowa's community colleges requires about 2,900 hours.
- After accounting for trade and year of enrollment, joint construction programs require nearly 1,200 more hours of training than employer-only construction programs.

Joint construction programs have higher completion rates than employer-only construction programs.

- Joint construction programs have a 60 percent completion rate.
- The graduation rate was 73 percent at public universities, 64 percent at nonprofit universities, and 61 percent at for-profit four-year institutions but just 26 percent at the state's community colleges.
- After accounting for demographics, trade, and year of enrollment, apprentices in joint construction programs are 28 percent more likely to graduate than those in employer-only construction programs.

Joint labor-management apprenticeship programs deliver middle-class careers in the construction trades.

- The average exit wage is $23 per hour for registered apprentices from joint construction programs.
- The mid-career wage of all Iowa workers with associate degrees also averages $23 per hour.
- After accounting demographics, trade, and year of enrollment, a registered apprentice earns about $10 more per hour if he or she graduates from a joint labor-management program in construction.

Registered apprenticeship programs could be encouraged as a viable alternative to college in Iowa.

- Apprenticeship readiness programs could be expanded into Iowa's high schools.
- The State of Iowa could educate students, teachers, parents, and counselors about apprenticeship programs to remove any perceived stigma associated with choosing trade schools over college.
- Iowa could expand access to child care programs, a significant barrier for women in the trades.
- Iowa could link apprenticeship training with growing investments in clean energy infrastructure.
- Iowa could enact a prevailing wage law to increase apprenticeship training in construction.

A registered apprenticeship program offers a viable alternative to college for Iowa's youth. In particular, joint labor-management apprenticeship programs in the construction trades have rigorous programs with training hours, graduation rates, and competitive earnings that rival institutions of higher education in Iowa.

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About the Authors

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Introduction

Economic and social science research finds that investing in infrastructure and education are the most effective public policies at boosting employment and growing the economy. For every dollar increase in infrastructure spending, the U.S. economy grows by between $1.57 and $2.20 (Zandi, 2010; Arnon et al., 2020). Similarly, an extra year of education increases an individual's earnings by up to 10 percent and boosts economic growth (Stevens & Weale, 2003; Barro, 1997). Research has found that a 10 percent increase in spending on public education increases the likelihood of graduating high school by 7 percent, improves the future wages of students by 7 percent, and reduces their chances of living in poverty once they hit adulthood by 4 percent (Baker, 2018; Jackson et al., 2015).

However, additional education through four-year college degrees is not the only option for young people. Registered apprenticeships are training programs that help businesses in Iowa find skilled workers who are in high demand. Participating apprentices get the opportunity to "earn while they learn" with minimal or no out-of-pocket costs. Employers, joint labor-management organizations, and unions all sponsor apprenticeship programs, covering tuition costs and offering structured, on-the-job training and certified classroom instruction tailored to meet the needs of employers. In return for this significant investment, businesses in Iowa gain access to a stable pool of skilled workers who meet industry standards for productivity and safety. By developing workers with in-demand skills, apprenticeship programs create pathways into middle-class careers for young adults who are unable or unwilling to go to college. There are currently more than 7,700 active apprentices in Iowa (DOLETA, 2021).

Economic research finds that registered apprenticeship programs have positive economic impacts. Countries that have more widespread usage of apprenticeship programs are more successful at transitioning young workers into stable jobs, resulting in lower unemployment rates (Bertschy et al., 2009; Ryan, 2001; Ryan, 1998). In Germany, where these programs are especially prevalent, apprenticeships have been found to increase a worker's wages by 8 percent per year (Clark & Fahr, 2002). In the United States, participants in registered apprenticeship programs earn about $124,000 more in wages and fringe benefits over their careers than similar non-participants (Reed et al., 2012).

Apprenticeship training is particularly important to the construction industry in the United States. 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 cooperatively administered by labor unions and signatory employers. Joint labor-management programs account for 97 percent of all active construction apprentices in Illinois, 94 percent in Indiana, 93 percent in Minnesota, 82 percent in Ohio, 82 percent in Wisconsin, 79 percent in Kentucky, 78 percent in Michigan, and 63 percent in Oregon (Manzo & Bruno, 2020; Philips, 2015a; Manzo & Duncan, 2018; Onsarigo et al., 2017; Philips, 2015b; Duncan & Manzo, 2016; Bilginsoy, 2017; Stepick & Manzo, 2021).

This report, authored by the Midwest Economic Policy Institute, evaluates enrollment, training requirements, completion rates, and average earnings for construction apprentices in Iowa. These outcomes are contrasted with public universities and community colleges to compare apprenticeship as an alternative post-secondary option in Iowa. Joint labor-management programs are also compared with employer-only programs in construction. Lastly, the report discusses potential policy considerations for Iowa before a concluding section recaps key findings.

Data and Methodology

The Registered Apprenticeship Partners Information Management Data System (RAPIDS) is a database of information on apprenticeship programs from participating states—including Iowa—that is collected and released by U.S. Department of Labor Employment and Training Administration (DOLETA). Apprenticeship programs are registered with the U.S. Department of Labor, which sets quality standards. DOLETA provides employers and unions with technical assistance in establishing and operating effective training programs.

