10-2008

Building Trades Apprentice Training in Massachusetts: An Analysis of Union and Non-Union Programs, 1997-2007

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The Future of Work Paper Series

Paper No. 3a ◘ October 2008

UMASS BOSTON LRC

THE COLLEGE OF PUBLIC & COMMUNITY SERVICE

Labor Resource Center

The *Future of Work in Massachusetts* is a joint research project of the Labor Centers at the University of Massachusetts Amherst, Boston, Dartmouth, and Lowell, funded by the University of Massachusetts' President's Office.

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October 2008
(Originally issued May 2008)

Building Trades Apprentice Training in Massachusetts Report Reissued

Subsequent to the original release of this report in May 2008, the Commonwealth of Massachusetts' Division of Apprentice Training (DAT) discovered an error in the data it had provided to the Labor Resource Center. Specifically, the DAT discovered that 883 apprentices had inadvertently been assigned the incorrect building trade. In this updated version of the report, all analyses have been conducted on the corrected data.

Acknowledgements

The authors are indebted to several individuals and organizations who made this research possible:

- The Construction Institute, which brought the idea to us and provided financial assistance to complete the research;
- Jeff Vincent, at Indiana University's Institute for the Study of Labor in Society, for sharing his experience with apprentice data acquisition;
- Kerinton Levy at Massachusetts' Division of Apprenticeship Training, whose guidance was instrumental in helping the authors to obtain appropriate data.

The results and analysis in this report and any remaining errors remain with the authors.

This research was supported in part by funds from by The Construction Institute, and by the *Future of Work in Massachusetts*, a joint research project of the Labor Centers at the University of Massachusetts Amherst, Boston, Dartmouth, and Lowell, funded by the University of Massachusetts' President's Office.

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Executive Summary

The construction industry in the United States is a growing industry which provides good jobs for workers without requiring high levels of academic credentials at entry. In addition, apprenticeship programs in the construction trades provide individuals with the opportunity to develop their skills and education while they work toward journeyperson certification. In order to produce skilled workers and to protect apprentices' rights, the United States government and individual state governments register apprenticeship programs.

This study compares the effectiveness of union and non-union building trade apprenticeship programs in Massachusetts over the ten year period 1997-2007. Using data from the Massachusetts Division of Apprentice Training (DAT), we analyzed several outcome variables including total enrollment levels and completion rates; enrollment and completion rates for minorities, women and other non-traditional populations; and program size and sustainability of union and non-union construction apprenticeship programs.

Key Findings

The findings of this study show that union apprenticeship programs in Massachusetts are more successful at enrolling apprentices and producing journey-level workers than are non-union programs. Specifically, we find that:

- union programs enroll the majority of building trade apprentices,
- the apprentice completion rates from union programs is higher than from non-union programs,
- union programs enroll non-traditional populations in higher numbers and at higher rates than do non-union programs, and
- the apprentice completion rates of non-traditional populations from union programs is higher than from non-union programs.

In addition, in examining the sustainability of union and non-union apprenticeship programs in Massachusetts, we found that the union programs are both larger and longer lasting than the non-union programs, and that the majority of non-union programs fail to produce even a single journey-level worker. When looked at together, these findings question the claim that non-union programs are as effective at joint labor-management programs. Indeed, we believe these findings suggest that non-union businesses may be registering apprenticeship programs that are never intended to provide the education and work experience sufficient to develop journey-level building trades workers.

Recommendations

We offer the following recommendations to the Massachusetts Division of Apprentice Training (DAT) in order to ensure that all apprenticeship programs are complying with the DAT's standards and providing all enrolled apprentices with the skills and knowledge to become successful construction journey-level workers:

Recommendation 1: The DAT examine non-traditional population enrollment and completion rates in conjunction with affirmative action plans submitted by apprentice sponsors in order to identify and address any barriers faced by apprentices from non-traditional populations.

Recommendation 2: The DAT address the concern that non-union businesses may be registering apprenticeship programs not intended to provide the education and work experience sufficient to develop journey-level building trades workers by using the available data to determine what further oversight is needed to ensure that its established standards are being met by all registered apprenticeship programs.

