

ANALYSIS OF

CONSTRUCTION INDUSTRY APPRENTICESHIP PROGRAMS

IN INDIANA



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Executive Summary

A number of large-scale construction projects will soon be underway in central Indiana. While this is good news for the state, there are concerns that an upswing in construction activity will create potential labor shortages. Anticipating possible disruptions in the labor supply leads to a consideration of general craft training. A particular focus of such efforts is on apprenticeship programs, which remain the predominant form of workforce development in construction.

This report is an assessment of apprenticeship and strategic responses to labor supply problems in construction. It was conducted by the Indiana University Institute for the Study of Labor in Society (ISLS) as part of its research program on construction industry labor markets. The report examines apprenticeship enrollment statistics for Indiana. Data for the analysis was obtained from the U.S. Department of Labor's Bureau of Apprenticeship and Training (BAT).

Key Findings:

The study found evidence for divergent labor development strategies between union apprenticeship programs and those sponsored by the Associated Builders and Contractors (ABC).

- ❑ Union programs have the vast majority of enrollments in the state construction industry, 7,285 registered apprentices (83 percent), compared to 1,491 in ABC programs.
- ❑ The most successful ABC program in terms of enrollment was for electricians but it enrolled less than 36 percent of the total number of electrical apprentices in the state.

The study also compared participation rates for non-traditional apprentices, including female and minority workers as well as veterans. These workers have been the focus of specific efforts to increase participation in industry training. Enrollment rates for non-traditional apprentices also diverged widely between union and ABC programs.

- ❑ Women apprentices comprised 3.2 percent of enrollments in union programs but only 0.5 percent in ABC programs.
- ❑ Minority apprentices comprised 9.4 percent of union enrollments but only 0.8 percent in ABC programs.

- ❑ The total proportion of veterans in union programs was 6.8 percent, with a proportion of 0.5 percent in ABC programs.

The study found that apprentices had more difficulty meeting their scheduled hours of on-the-job training in ABC programs. The Department of Labor marks an apprentice's status as overdue once the expected end of the term of training has been reached. This is generally due to a lack of work, a situation faced by union as well as ABC employers. Union programs again had an apparent advantage.

- ❑ Over 39 percent of apprentices in ABC programs were considered to be in overdue status, compared to fewer than 13 percent in union programs.

While the study did not compare the relative quality between programs, there were clear differences in apprenticeship enrollment patterns. Whatever the reasons, there seems to be ample evidence that the ABC generally places a lower priority on developing craft skills than union employers.

Table of Contents

Topic/Section	Page Number
<i>Executive Summary</i>	2
<i>Introduction</i>	5
Table 1 Occupational Projections (Metropolitan Indianapolis)	7
<i>The Apprenticeship System</i>	8
What is Apprenticeship?	8
The Apprenticeship Model	9
Alternative Models of Skill Training in Construction	10
Open Shop and Union Apprenticeship Programs	11
<i>Results</i>	12
Apprenticeship Enrollment Statistics	12
Figure 1 Number of Apprentices by Type of Program	13
Figure 2 Proportion of Apprentices by Type of Program	13
Figure 3 Percentage of Apprentices Trained in Heating and Air Conditioning Service and Installation Work	14
Table 2 Number of Enrolled Apprentices by Occupation	15
Participation Rates for Non-Traditional Apprentices	16
Figure 4 Enrollment Rates for Non-Traditional Apprentices	16
Table 3 Number of Apprentices From Non-Traditional Groups ...	18
Table 4 Participation Rates for Non-Traditional Apprentices	19
Overdue Status	19
Figure 5 Number of Apprentices in Overdue Status	20
Figure 6 Percentage of Apprentices in Overdue Status	21
<i>Summary</i>	22

Introduction

Worker education and skill training are fundamental components in successful economic development strategies. Nowhere is the positive association between labor resources and economic health more evident than in the construction industry. Stakeholders in the industry, construction users, employers, unions and governments, have reason to pay particular attention to local labor markets. Instabilities in construction markets have a significant (though hard to estimate) cost impact. Whether or not there will be an adequate supply of skilled workers to meet future demand is a persistent worry.

There is general consensus that construction labor market instabilities require a concerted strategic response.¹ *ENR* (Engineering News Record), one of the leading business periodicals covering the construction industry, has been reporting on labor market instabilities over the last 15 years. *ENR* articles routinely emphasize the importance of training.²

The government, unions, contractors and industry as a whole recognizes that the future lies in the ability of the industry to attract, train and hold onto young people who can be molded into productive craftspersons... The industry desperately needs these people, as demonstrated by the construction boom and labor shortages during the last few years. While the heat is off employers for the moment, the existing work force is aging and the cycle will resume again shortly as retirements hit home.³

Construction work remains organized by craft specialization and skilled workers contribute a large majority of the labor hours on a typical project. Because output is not standardized, construction workers must apply more knowledge about the production process than workers in many other industries. As a result, skill training is intensive and requires a significant commitment of resources on the part of employers and workers.

Adequate information is important for any consideration of future labor market activity. Unfortunately, predictions are often difficult. Because of the highly cyclical nature of demand, construction unemployment rates consistently have been nearly double that of other industries.⁴ Construction work can be strenuous, dangerous and, in colder climates, is seasonal. Given the inherent uncertainties in employment, attracting and retaining

¹ The Business Roundtable, *Confronting the Skilled Construction Workforce Shortage: A Blueprint for the Future*, October, 1997

² Arthur Fox, "Looming People Shortages Put Industry on Alert," *ENR*, Oct 20, 1988 p. 24-25; William G. Krizan, "Craft Labor Shortages on the Horizon," *ENR*, March 23, 1989 p. 39; William G. Krizan, "Skill Shortage Saps Rebound," *ENR* June 14, 1990 p. 15-16; Workforce Foundation is Dead But Issues are Alive and Growing, *ENR* Editorial November 7, 1994; William G. Krizan, "Craft Shortages Creeping In," *ENR* December 25, 1995 p 33-35

³ Apprenticeship Training Is Everyone's Business, *ENR*, May 27, 2002, p. 60

⁴ Roger L. Bowlby, Sidney L. Carroll, and Richard Evans, "Measuring the Social Costs of Instability in Construction" *Monthly Labor Review*, February, 1980.

workers is particularly challenging. As a result, skilled labor shortages are a potential problem on *any* large construction project.⁵ Learning a broad range of craft skills takes time, so poor quality forecasts exacerbate labor supply problems.