This report evaluates RAPIDS apprenticeship data for apprentices who started their training from the beginning of 2010 through the end of 2017, which allows for at least three years of data to assess outcomes for each apprentice (DOLETA, 2021). Figure 1 presents a breakdown of all apprentices enrolled in USDOL-approved programs over the eight-year period. In total, the DOLETA dataset includes information on more than 25,000 individuals who became apprentices in Iowa between 2010 and 2017 (Figure 1).

About half of all apprenticeship programs in Iowa are focused on careers in the construction trades (Figure 1). Nearly 11,400 registered apprentices in Iowa were enrolled in construction apprenticeship programs between 2010 and 2017, accounting for 46 percent of all registered apprentices in the state. While construction is the largest industry that invests in apprenticeship programs, Iowa apprentices also trained for careers in the transportation and warehousing, utilities, manufacturing, and educational services sectors.

Apprenticeship programs are sponsored either jointly by labor unions and employers that are signatories to collective bargaining agreements (joint labor-management programs) or unilaterally by employers. Joint labor-management programs are cooperatively administered with standards, trainee wages, and apprentice-to-worker ratios established in collective bargaining agreements. By contrast, employer-only programs are sponsored by a single employer or group of employers—usually through a trade association—who unilaterally determine program content, set entry requirements, and monitor trainee progress.

The majority of Iowa's construction apprentices are enrolled in joint labor-management apprenticeship programs (Figure 1). According to the RAPIDS data, joint labor-management apprenticeship programs enrolled nearly 6,300 registered apprentices between 2010 and 2017, accounting for 25 percent of all apprentices across Iowa. Employer-only apprenticeship programs had about 5,100 registered apprentices, representing another 20 percent. Within the construction industry, joint labor-management apprenticeship programs accounted for 55 percent of all registered apprenticeships in Iowa.

FIGURE 1: STATISTICS ON REGISTERED APPRENTICES ENROLLED BY PROGRAM TYPE AND INDUSTRY IN IOWA, 2010-2017

Type of Registered Apprenticeship Program	Enrolled Apprentices	Share of Apprentices
Joint Labor-Management Program in Construction	6,294	25.2%
Employer-Only Construction Program	5,097	20.4%
All Other Non-Construction Programs*	13,622	54.5%
Total for All Registered Apprenticeship Programs	**25,013**	**100.0%**
Joint Labor-Management Share of Construction Apprenticeships		*55.3%*

Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021).
*In addition to the 11,391 apprentices in construction, others major industries with apprentices in Iowa include transportation and warehousing (n= 9,184), utilities (n= 2,492), manufacturing (n= 647), and educational services (n= 393).

This report also details higher education statistics for universities and community colleges in Iowa. The Iowa College Student Aid Commission periodically releases reports on student and faculty diversity, including recently for college students enrolled in Fall 2017 (Iowa College Aid, 2018). In 2020, the Iowa College Student

Aid Commission also released a report on the condition of Iowa's higher education system that includes data on graduation rates at universities and community colleges (Iowa College Aid, 2020).

Finally, this report utilizes the *Current Population Survey Outgoing Rotation Groups* (CPS ORG), which is conducted and released by the Bureau of Labor Statistics (BLS) at the U.S. Department of Labor. The CPS ORG data reports individual-level information on 25,000 respondents nationwide each month. The records include data on wages, hours worked, industry, and occupation as well as other demographic, geographic, education, and work variables (CEPR, 2020). CPS ORG information is used to compare entry wages for trainees and journey-level wages for apprenticeship program graduates to comparable earnings for those with associate degrees and bachelor's degrees.

Enrollment in Apprenticeship Programs, Public Universities, and Community Colleges

Joint labor-management programs train about 6-in-10 registered construction apprentices (Figure 2). Between 2010 and 2017, joint labor-management programs enrolled 55 percent of all registered apprentices in the construction trades. Joint labor-management programs accounted for 55 percent of all male apprentices and 70 percent of all women apprentices in construction. These programs registered 54 percent of all White apprentices, 68 percent of all Black or African American apprentices, and 63 percent of all Latinx or Hispanic apprentices. Joint construction programs also trained 61 percent of military veterans.

FIGURE 2: DEMOGRAPHIC CHARACTERISTICS OF CONSTRUCTION APPRENTICES IN IOWA, BY TYPE OF PROGRAM, 2010-2017

Enrollment of Construction Apprentices, 2010-2017	Joint Labor-Management Programs	Employer-Only Programs	Total for All Programs	Joint Share
Total (All Apprentices)	**6,294**	**5,097**	**11,391**	**55.3%**
Gender Identification: Man	6,160	5,040	11,200	**55.0%**
Gender Identification: Woman	134	57	191	**70.2%**
Race: White	5,077	4,310	9,391	**54.1%**
Race: Black or African American	221	104	325	**68.0%**
Race: Latinx or Hispanic	134	57	191	**62.5%**
Status: Military Veteran	669	426	1,095	**61.1%**

Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021).