Recommendation 3: To provide better comparative data, the DAT redesign its data collection tools to duplicate the national data collected by the U.S. Department of Labor's Office of Apprenticeship Training, Employer and Labor Services (OATELS), including the collection of Standard Industrial Classification (SIC) and Standard Occupational Classification (SOC) codes for all apprentice programs and program sponsors.

Introduction

Apprenticeship—the systematic transfer of workplace skills from experienced crafts people to new generations—is an ancient form of workforce development. Until modern times, apprentices were usually children working under very harsh conditions that were only technically different from indentured servitude. Beginning with laws passed in the 17th century mandating that apprentices receive instruction in their trades and be taught to read and write, Massachusetts has led the way in improving conditions for apprentices through regulation and standard setting (Bremner, 1970). Apprenticeship in the United States was largely unregulated at the federal level until the passage of the National Apprenticeship Act (NAA) in 1937. The NAA directed the Secretary of Labor "to formulate and promote the furtherance of labor standards necessary to safeguard the welfare of apprentices" and "bring together employers and labor for the formulation of programs of apprenticeship" (U.S. National Apprenticeship Act).

While apprenticeship declined nationally in the 19th century as industrialization undermined craftsmanship and it became increasingly expensive to capitalize and operate the small master's shop, it has grown since the end of World War I (Rorabaugh, 1986). Following World War I, with the exception of the 1930's depression era, apprenticeship grew steadily until the economic dislocations of the 1970's. The late 20th century and early 21st century have brought a steady decline in work-based benefits and job security coupled with a weakened national labor movement as nation-wide union density has declined. However, the number of apprenticeship programs has held steady and even increased in this period. Apprenticeship's resilience to economic change may be explained by the continued need for more technically skilled workers. Some have attributed the strength of the apprenticed sectors to the efficiencies of apprenticeship: though expensive upfront, the apprentice system allows employers to invest in skilled and permanent populations of workers (Jacoby, 2001). Whatever the reasons, there are currently over 850 apprenticable occupations recognized by the United States Department of Labor and 101 of those are registered in Massachusetts (MA Division of Apprentice Training website).

While apprenticeships in both traditional (e.g. manufacturing) and emerging sectors (e.g. health care, information technology) are experiencing the volatility and insecurity that comes with globalization, technological advance, and low paid work, apprenticeship in the construction trades is well established. Despite the vagaries of economic booms and busts, the construction industry has seen consistent growth with associated labor shortages over recent decades. There are indications that this industry growth will continue: the U.S. Government Accounting Office (GAO) predicts that 850,000 construction jobs will open up between 2002 ands 2012 (U.S. GAO, 2005). In addition, construction jobs are good jobs.[1] Construction work is among the highest paid blue collar work, entry into the industry does not require greater than a high school

degree, and much of construction has remained unionized. Because of these factors, demand to enter the field is often higher than the supply of available apprenticeships (Heg and Watrus, 2007).

For 50 years after the passage of the NAA, the great majority of apprenticeship programs throughout the United States were joint labor-management programs in the unionized building trades. Construction has been a very contested sector of the economy; beginning in the 1980's, two independent forces have pushed for opening up apprenticeship in the building trades and increasing the number of non-union construction apprenticeship programs. Actual and perceived exclusion of minorities and women has fueled a movement by community-based organizations and civil rights advocates critical of the weak representation of women and minorities in most traditional joint labor-management programs (St. Paul Coalition for Diversity in the Building Trades; Philadelphia Business Journal, 2008). Concurrently, advocates of free-market economics and greater competition have challenged the preeminence of union apprenticeship training and have sought to provide greater latitude for non-union, or "open shop" contractors, to operate registered apprenticeship programs (Baird, 2003; Associated Building and Contractors, Inc., 2007), claiming that non-union programs can be as effective as established joint labor-management programs.