Though inconsistencies in data collection methods limit their precision, occupational projections provide a useful picture of construction labor demand. **Table 1** shows the number of anticipated construction job openings over a 10-year period and annually in Indianapolis, Indiana's largest labor market. The data indicate that demand for replacements and new job openings number in the thousands each year. Other than market size and the diversity of projects, Indianapolis data likely represent the situation in other regions of the state as well.

Anticipating increasing market demand, construction labor supply is once again a particular concern in Indiana. A recent report issued by the Indiana Construction Roundtable concludes that central Indiana is facing potential construction craft labor shortages over the next several years.⁶ The report emphasizes that economic growth in the region presents "unprecedented challenges" for industry, particularly for skilled labor development. One of its principal recommendations is that apprenticeship and training programs should establish plans to compensate for projected shortages.

⁵ Another characteristic of construction labor shortages is the relatively high proportion of workers who leave the industry permanently during a recession.

⁶ Indiana Construction Roundtable *Central Indiana Craft Study*, September 19, 2003

Table 1 Occupational Projections (Metropolitan Indianapolis)

Job Title	1998 Employment	2008 Employment	Annual Growth Rate	Annual Avg. New Jobs	Annual Avg. Replacement Jobs	Annual Avg. Job Openings
Boilermakers	130	170	2.79%			10
Brickmasons/Blockmasons	1,250	1,710	3.61%	50	30	70
Cabinetmakers/Bench Carpenters	460	540	1.84%	10	10	10
Carpenters	7,310	8,610	1.78%	130	200	330
Carpet Installers	910	1,050	1.52%	10	20	30
Ceiling Tile Instllrs/Acoust Crpts	130	170	2.88%			10
Cncrt Fnshrs/Cmnt Msns/Trzo Wkrs	1,130	1,400	2.41%	30	10	40
Constr/Extractive Wkrs, NEC	750	920	2.30%	20	20	40
Construction Trades Workers, NEC	750	960	2.84%	20	20	40
Crane & Tower Operators	440	460	0.47%		10	10
Drywall Installers	560	730	3.03%	20	10	20
Electricians	4,650	5,950	2.80%	130	100	230
Elevator Installers & Repairers	100	130	3.61%			10
First Line Supervs: Const/Extrac	3,150	4,130	3.09%	100	80	180
First Line Supervs: Helprs/Labrs	1,020	1,170	1.56%	20	30	40
Flr Layers, Ex Carpet/Wd/Hd Tile	70	90	2.57%			
Glaziers	380	450	1.90%	10	10	20
Grader/Bulldozer/Scraper Opers	490	600	2.40%	10		20
Hazardous Materials Removel Wkrs	230	320	3.73%	10	10	20
Heat/AC/Refrig Mechns/Instllrs	2,190	3,000	3.68%	80	40	120
Helpers/Laborers/Movers, NEC	11,480	14,380	2.53%	290	360	650
Millwrights	900	1,070	1.93%	20	20	40
Operating Engineers	1,150	1,450	2.63%	30	20	50
Painters & Paperhangers	3,310	4,160	2.58%	90	80	170
Pipelayers	270	330	2.21%	10	10	10
Pipelaying Fitters	70	80	1.03%			
Plasterers & Stucco Masons	140	180	3.63%			10
Plumbers/Pipefitters/Steamfitters	3,770	4,680	2.42%	90	50	140
Roofers	1,490	2,010	3.49%	50	50	100
Sheet Metal Duct Installers	220	340	5.36%	10	10	20
Sheet Metal Workers	1,390	1,880	3.54%	50	30	80
Stonemasons	100	130	3.23%			10
Structural Metal Workers	790	990	2.60%	20	20	40
Total	53,178	66,248	2.40%	1,310	1,250	2,560

Source: Indiana Department of Workforce Development

The Apprenticeship System

What is Apprenticeship?

The delivery of craft-based skill training in the industry traditionally has been provided through a system of apprenticeship. Apprentices acquire both theoretical and practical knowledge through a combination of classroom instruction and on-the-job training. The latter component requires extensive experience, typically over a four to five year period of indenture. The terms of the indenture between the apprentice and program sponsor are contractual in nature. In return for the sponsor's commitment to provide training, apprentices agree to perform satisfactorily on the job and in the classroom. The formal agreement establishes conditions of employment such as wages, the skills to be learned on the job, the type of classroom instruction to be provided and the duration of training.

Program sponsors include joint labor-management committees, individual employers or employer associations. Programs and apprentices may be registered as a method of accreditation with the U.S. Department of Labor's BAT or with State Apprenticeship Councils (SACs) overseen by the BAT. Indiana is one of 23 states with BAT registered programs.

In describing apprenticeship the BAT states:

The government's role is to, first, safeguard the welfare of apprentices, second, ensure the quality and equality of access of apprenticeship programs, and third, provide integrated employment and training information to sponsors and the local employment and training community.

Sponsor obligations represent basic labor standards for apprentices under Title 29, Code of Federal Regulations, Part 29.5. These obligations include:⁷

- ❑ a full and fair opportunity to apply for apprenticeship;
- ❑ a schedule of work processes in which an apprentice is to receive training and experience on the job;
- ❑ organized instruction designed to provide apprentices with knowledge in technical subjects related to their trade (e.g., a minimum of 144 hours per year is normally considered necessary);
- ❑ a progressively increasing schedule of wages;
- ❑ proper supervision of on-the-job training with adequate facilities to train apprentices;
- ❑ an apprentice's progress, both in job performances and related instruction is evaluated periodically and appropriate records are maintained;
- ❑ no discrimination in any phase of selection, employment, or training.

⁷ available on-line: http://www.doleta.gov/atels_bat/reg-apprentice.cfm

The Apprenticeship Model

With its roots predating the industrial revolution, the apprenticeship model of craft training has proven remarkably resilient in adapting to meet market demand. There is a simple rationale to explain this fact; the apprenticeship system benefits workers as well as employers.

Workers are attracted to jobs that reward investments in education. This is accomplished through a graduated pay scale that reflects rising productivity on the job. The terms of the apprenticeship on the job and in the classroom are enforceable so workers have a “voice” in the bargain. The stronger the terms of the contract, the fewer the number of workers who “exit” the system. Historically, apprenticeships sponsored jointly by unions and contractors have flourished because such contractual obligations are standard.⁸ In general, union contractors have found union relationships advantageous because firm performance is higher where workers have a greater voice in decision-making.⁹

The apprenticeship system also meets the needs of participating employers in other ways. Contractors want to maintain stability in labor supply to ensure profitability. The apprenticeship system has adapted to fit the construction industry’s predominantly “casual” labor market, where craft labor is held in reserve and deployed according to a particular contractor’s requirements. Workers may be employed by a number of contractors in a given year but apprenticeship provides uniformity in training with skills that are transferable. With a number of employers who sponsor programs, recruitment and selection costs necessary to maintain an adequate supply of skilled labor are minimized. Multiple employer participants also provide a greater pool of job opportunities for apprentices.