FIGURE 3: DEMOGRAPHIC SHARES OF CONSTRUCTION APPRENTICES BY TYPE OF PROGRAM IN IOWA, 2010-2017

Diversity of Construction of Apprentices, 2010-2017	Share of Apprentices in Joint Labor-Management Programs	Share of Apprentices in Employer-Only Programs	Joint Difference
Gender Identification: Man	97.9%	98.9%	**-1.0%**
Gender Identification: Woman	2.1%	1.1%	**+1.0%**
Race: White	80.7%	84.6%	**-3.9%**
Race: Black or African American	3.5%	2.0%	**+1.5%**
Race: Latinx or Hispanic	6.4%	4.7%	**+1.6%**
Status: Military Veteran	10.6%	8.4%	**+2.3%**

Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021).

Joint labor-management construction programs in Iowa are more diverse than employer-only programs, such as those affiliated with the Associated Builders and Contractors (ABC) (Figure 3). The share of registered apprentices who are women is 1 percent higher in joint construction programs. The shares of registered apprentices who are Black or African American and Latinx or Hispanic are 2 percent higher, while the share

who are White alone is 4 percent lower. In addition, a higher share of enrolled apprentices were military veterans in joint construction programs (11 percent) than in employer-only programs (8 percent).

Although joint labor-management apprenticeship programs in construction can take steps to improve the diversity of their apprenticeship classes, their racial and ethnic diversity approaches public universities and community colleges in Iowa (Figure 4). Both the Black or African American share (4 percent) and the Latinx or Hispanic share (6 percent) of apprentices in joint construction programs are around 1 percent lower than the share of students at public universities and community colleges in Iowa—at 5 percent for Black or African American students and 7 percent for Latinx or Hispanic students, respectfully. The share of White graduates is higher in joint construction programs (81 percent) than public universities and community colleges (74 percent), but that is partially because the share of graduates from all other racial and ethnic backgrounds is higher in public universities and community colleges (13 percent) than joint construction programs (10 percent). Across Iowa, joint construction programs are slightly less diverse than public universities and community colleges but are more diverse than employer-only construction programs.

FIGURE 4: TOTAL NUMBER AND SHARES OF ENROLLED PARTICIPANTS BY HIGHER EDUCATION PROGRAM IN IOWA, 2017

Diversity of Participants Enrolled in Higher Education Classes by Program, 2017	Apprentices in Joint Labor-Management Programs in Construction		Non-International Students in Iowa's Public Universities and Community Colleges	
	Number	Share	Number	Share
All Higher Education Enrollment	**6,294**	**100.0%**	**146,238**	**100.0%**
White	5,077	80.7%	108,798	74.4%
Black or African American	221	3.5%	7,777	5.3%
Latinx or Hispanic	401	6.4%	10,163	6.9%
Other Race (or Unknown)	595	9.5%	19,500	13.3%

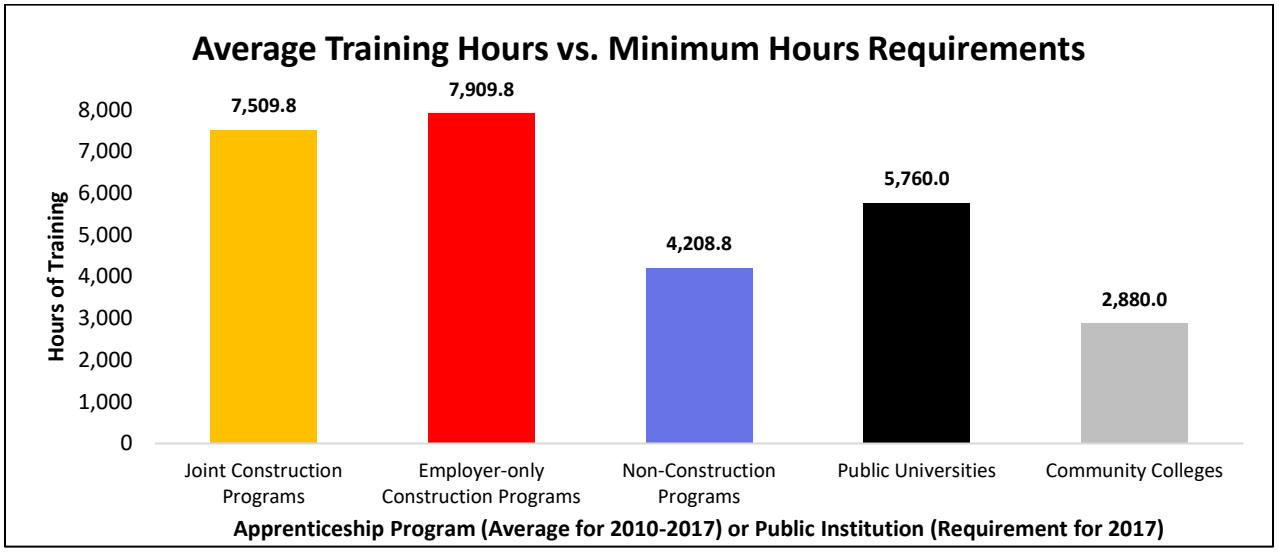
Source(s): Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021) and data from the Iowa College Aid's "Student & Faculty Diversity Report" (2018).