This study seeks to examine those claims by comparing union and non-union building trade apprenticeship programs in Massachusetts over the ten year period 1997-2007. We looked at several outcome variables including total enrollment levels and completion rates; enrollment and completion rates for minorities, women and other non-traditional populations; and program size and sustainability of union and non-union construction apprenticeship programs.

Methodology

The methodology of this study is based on similar efforts reported in unpublished studies on apprenticeship in Indiana (Vincent, 2004), Kentucky (Londrigan and Wise, 19975), Maryland (Johansson and Feinstein, 2005), Oregon (Byrd and Weinstein, 2005), West Virginia (Etherton et al., 2002), and nationwide (Bilginsoy, 1998).

Massachusetts is one of 27 states that operate their own registered apprenticeship system. The Division of Apprenticeship Training (DAT) in the Commonwealth of Massachusetts' Department of Labor and Workforce Development is responsible for promoting, developing and servicing registered apprenticeship programs. To fulfill those duties, the DAT is empowered to establish "minimum standards governing apprenticeship in Massachusetts to maintain the integrity of employment-based training programs and to safeguard the welfare of Massachusetts apprentices" (CMR, Title 453, c. 7.00), review and approve applications for apprentice programs, cancel apprentice programs due to inactivity or violation of the Apprenticeship Law (Massachusetts General Laws chapter 23 sections 11E-11W, and the Code of Massachusetts Regulations Title 453, Chapter 7.00), conduct payroll audits to ensure that the Apprenticeship Law's wage stipulations are adhered to, award State Certifications to apprentices who successfully complete registered apprentice programs, and collect data on all registered apprentice programs and apprentices.

Data for this study were provided by the DAT pursuant to a Public Records Act request filed by the authors. The analysis presented here is limited to the information collected by the DAT for the time period January 1, 1997 through October 1, 2007, and includes:

- the building trade of the apprentice
- the date the apprentice was enrolled in the program
- the projected date by which the apprentice will complete the program
- the actual date the apprentice completed the program
- the status of the apprentice within the program (e.g. active, cancelled, suspended, completed)
- the apprentice's sex, race or ethnicity, veteran's status, disabled status, and educational attainment[2]
- the sponsor of the program including sponsor name and address
- the date the apprenticeship program was approved by the DAT
- the date the apprenticeship program was cancelled
- the union status of the apprenticeship program

Once received, the data were entered into a spreadsheet program for review and analysis. First, the data were reviewed to limit inclusion to building trade apprenticeship programs. The trade listed for each apprenticeship program was examined to ensure that it was indeed a building trade and it was placed in the appropriate building trade category. Two building trades were excluded from the study due to minimal enrollment of apprentices (less than 50 enrolled apprentices over the ten year period): apprenticeship programs for fence erectors and welders were excluded because the data included only one and two apprentices, respectively, for each trade. Table 1 provides a list of the apprenticeship program trades that were included in this study.

In contrast to the National Registered Apprenticeships System, administered by the U.S. Department of Labor's Office of Apprenticeship Training, Employer and Labor Services (OATELS), the DAT does not collect Standard Industrial Classification (SIC) and Standard Occupational Classification (SOC) codes for each apprenticeship program. Without this data, we were not able to eliminate the apprenticeship programs that were not in the construction industry. Thus, while all the joint labor-management programs are known to serve the construction industry, some portion of the non-union programs included in this study undoubtedly serve other industries, such as manufacturing, education, etc. Since no DAT data were available to eliminate those programs, we are certain that we have over-estimated both the number of apprenticeship programs and the number of apprentices in non-union building trade apprenticeship programs in Massachusetts.

For the purpose of this study, "union" apprenticeship programs were defined as those programs which are sponsored jointly by unions and employers, and which are party to collective bargaining agreements. Any program that was not a joint labor-management apprenticeship program was classified as "non-union."

Finally, each apprentice's record was examined to confirm that it contained at a minimum a trade name and the name of a sponsor. Ten apprentices were excluded from the study for lack of either or both of these pieces of information. The rest of the data provided for each apprentice were not always complete. Thus, the sub-population analyses presented here, such as the analysis of racial and ethnic minorities, are based only on those apprentices about whom appropriate data were available.