⁸ Clinton C. Bourdon and Raymond E. Levitt, *Union and Open-shop Construction: Compensation, Work Practices and Labor Markets*, Lexington Books 1980

⁹ Dale Belman, “Unions, the Quality of Labor Relations and Firm Performance” *Unions and Economic Competitiveness* Lawrence Mishel and Paula Voos, ed. M.E. Sharpe, 1992.

Alternative Models of Skill Training in Construction

Labor markets reflect complex social interaction and not all the benefits of skill training investments are easily quantifiable.¹⁰ One such benefit is worker mobility. The Department of Labor still describes the wide variety of skills learned in apprenticeship training as an advantage for workers in labor markets.¹¹ The nature of this advantage is problematic for some employers who prefer not to cede aspects of managerial control over the labor process to craft workers. For this reason, labor shortages are an indication of market imbalances in terms of demand as well as supply.

In the context of skill demand, the Business Roundtable's 1983 prediction that a shortfall of 1.9 million workers would occur before 1992 deserves closer scrutiny. The Roundtable claimed that the anticipated shortfall was attributable primarily to inefficiencies in apprenticeship training. They recommended that training programs accommodate the development of subjourney-level workers and helpers.¹² These workers could be trained quickly outside the apprenticeship system if provided with a narrower set of skills than existing craft workers.

This logic appealed to some open shop employers. In response to the Business Roundtable report, the Associated Builders and Contractors (ABC) called for training initiatives to be "taken out of the political arena." A widely publicized effort was made to establish ABC training that would compete with union apprenticeship programs.¹³

Contractors who build the most complex projects must have access to workers who can accomplish many tasks. The lack of craft training sponsored by open shop contractors increases their demand for workers having more limited skills. These workers must be deployed with a narrow division of labor since they are not trained to do as many tasks as craft workers. Herbert Northrup, a long-time craft union critic, asserts that open shop contractors have considerable freedom to organize work by hiring low-wage, unskilled temporary workers. He acknowledges though, that open shop contractors are at a disadvantage in meeting the labor needs on larger projects.¹⁴

¹⁰ Stephen Mangum, Garth Mangum and Gary Hansen "Assessing the Returns to Training" *New Developments in Worker Training: A Legacy for the 1990s*, Industrial Relations Research Association, 1990

¹¹ U.S. Department of Labor, *Occupational Outlook Quarterly*, 46, 2, Summer, 2002

¹² The Business Roundtable, *Government Limitations on Training Innovations*, Report D-2, *Construction Industry Cost Effectiveness Project*, 1982

¹³ Associated Builders and Contractors, *Implementation Plan for Construction Industry Cost Effectiveness*, 1983

¹⁴ Herbert R. Northrup, *Open Shop Construction Revisited*, Wharton Industrial Research Unit, University of Pennsylvania, 1986

Open Shop and Union Apprenticeship Programs

The current research literature shows a disparity in training between union and open shop apprenticeship programs. A 1997 study conducted by the Building Trades Apprenticeship Coordinators/Directors Association of Kentucky and the Greater Louisville Building and Construction Trades Council argued that joint labor-management (union) training programs were more effective than their open shop counterparts.¹⁵ The study found the union sector programs produced a far greater number of craft workers than those in the open shop. Union programs enrolled 69 percent of 6,214 apprentices.

A number of recent studies reach similar conclusions about the preponderance of union apprenticeship training. A West Virginia study found 3,194 apprentices registered between 1990 and 1999 and of these, 95 percent were in joint labor-management programs.¹⁶ A study of Pennsylvania reported a union share of 82 percent of all registered apprentices between 1997 and 2001.¹⁷ In Washington, 93 percent of registered apprentices between 1995 and 2001 were in union programs.¹⁸

Examining records from 36 states, the AFL-CIO's Building and Construction Trades Department found that union programs had enrolled 72 percent of some 468,000 apprentices registered between 1989 and 2001.¹⁹ The study also found that between 1997 and 2001, union programs graduated 45,480 apprentices, three times the number of graduates in non-union programs. One additional conclusion in the research literature is that union programs are more diverse in race and gender.²⁰ For example, the Building Trades Department calculated that between 1989 and 2001, union programs

¹⁵ William J. Londrigan and Joseph B. Wise, *Apprentice Training in Kentucky: A Comparison of Union and Non-Union Programs in the Building Trades*, 1997

¹⁶ Sarah Etherton, Stephen L. Cook and Robert V. Massey Jr., *Building Trades Apprenticeship Training in West Virginia: A Comparison of Union and Non-Union Building Trades Programs in the 1990s*, West Virginia University Institute for Labor Studies and Research, May 2002

¹⁷ David H. Bradley and Stephen A. Herzenberg, *Construction Apprenticeship and Training in Pennsylvania*, Capitol Area Labor Management Committee, 2002

¹⁸ Randy Loomans and Mitch Seaman, *Apprenticeship Utilization in Washington State Programs In the Building and Construction Industry*, Washington State Building and Construction Trades Council, 2002

¹⁹ Building and Construction Trades Department, AFL-CIO, *A Preliminary Report on Associated Builders and Contractors Apprenticeship Training: Flawed and Failing Initiatives* October, 2003

available on-line: <http://www.bctd.org/training/abcreport/ABCreport.pdf>

²⁰ Günseli Berik and Cihan Bilginsoy, "Unions and Women's Training for the Skilled Trades in the U.S.," *Review of Black Political Economy*, 29, 4, Spring 2002, p.97-122; Berik and Bilginsoy, "Do Unions Help or Hinder Women? Apprenticeship Training in the United States," *Industrial Relations*, 39, 4, October, 2000, p 600-624

enrolled nearly three times as many minority apprentices and four times as many women as the non-union programs.

In general, open shop contractors have had limited success developing craft-based training efforts. One proposed solution resulted in the creation of the open shop National Center for Construction Education and Research.²¹ The primary Indiana partner adopting the NCCER curriculum is the state chapter of the ABC. The Indiana ABC sponsors registered multi-year apprenticeships for a number of construction occupations. The viability of the system remains an open question. Narrow skill development is still very much a part of the ABC training strategy. Its website provides details of a partnership with Construction Careers of America (CCA) in the adoption of a new education program with "unlimited potential for ABC and its membership."²² CCA describes itself as "the construction division of Franklin Career Services, a nationwide vocational school system that focuses solely on intensive short-term career training."²³ Although the curriculum prospectus states that training is equivalent to a first year apprenticeship, students are not sponsored by an employer and have no immediate connection to any of the on-the job training components.