Hours Requirements for Apprenticeship Programs, Universities, and Community Colleges

Building high-quality infrastructure that is both safe and durable requires a skilled workforce. Accordingly, many registered apprenticeship programs are very rigorous in Iowa, providing thousands of hours of classroom and on-the-job training to boost workers' skills. On average, registered apprentices enrolled in joint labor-management programs in construction are required to complete about 7,500 hours of classroom and on-the-job training (Figure 5). By contrast, the typical 120-credit hour bachelor's degree at public universities in Iowa—such as Iowa State University—requires a minimum of about 5,800 "contact hours" (e.g., lectures and lab times) and "preparation hours" (e.g., homework and fieldwork) and the typical 60-credit hour associate degree at Iowa's community colleges—such as Iowa Central Community College—requires about 2,900 total hours (Iowa State University, 2021; Iowa Central Community College, 2021).[1] Joint labor-management apprenticeship programs in construction thus require 30 percent more hours of training to graduate than four-year universities and 161 percent more hours than two-year colleges.

[1] At Iowa State University, "[e]ach credit is normally earned by attending one (50-minute) hour of lecture per week for the entire 16-week semester, or by attending a laboratory or studio period of two or three hours per week. As a guideline, undergraduate students typically will be expected to spend two hours in preparation outside of class for each lecture hour." Three total contact and preparation hours multiplied by 120 credit hours over 16 weeks equals 5,760 total hours.

FIGURE 5: HOURS OF APPRENTICESHIP TRAINING VS. MINIMUM REQUIREMENTS TO GRADUATE FROM PUBLIC INSTITUTIONS



Source(s): RAPIDS data for apprenticeships in Iowa between 2010 and 2017 by the Office of Apprenticeship at the U.S. Department of Labor; "Information About Courses" at Iowa State University (Iowa State University, 2021); "Academics" at Iowa Central Community College (Iowa Central Community College, 2021).

Apprentices in employer-only construction programs report that their programs require an average of about 7,900 hours, slightly higher than their joint labor-management counterparts (Figure 5). However, the reason is that the majority of apprentices in employer-only construction programs are training to become electricians—a craft that generally requires a significant amount of training hours (Figure 6). Joint labor-management programs provide a more complete array of training, with programs ranging from laborers to operating engineers. On the other hand, employer-only programs are more concentrated in training for electricians, which is responsible for 53 percent of total employer-only apprentices. Employer-only construction programs also train little to no carpenters, operating engineers, painters, roofers, and ironworkers. When evaluating the number of years required to complete an apprenticeship program, joint construction programs average 4.0 years compared with 3.5 years for employer-only construction programs.

FIGURE 6: SHARE OF REGISTERED APPRENTICES BY CONSTRUCTION TRADE BY TYPE OF PROGRAM, 2010-2017

Construction Trade	Percent of Apprentices by Programs	
	Joint Programs	Employer-Only Programs
Number of Apprentices	**6,294**	**5,097**
Carpenters	20.1%	0.0%
Laborers	6.3%	1.2%
Electricians	18.0%	53.4%
HVAC	1.7%	20.8%
Operating Engineers	3.7%	0.1%
Plumbers and Pipefitters	15.6%	19.7%
Painters	27.8%	0.0%
Roofers	39.1%	0.0%
Sheet Metal Workers	4.5%	2.7%
Ironworkers	7.0%	0.0%
Average Years to Complete Program	***4.0 years***	***3.5 years***

Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021).

Using a statistical tool called a "regression" that can isolate the impact of type of program sponsor from other factors, joint labor-management programs in construction statistically have more rigorous term lengths. An apples-to-apples comparison reveals that a registered apprentice enrolled in a joint construction program in Iowa is required to complete nearly 1,200 more hours, on average, than a comparable apprentice who started in the same year and is training for the same trade in an employer-only program. This result is significant at the 99-percent level of statistical confidence (Figure 7).

FIGURE 7: REGRESSION ON THE HOURS REQUIRED TO COMPLETE TRAINING FOR A CONSTRUCTION APPRENTICE IN IOWA

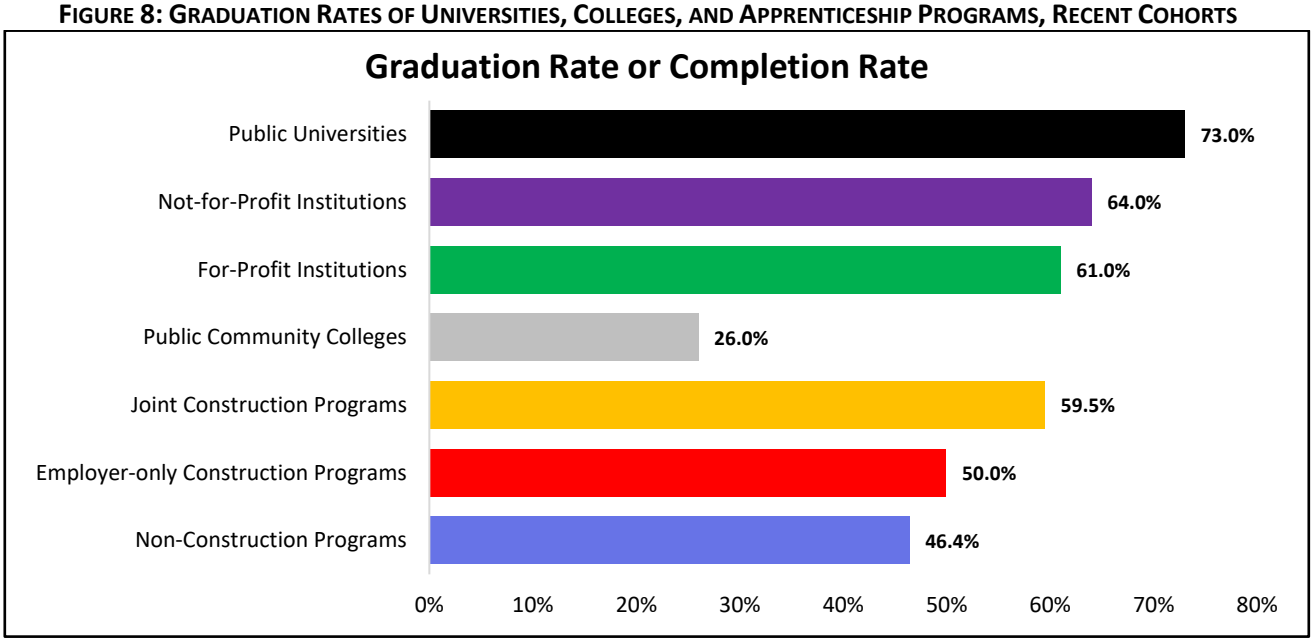
Robust OLS Regression of Hours Required to Complete Training for a Construction Apprentice	Average Effect on Hours	(Standard Error)
Joint Labor-Management Program	**+1,151.84*** **	**(22.43)**
Trade: Carpenter	-216.08***	(73.78)
Trade: Laborer	-2,499.27***	(65.35)
Trade: Electrician	+2,277.30***	(66.85)
Trade: HVAC	+2,177.77***	(67.39)
Trade: Operating Engineer	-1,969.96***	(90.09)
Trade: Plumber and Pipefitter	+2,350.65***	(65.76)
Trade: Painter	+275.24***	(96.64)
Trade: Roofer	-961.92***	(93.66)
Trade: Sheet Metal Worker	+2,749.69***	(68.27)
Trade: Ironworker	-109.56	(76.59)
Year Enrolled: 2011	-6.26	(39.84)
Year Enrolled: 2012	-15.31	(33.70)
Year Enrolled: 2013	-123.16***	(37.85)
Year Enrolled: 2014	-120.16***	(27.15)
Year Enrolled: 2015	-90.91	(58.62)
Year Enrolled: 2016	-142.34***	(31.64)
Year Enrolled: 2017	-218.16***	(34.78)
Constant (Baseline)	5,839.81***	(69.16)

Source(s): Authors' analysis of RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021). ***p≤|0.01|; **p≤|0.05|; *p≤|0.10|; N= 11,389; R^2= 0.629.

Graduation Rates for Apprenticeship Programs, Universities, and Community Colleges

Joint labor-management apprenticeship programs in construction have completion rates that approach the graduation rates of Iowa's four-year universities (Figure 8). The Iowa College Student Aid Commission recently published data on higher-education graduation rates in the *Condition of Higher Education in Iowa: 2020* report. The data is for students who completed their degrees within 150 percent of the expected time, or six years for bachelor's degree programs and three years for associate degrees. The report includes information through the 2011 cohort, meaning that the six-year graduation rate data run through the end of 2017—which corresponds to the DOLETA apprenticeship data (Iowa College Aid, 2020). Since the typical apprentice must complete the equivalent of four years to graduate and become a journeyworker, the six-year completion rate for apprenticeship programs is assessed and contrasted with six-year graduation rates at Iowa's universities and three-year graduation rates at Iowa's community colleges. The analysis is limited to the incoming classes of 2010 through 2012 because an individual entering an apprenticeship program in January 2012 would have had six full years to complete the program by December 2017.

FIGURE 8: GRADUATION RATES OF UNIVERSITIES, COLLEGES, AND APPRENTICESHIP PROGRAMS, RECENT COHORTS



Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration, with only apprentices enrolled between 2010 and 2012 analyzed to assess the six-year completion rate (DOLETA, 2021); data on the freshmen class of 2011 from the *Condition of Higher Education in Iowa: 2020* by the Iowa College Student Aid Commission (Iowa College Aid, 2020).