Results

Apprenticeship Enrollment Statistics

ISLS obtained enrollment statistics for registered apprenticeship programs in Indiana from the U.S. Department of Labor's Bureau of Apprenticeship and Training (BAT). As in other states, substantial differences in enrollment were found between the open shop training programs of the ABC and joint labor-management programs in the union sector.

There were 8,776 apprentices registered in union and ABC programs in Indiana.²⁴ Just over 83 percent, or 7,285 apprentices, were enrolled in union programs. (See **Figure 1** and **Figure 2**) As shown in **Table 2**, in nearly every occupation union programs enrolled all, or nearly all, apprentices. Apprentices for several craft occupations were found only in the union sector. The electrician program was the largest for ABC with 816 apprentices. This number represents over half of the 1,491 in ABC programs but is less than 36 percent of the total number of electricians being trained in Indiana. In the other ABC programs with the next largest numbers of apprentices (carpenter, plumber and sheet metal worker), the proportion of the total occupation was no higher than 25 percent.

²¹ available on-line: <http://www.nccer.org>

²² available on-line: <http://www.abc-indy.org/>

²³ available on-line: <http://www.constructionbootcamp.com>

²⁴ Program data for August, 2003. Boilermakers and Sprinkler Fitters program data were obtained from BAT in February, 2004.

Figure 1 Number of Apprentices by Type of Program

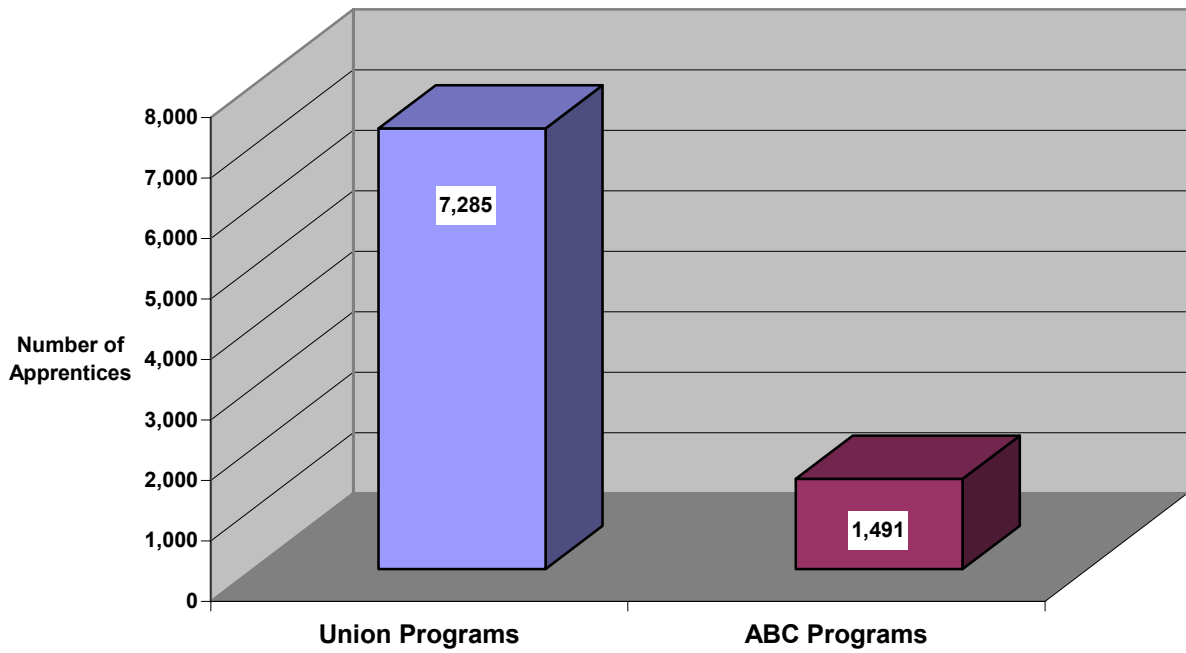
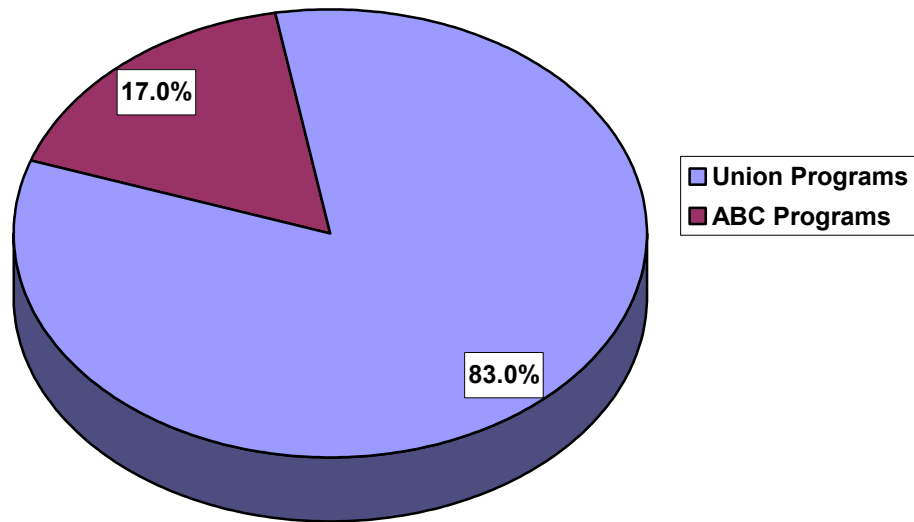


Figure 2 Proportion of Apprentices by Type of Program

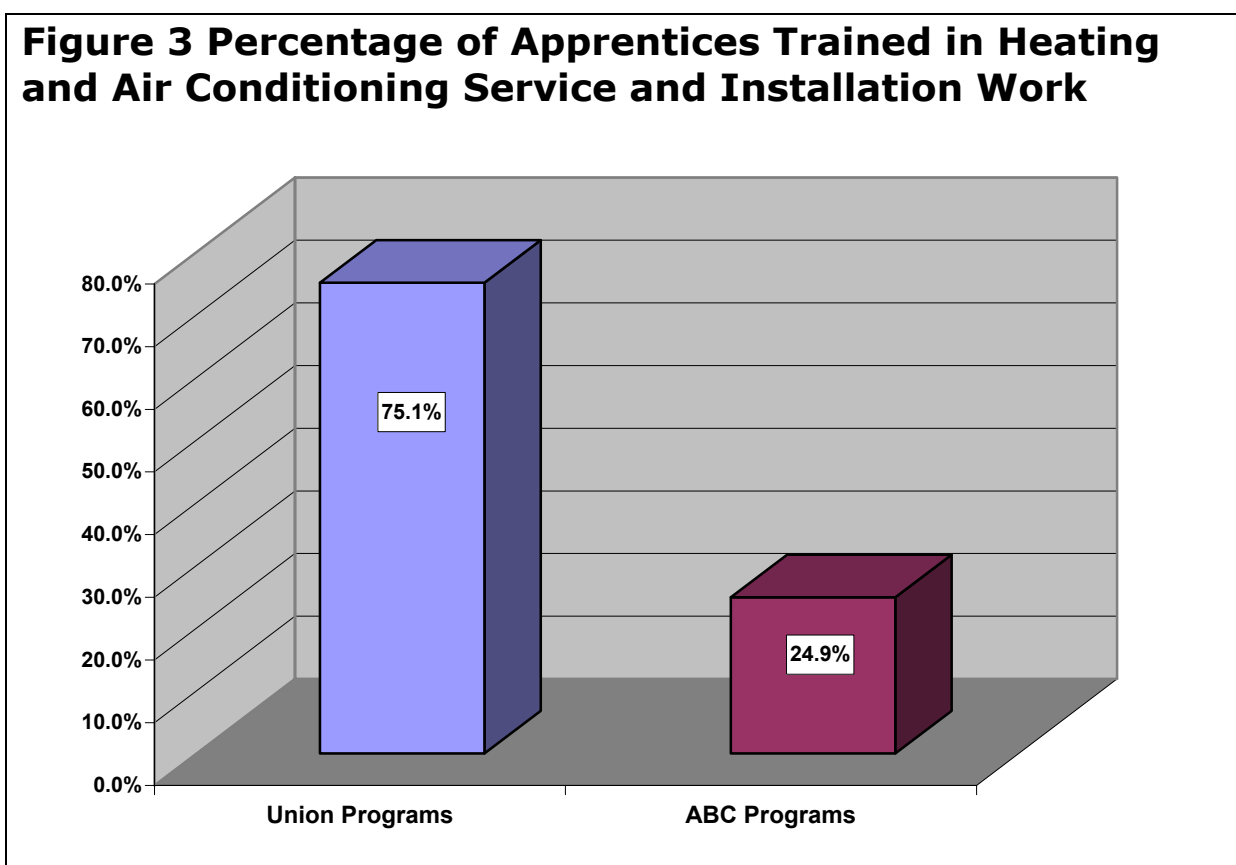


Source: U.S. Department of Labor Bureau of Apprenticeship and Training

What appears to be the single exception to the pattern of union predominance in apprenticeship enrollment, the ABC's heating and air conditioning program, merely illustrates a fundamental philosophical difference between the union's model of training and the ABC's model, as discussed in the *Alternative Models of Skill Training* section of this report.

This ABC program trains in a skill-set that is narrower than the comparable union programs. For example, the union program for sheet metal workers includes extensive classroom and practical training in all phases of heating and air conditioning as part of 5-year comprehensive curriculum. This curriculum is designed to teach the broad skill-set necessary to meet the complexity of a construction project. Similarly, the union plumbing and pipefitting programs allow apprentices to specialize in heating and air conditioning but also require mastery of numerous additional skills, unique to these trades, for completion of their 5-year programs.

As shown in **Figure 3**, these three union programs supply over 75% of the craft labor for this occupation.



Source: U.S. Department of Labor Bureau of Apprenticeship and Training

Table 2 Number of Enrolled Apprentices by Occupation

Occupation	Total Number of Apprentices	Union Programs		ABC Programs	
		Number of Apprentices	Percent	Number of Apprentices	Percent
Boilermaker	242	242	100.0	0	0.0
Bricklayers	307	304	99.0	3	1.0
Carpenters	1,395	1,167	83.7	228	16.3
Cement Mason	113	106	93.8	7	6.2
Construction Craft Laborer	266	266	100.0	0	0.0
Electrician	2,300	1,484	64.5	816	35.5
Elevator Constructor	55	55	100.0	0	0.0
Floor Layer	56	56	100.0	0	0.0
Glazier	112	112	100.0	0	0.0
Heating & Air Cond. Inst./Service	144	*	*	144	*
Insulation Worker	133	128	96.2	5	3.8
Lather	1	1	100.0	0	0.0
Millwright	160	160	100.0	0	0.0
Operating Engineer	224	211	94.2	13	5.8
Painter (Construction)	325	325	100.0	0	0.0
Pipefitter	305	295	96.7	10	3.3
Plasterer	56	56	100.0	0	0.0
Plumber	729	550	75.4	179	24.6
Residential Carpenter	71	71	100.0	0	0.0
Residential Wireman	45	45	100.0	0	0.0
Roofer	406	397	97.8	9	2.2
Sheet Metal Worker	469	392	83.6	77	16.4
Sprinkler Fitter	294	294	100.0	0	0.0
Structural-Steel Worker	369	369	100.0	0	0.0
Telecommunications Tech	104	104	100.0	0	0.0
Tile Setter	26	26	100.0	0	0.0
Tuckpointer, Cleaner, Caulker	69	69	100.0	0	0.0
Total	8,776	7,285	83.0	1,491	17.0