Joint labor-management construction programs have a completion rate of about 60 percent (Figure 8). This completion rate is on par with the six-year graduation rates of 61 percent for for-profit institutions, such as the Purdue University Global online school, and 64 percent for not-for-profit universities, such as Drake University. While joint construction programs have a completion rate that is below the 73 percent graduation rate of Iowa's three public universities, it greatly exceeds the 26 percent graduation rate reported by the state's community colleges. With graduation rates that approach most four-year universities and beat out community colleges, joint labor-management apprenticeship programs in construction are a strong alternative for young individuals seeking to build an in-demand skillset upon graduating high school.

Employer-only construction programs recorded a lower completion rate than joint construction programs (Figure 8). Employer-only construction programs graduate half of their trainees (50 percent). The completion rate for employer-only construction programs is between 11 percent and 23 percent below the comparable rates posted by four-year universities in the state.

Another statistical tool called a "probit regression" is utilized to examine which factors impact the probability that an individual apprentice will graduate from a construction training program. After accounting for age, racial background, gender identification, veteran status, trade, and start year, the factor that statistically has the greatest impact on whether an individual successfully completes a construction apprenticeship program in Iowa is whether his or her program was sponsored jointly by contractors and unions (Figure 9). Registered apprentices are 28 percent more likely to graduate, on average, if they are enrolled in joint labor-management apprenticeship programs. This result is significant at the 99-percent level of statistical confidence.

The data exposes a stark contrast between joint labor-management programs and employer-only programs in construction. Completion rates are a measure of performance because registered apprentices gain journeyworker-level recognition for their hard work and their study in the form of pay increases. High completion rates also mean that apprenticeship programs have successfully expended resources to train skilled workers. Low completion rates, on the other hand, represent an inefficient use of resources, with

programs not recruiting, screening, and admitting committed trainees and not adequately delivering qualified craft employees for employers. For both workers and contractors, the data shows that joint programs are more successful than employer-only programs.

FIGURE 9: PROBIT REGRESSION ON THE PROBABILITY OF A CONSTRUCTION APPRENTICE COMPLETING TRAINING IN IOWA

Probability of a Registered Apprentice Completing a Construction Apprenticeship Program	Average Marginal Effect on Completion Rate	(Standard Error)
Joint Labor-Management Program	**+0.2751*** **	**(0.022)**
Demographic: Age at Enrollment	-0.0013	(0.001)
Demographic: White	+0.0232	(0.030)
Demographic: Black or African American	-0.0528	(0.075)
Demographic: Latinx or Hispanic	-0.0885*	(0.050)
Demographic: Woman	-0.1819**	(0.081)
Demographic: Military Veteran	-0.1044***	(0.031)
Trade: Carpenter	-0.1511***	(0.040)
Trade: Laborer	-0.2785***	(0.054)
Trade: Electrician	+0.1578***	(0.034)
Trade: HVAC	+0.2145***	(0.042)
Trade: Operating Engineer	-0.0744	(0.079)
Trade: Plumber and Pipefitter	+0.1815***	(0.037)
Trade: Painter	-0.0490	(0.064)
Trade: Roofer	-0.4088***	(0.058)
Trade: Sheet Metal Worker	+0.1409***	(0.049)
Trade: Ironworker	-0.0365	(0.051)
Year Enrolled: 2011	-0.0040	(0.023)
Year Enrolled: 2012	+0.0328	(0.022)
Constant (Baseline)	0.5476***	(0.009)

Source(s): Authors' analysis of RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration, with only apprentices enrolled between 2010 and 2012 analyzed (DOLETA, 2021). ***p≤|0.01|; **p≤|0.05|; *p≤|0.10|; N= 3,112; Pseudo R^2= 0.068.

The Hourly Earnings of Apprentices Compared with College-Educated Workers

Registered apprentices in joint labor-management construction programs earn higher training wages than apprentices in employer-only construction programs (Figure 10). At the time of entry, the average registered apprentice in joint construction programs earns $16 per hour. First-year apprentices in joint construction programs earn 17 percent more than their counterparts in employer-only construction programs ($14 per hour). Apprentices in all other non-construction programs start out at $14 per hour on average.

The earnings growth potential is also higher for registered apprentices in joint construction programs (Figure 10). Upon completion, the average worker graduating from a joint labor-management construction program earns $23 per hour, about a 47 percent increase over the entry wage. By contrast, the average exit wage of an apprentice enrolled in an employer-only construction program is only $17 per hour, a wage growth of 28 percent. Union journeyworkers earn 34 percent more per hour than those who graduate from employer-only programs, creating a strong financial incentive for high-quality candidates to apply for and complete the more rigorous joint labor-management construction programs.