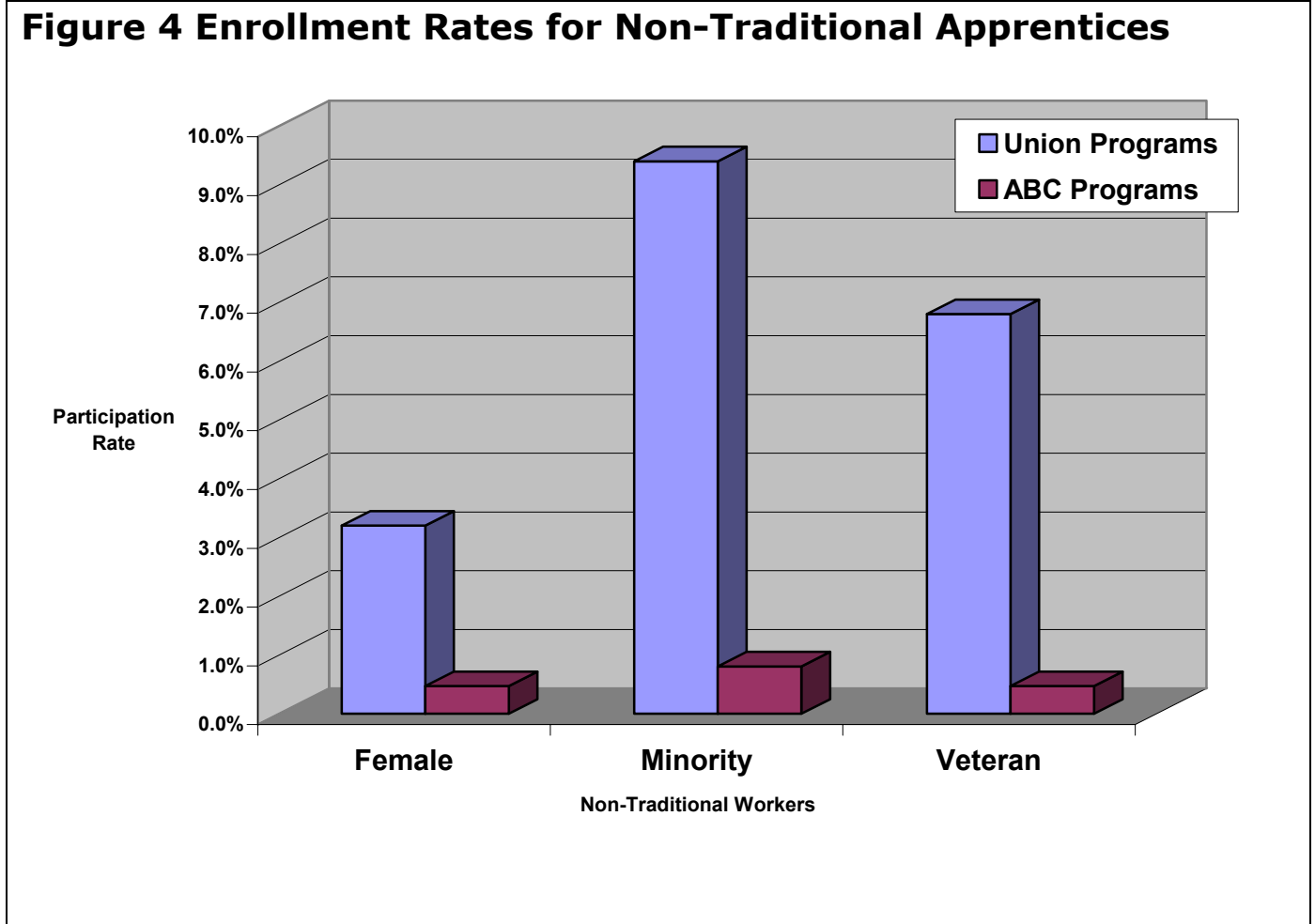
Source: U.S. Department of Labor Bureau of Apprenticeship and Training

*Heating & Air Cond. Inst./Service is included as part of the comprehensive curriculum in union plumbing, pipefitter and sheet metal worker programs. It is therefore not listed as a separate occupational code for union apprentices. See **Figure 3**.

Participation Rates for Non-Traditional Apprentices

Figure 4 compares enrollment rates for non-traditional apprentices. These apprentices, including female and minority workers, are considered non-traditional in that their participation in the construction labor force has been low. Along with veterans, they have been the focus of specific efforts to increase their participation in industry training programs.

Benchmark statistics on construction labor force participation rates are difficult to calculate with any precision. The 2000 Census found that white workers comprised 87.5 percent of the workforce in Indiana. The Equal Employment Opportunity Commission (EEOC) in its 2001 EEO-1 report estimated that women comprised 13 percent and minority workers about 10 percent of all craft workers in Indiana. The EEOC data are obtained from only a limited number of employers in the industry so the results must be applied cautiously to construction.



Source: U.S. Department of Labor Bureau of Apprenticeship and Training

The overall proportion of women among non-traditional apprentices in Indiana appears to be low, 3.2 percent for union programs and 0.5 percent for ABC programs. However the 9.4 percent minority enrollment in union programs is consistent with the EEOC data, and is much greater than the 0.8 percent enrollment in the ABC program.

The difference in veteran enrollment in union (6.8 percent) and ABC programs (0.5 percent) may be attributed to the fact that in 1998 the State Approving Agency (SAA) withdrew approval of the ABC apprenticeship programs in the state of Indiana. This SAA approval is required for veterans enrolled in an apprenticeship program to be eligible for GI Bill educational benefits. The SAA's withdrawal of approval was based on the fact that the ABC was unable to provide the necessary student records in compliance with the Code of Federal Regulations.

The most consistent finding of this report is that union programs enroll the overwhelming majority of apprentices in all three groups – minority, female and veterans. **Tables 3 and 4** show a breakdown by occupation. The largest numbers of female apprentices are in laborer, painter, electrician, operating engineer and carpenter programs. Most female apprentices are in laborer, operating engineer and painter programs. The largest numbers of minority apprentices are in electrician, roofer, carpenter, plumber and laborer programs. Most minority apprentices were in cement mason, residential carpenter, plasterer and roofer programs. The largest numbers of veteran apprentices were found in electrician, carpenter, sheet metal worker, plumber and ironworker programs. The percentage of veterans was greatest in glazier, sheet metal worker and ironworker programs.

Table 3 Number of Apprentices From Non-Traditional Groups

Occupation	Number of Female Apprentices		Number of Minority Apprentices		Number of Veteran Apprentices	
	Union Programs	ABC Programs	Union Programs	ABC Programs	Union Programs	ABC Programs
Boilermakers	4	0	12	0	29	0
Bricklayers	6	0	36	0	9	0
Carpenters	22	0	78	0	37	1
Cement Mason	2	0	32	0	4	0
Construction Craft Laborer	43	0	44	0	17	0
Electrician	30	5	101	7	97	5
Elevator Constructor	1	0	5	0	11	0
Floor Layer	1	0	0	0	0	0
Glazier	3	0	13	0	24	0
Heating & Air Cond. Inst./Service	*	1	*	3	*	0
Insulation Worker	9	0	6	0	10	0
Lather	0	0	0	0	0	0
Millwright	1	0	5	0	10	0
Operating Engineer	26	0	14	0	17	0
Painter (Construction)	33	0	67	0	28	0
Pipefitter	7	0	5	0	8	0
Plasterer	1	0	12	0	5	0
Plumber	9	1	57	2	42	1
Residential Carpenter	3	0	18	0	3	0
Residential Wireman	1	0	3	0	0	0
Roofer	5	0	81	0	26	0
Sheet Metal Worker	9	0	33	0	56	0
Structural-Steel Worker	4	0	20	0	39	0
Telecommunications Tech	5	0	7	0	2	0
Tile Setter	0	0	5	0	0	0
Tuckpointer, Cleaner, Caulker	0	0	4	0	0	0
Total	225	7	658	12	474	7

Source: U.S. Department of Labor Bureau of Apprenticeship and Training

Note: Demographic data for Sprinkler Fitters not available.

*Heating & Air Cond. Inst./Service is included as part of the comprehensive curriculum in union plumbing, pipefitter and sheet metal worker programs. It is therefore not listed as a separate occupational code for union apprentices. See **Figure 3**.

Table 4 Participation Rates for Non-Traditional Apprentices

Occupation	Percent Female Apprentices		Percent Minority Apprentices		Percent Veteran Apprentices	
	Union Programs	ABC Programs	Union Programs	ABC Programs	Union Programs	ABC Programs
Boilermakers	1.7	-	5.0	-	12.0	-
Bricklayers	2.0	-	11.8	-	3.0	-
Carpenters	1.9	-	6.7	-	3.2	0.1
Cement Mason	1.9	-	30.2	-	3.8	-
Construction Craft Laborer	16.2	-	16.5	-	6.4	-
Electrician	2.0	0.6	6.8	0.5	6.5	0.3
Elevator Constructor	1.8	-	9.1	-	2-	-
Floor Layer	1.8	-	-	-	-	-
Glazier	2.7	-	11.6	-	21.4	-
Heating & Air Cond. Inst./Service	*	0.7	*	-	*	-
Insulation Worker	7.0	-	4.7	-	7.8	-
Lather	0.0	-	-	-	-	-
Millwright	0.6	-	3.1	-	6.3	-
Operating Engineer	12.3	-	6.6	-	8.1	-
Painter (Construction)	10.2	-	20.6	-	8.6	-
Pipefitter	2.4	-	1.7	-	2.7	-
Plasterer	1.8	-	21.4	-	8.9	-
Plumber	1.6	0.6	10.4	0.4	7.6	0.2
Residential Carpenter	4.2	-	25.4	-	4.2	-
Residential Wireman	2.2	-	6.7	-	-	-
Roofer	1.3	-	20.4	-	6.5	-
Sheet Metal Worker	2.3	-	8.4	-	14.3	-
Structural-Steel Worker	1.1	-	5.4	-	10.6	-
Telecommunications Tech	4.8	-	6.7	-	1.9	-
Tile Setter	0.0	-	19.2	-	-	-
Tuckpointer, Cleaner, Caulker	0.0	-	5.8	-	-	-
Total	3.2	0.5	9.4	0.8	6.8	0.5

Source: U.S. Department of Labor Bureau of Apprenticeship and Training

Note: Demographic data for Sprinkler Fitters not available.

*Heating & Air Cond. Inst./Service is included as part of the comprehensive curriculum in union plumbing, pipefitter and sheet metal worker programs. It is therefore not listed as a separate occupational code for union apprentices. See **Figure 3**.

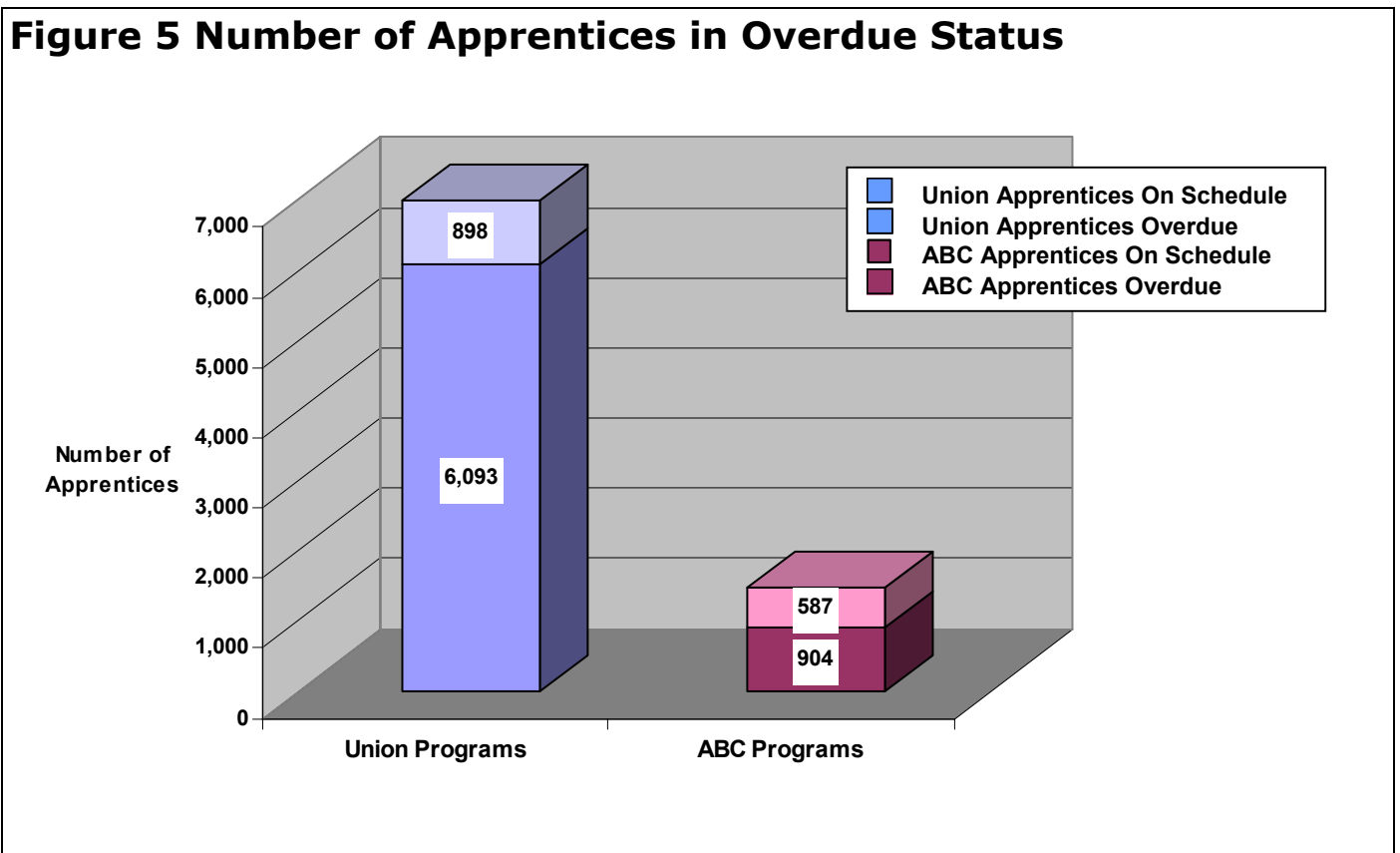
Overdue Status

Apprentices sometimes reach the end of the scheduled term of indenture without completing the program. In these cases, if the apprenticeship has not been suspended or cancelled, the Department of Labor marks an apprentice's status as overdue. This situation results from the apprentice's inability to work the requisite hours within the initial time allotted to complete the program. Although illness or military service may trigger such an interruption, the usual cause is a lack of work. Given the nature of construction labor markets, this is a common problem for apprentices.