FIGURE 10: AVERAGE WAGES FOR IOWA WORKERS BY APPRENTICESHIP PROGRAM OR LEVEL OF EDUCATION, 2010-2017

Average Wage by Program or Education	Starting Wage	Mid-Career Wage
Apprenticeship Program	Start Wage	Exit Wage
Joint Labor-Management Construction Apprentices	$15.82	$23.24
Employer-Only Construction Apprentices	$13.55	$17.38
All Other Non-Construction Registered Apprentices	$13.52	$16.33
Educational Degree	Real Wage: Ages 16-30	Real Wage: Ages 31-60
Workers with Only High School Diplomas or GEDs	$14.24	$20.70
Workers with Associate Degrees	$17.06	$23.23
Workers with Bachelor's Degrees	$21.31	$31.99
Workers with Advanced Degrees	$26.36	$37.80

Source(s): Source(s): RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021) and 2010-2017 data for Iowa from the *Current Population Survey Outgoing Rotation Groups* by the Bureau of Labor Statistics (CEPR, 2020).

FIGURE 11: REGRESSION ON THE AVERAGE EXIT WAGE OF A CONSTRUCTION APPRENTICE COMPLETING TRAINING IN IOWA

Robust OLS Regression of a Hours Required to Complete Training for a Construction Apprentice	Average Effect on Exit Wage	(Standard Error)
Joint Labor-Management Program	**+$9.93*** **	**(0.22)**
Demographic: Age at Enrollment	$0.03***	(0.01)
Demographic: White	$0.64***	(0.21)
Demographic: Black or African American	-$1.12***	(0.37)
Demographic: Latinx or Hispanic	+$0.12	(0.32)
Demographic: Woman	-$1.83***	(0.50)
Demographic: Military Veteran	-$0.54**	(0.22)
Trade: Carpenter	-$3.77***	(0.29)
Trade: Laborer	-$3.39***	(0.36)
Trade: Electrician	+$3.63***	(0.24)
Trade: HVAC	+$4.01***	(0.36)
Trade: Operating Engineer	-$3.58***	(0.31)
Trade: Plumber and Pipefitter	+$5.17***	(0.34)
Trade: Painter	-$3.96***	(0.59)
Trade: Roofer	-$6.79***	(0.42)
Trade: Sheet Metal Worker	+$3.12***	(0.46)
Trade: Ironworker	+$0.30	(0.34)
Year Enrolled: 2011	-$0.06	(0.27)
Year Enrolled: 2012	+$0.06	(0.26)
Year Enrolled: 2013	+$0.22	(0.27)
Year Enrolled: 2014	+$1.34***	(0.23)
Year Enrolled: 2015	+$1.05***	(0.38)
Year Enrolled: 2016	+$0.71***	(0.26)
Year Enrolled: 2017	+$0.20	(0.30)
Constant (Baseline)	$11.61***	(0.47)

Source(s): Authors' analysis of RAPIDS data for Iowa from 2010 to 2017 by the U.S. Department of Labor Employment and Training Administration (DOLETA, 2021). ***p≤|0.01|; **p≤|0.05|; *p≤|0.10|; N= 9,429; R^2= 0.336. A regression of the natural logarithm of the exit wage produced similar results, but had less statistical power with an R^2 of just 0.287.

Joint labor-management programs in construction offer an alternative for skilled workers in Iowa to earn a competitive wage (Figure 10). Right away, first-year apprentices in joint construction programs earn 11 percent more per hour ($16 per hour), on average, than young Iowa workers with only high school diplomas ($14 per hour). While the average mid-career earnings for those with bachelor's degrees amount to $32 per hour, the average wage for journeyworkers who complete joint construction programs ($23 per hour) compares favorably to mid-career hourly incomes for Iowa workers with associate degrees ($23 per hour). It is worth noting that construction apprentices get the opportunity to "earn while they learn" with minimal or no out-of-pocket costs. The average debt for student borrowers in Iowa is $30,800 (Hanson, 2021). Construction apprentices in joint labor-management programs across Iowa are able to earn comparable wages to those with associate degrees without incurring any of the student loan debt.

A final regression is employed to assess the unique and independent effect that a joint labor-management program has on a construction apprentice's exit wage upon completing his or her training. After accounting for age, racial background, gender identification, veteran status, trade, and start year, a registered apprentice earns an average of $10 more per hour if he or she graduates from a joint labor-management program in construction (Figure 11). This result is significant at the 99-percent level of statistical confidence.

Potential Policy Considerations for Iowa

Not all young people are able or willing to go to college. For many, the path to the middle class is through registered apprenticeship programs, particularly in the construction trades. Registered apprenticeship programs could be expanded to enhance worker skills, improve productivity and safety, and raise wages in Iowa. High schools and community colleges, private apprenticeship programs, and elected officials can all take steps to encourage apprenticeship programs as a viable alternative to college for Iowa's youth.

First, apprenticeship readiness programs could be both expanded across Iowa. The State of Iowa could partner with existing apprenticeship readiness programs to increase training course offerings in apprencticeable occupations at public high schools and community colleges (Olinsky & Ayers, 2013). For example, Destinations Career Academy of Wisconsin is a recent program which opened in 2016. Destinations Career Academy of Wisconsin is an online public charter school that includes both traditional academics and career readiness education, with state-licensed teachers who teach both full-time and part-time high school students (DCAWI, 2021). The program also recently expanded into nearby Minnesota, where young students across Minnesota can now learn online at Minnesota Virtual Academy (MNVA) (DCAMNVA, 2021). Upon graduation from this program, students achieve applicable skills required to transition into positions in registered apprenticeship programs. Building trades unions in Iowa could consider working with their counterparts in Wisconsin and Minnesota to open their own career academy—or a similar program—so young Iowans can combine traditional high school academics with industry-relevant electives focused on the construction trades.