Figure 4 indicates the number of apprentices in overdue status in union and ABC programs. As indicated in **Figure 5**, a total of 39 percent of apprentices in ABC programs were considered overdue, compared with 12.8 percent of apprentices in union programs.

These results must be interpreted cautiously but they do indicate a possible difficulty providing stable job opportunities for open shop craft workers. Union programs seem to be more robust in responding to fluctuations in construction demand.

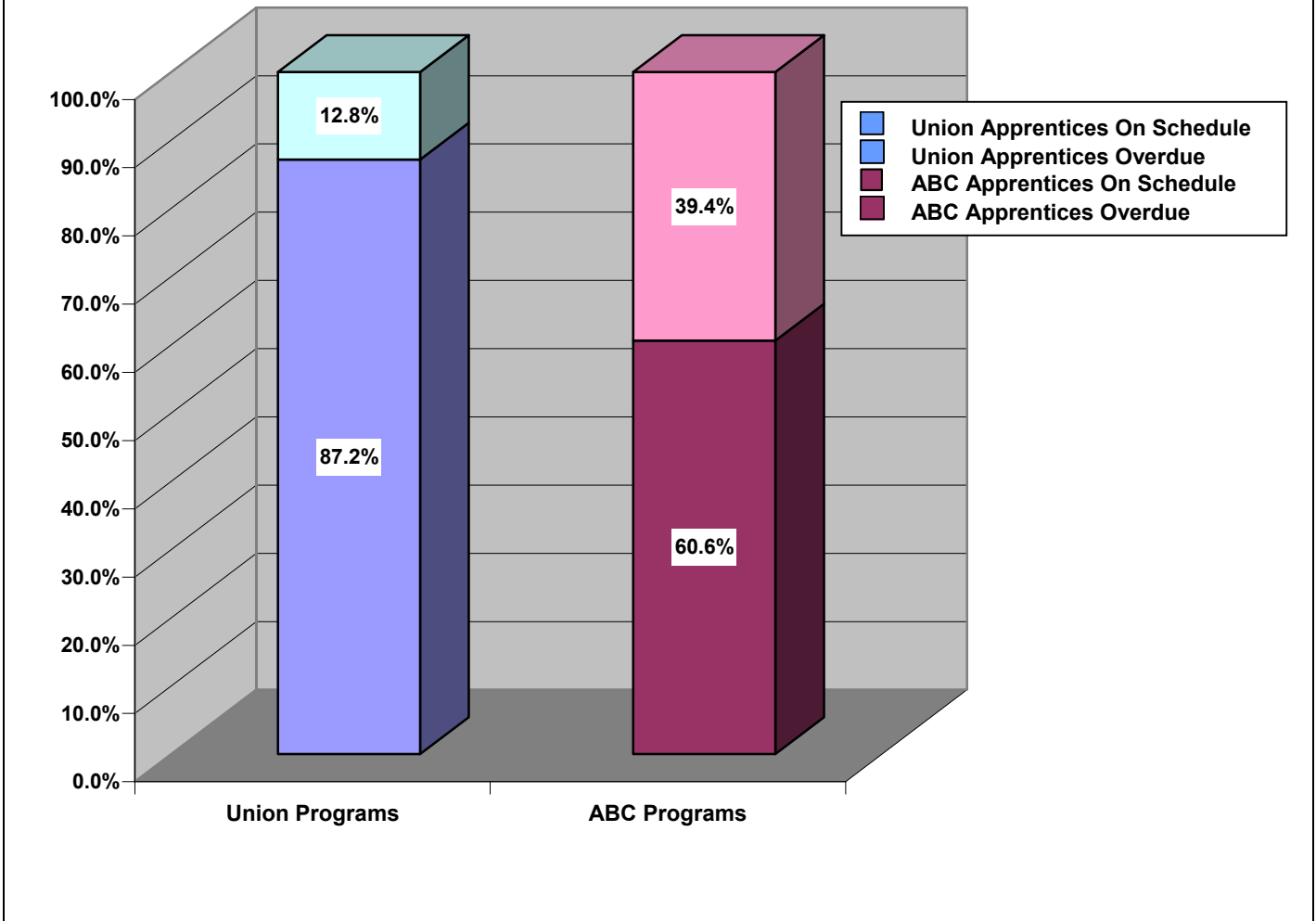
Figure 5 Number of Apprentices in Overdue Status



Source: U.S. Department of Labor Bureau of Apprenticeship and Training

Note: Overdue status data for Sprinkler Fitters not available.

Figure 6 Percentage of Apprentices in Overdue Status



Source: U.S. Department of Labor Bureau of Apprenticeship and Training

Note: Overdue status data for Sprinkler Fitters not available.

Summary

Effective labor supply strategies require good market data but unfortunately, tracking supply and demand for construction training is difficult. The availability of data has improved with the advent of web publishing but construction market statistics are notoriously amorphous. There has been little change since the Business Roundtable noted the lack of reliable construction information nearly 20 years ago.

With this caveat in mind, it is clear that the data for Indiana in this report corroborate results obtained in previous apprenticeship research. These data consistently show disparate enrollment patterns between union and open shop apprenticeship programs. The observed differences in apprenticeship emanate from the relative attractiveness of various technical attributes of the training programs. Craft training philosophies, particularly as they concern the job aspects of an apprenticeship, have a considerable influence on this process. This study makes no claim about the relative quality between union and ABC programs. However, even if the sentiment is by no means universal, it seems clear that open shop employers place a lower priority on developing craft skills than do union employers.

A study of apprenticeship program performance and outcomes is beyond the scope of this report. More information is needed to evaluate the feasibility of expanding craft training programs. This is especially true for efforts aimed at improving female and minority labor force participation in the construction industry. Whatever strategies are brought to bear on the problem of skilled labor shortages, union programs must play a leadership role in finding solutions.