Across the border, the Illinois Department of Transportation (IDOT) has operated the Highway Construction Careers Training Program (HCCTP) at 12 community colleges since 2011. The goal of this apprenticeship readiness program is to increase the participation of women, people of color, and disadvantaged individuals in the highway construction industry (IDOT, 2021). The 14-week program includes math curriculum for the trades and technical skills training such a tool usage, and places certified graduates on IDOT project sites at a pay of $15 per hour. In total, more than 3,000 students have completed the program and nearly 1,200 have been placed in registered apprenticeship programs across Illinois. The Iowa Department of Transportation could consider offering similar apprenticeship readiness programs at the state's two-year colleges.

As part of any expansion in apprenticeship readiness programs, the State of Iowa should remove any perception of a stigma associated with choosing trade schools over college (St-Esprit, 2019). Educating students, parents, teachers, and counselors about apprenticeship programs and addressing misconceptions about the trades can help residents understand that vocational training may be a better path to stable jobs for many workers than college degrees. Creating mentoring programs within apprenticeship programs and retaining counselors to address challenges unique to people of color can also help improve racial diversity within the state's private apprenticeship programs (Bruno et al., 2016).

The State of Iowa could increase access to child care and early childhood education programs to increase women employed in the construction trades. Women report that the lack of access to affordable child care is a significant barrier to participating in registered apprenticeship programs (Reed et al., 2012). 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. Expanding early childhood education programs has also been found to boost employment, especially among women (Schocet, 2019).

The State of Iowa could link apprenticeship training with taxpayer-subsidized and ratepayer-funded investments in clean energy production. According to Iowa Workforce Development, the state agency tasked with providing employment services for individual job seekers, the two fastest-growing occupations in Iowa over the next decade are expected to be solar photovoltaic installers, projected to grow 5.7 percent per year, and wind turbine service technicians, projected to grow 4.6 percent per year—which are 8 times and 7 times the growth rate for all occupations in Iowa (0.7 percent per year), respectively (IWD, 2021). Encouraging utility companies to utilize registered apprentices on wind and solar developments through project labor agreements (PLAs) or apprenticeship ratios could increase the number of apprentices in Iowa and ensure that the transition to renewable energy is built by skilled local workers.

Finally, the State of Iowa could institute a prevailing wage law. Prevailing wages are essentially minimum wages for different types of skilled construction workers on taxpayer-funded projects based on wages, benefits, and training investments that are actually paid in the local community. Prevailing wages level the playing field for all construction contractors by ensuring that public expenditures reflect local market standards of compensation and craftsmanship. Economic research has shown that prevailing wage laws increase apprenticeship training in construction (Duncan & Ormiston, 2017). The number of apprentices, as a share of the overall construction workforce, is 8 percent higher in states with prevailing wage laws (Bilginsoy, 2003). Apprentices have also been found to complete graduation requirements at a faster rate in states with prevailing wage laws (Bilginsoy, 2003). The lack of a prevailing wage law is one of the reasons why union journeyworkers in Iowa only earn $23 per hour and nonunion construction workers only earn $17 per hour. In comparison, union journeyworkers earn $40 per hour in Illinois and $33 per hour in Minnesota, two bordering states that have prevailing wage laws (Manzo & Bruno, 2020; Manzo et al., 2021). Nonunion construction workers earn $23 per hour in Illinois and $25 per hour in Minnesota. Passing a prevailing wage law would strengthen Iowa's system of privately-funded apprenticeship training while also improving labor market outcomes for both union and nonunion construction workers in Iowa.

Conclusion

As an alternative for young individuals seeking to build an in-demand skillset upon graduating high school, joint labor-management construction apprenticeship programs are the "gold standard." These programs account for the majority of registered apprentices in Iowa's construction industry, training 55 percent of all active construction apprentices. Joint labor-management apprenticeship programs are also more rigorous than employer-only construction programs, requiring nearly 1,200 more hours of training, but have a

completion rate that is 28 percent higher after accounting for other factors. Journeyworkers graduating from joint labor-management construction programs earn about $23 per hour, resulting in incomes that parallel the average for workers with associate degrees. These outcomes are achieved without incurring $30,800 in debt, which is the average loan burden for student borrowers in Iowa.

For many young people, the path to the middle class is through registered apprenticeships. To expand registered apprenticeships, Iowa could encourage apprenticeship readiness programs at public high schools and community colleges, improve access to child care programs to increase women in the construction trades, link the apprenticeship system with growing clean energy sector careers, enact a prevailing wage law, and take steps to remove any perceived stigma associated with choosing trade schools over college. Registered apprenticeship programs can be promoted as viable alternatives to college.

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