Table 1: Building Trade Categories

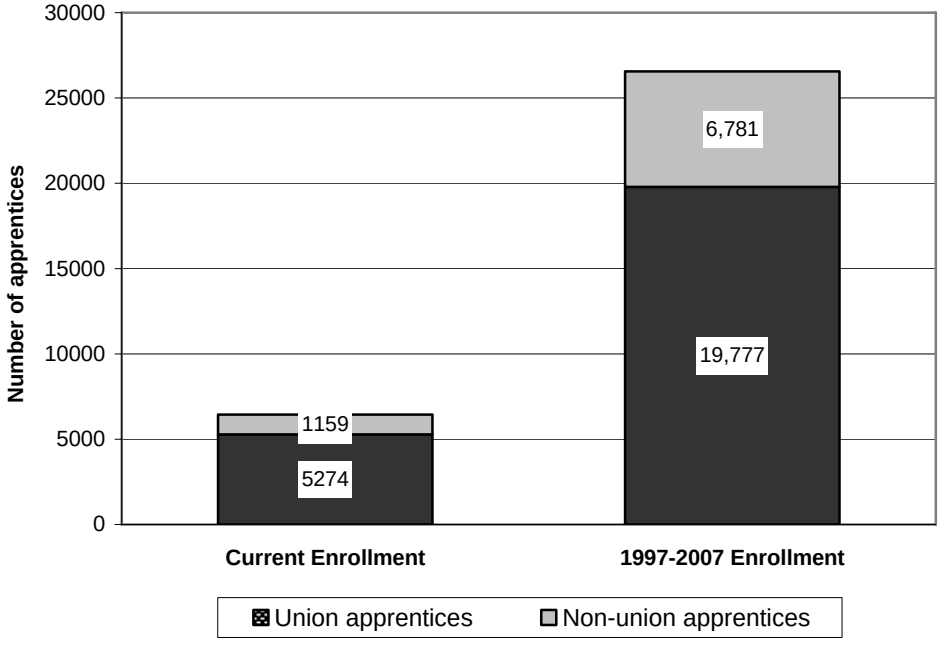
Building Trade	DAT Apprenticeship Program Trades
Asbestos worker	Asbestos worker
Boilermaker	Boilermaker
Bricklayer	Bricklayer; Bricklayer – pointer, cleaner, caulker; Terrazo finisher; Tile finisher; Tile layer; Tile setter
Carpenter	Carpenter; Cabinet maker
Cement mason	Bricklayer & cement mason (comb.); Cement mason; Plasterer
Electrician	Electrician; Electrician (Indust.maint.)
Elevator constructor	Elevator constructor
Floor layer	Floor coverer; Resilient floor layer
Glazier	Glazier
Heating & AC	Air conditioning mechanic; HVAC – Air cond mech (tech); Refrig/Air cond. & oil burner mech.; Refrigeration / Air cond. mech.
Insulation worker	Heat & frost insulator; Insulation worker
Iron worker	Iron worker
Laborer	Construction craft laborer
Millwright	Millwright
Operating engineer	Universal equipment operator (hoisting & portable engineer); Operating (hoisting & portable engineer); Hoisting & portable (heavy duty mech.)
Painter	Painter; Sign painter (commercial); Taper
Pile driver	Pile driver; Pile driver operator
Pipefitter	Pipefitter ; Pipefitter (steamfitter); Steamfitter/Pipefitter
Plumber	Gas fitter; Plumber; Plumber (5 year program)
Roofer	Roofer; Roofer & slater
Sheet metal worker	Sheet metal worker; Sheet metal wkr (bench hand); Sheet metal worker (fabr.)
Sprinkler fitter	Sprinkler fitter
Telecom	Telecom specialist; Telecom technician

Findings and Analysis

I. Apprentice Enrollment

The majority of apprentices currently registered in building trade apprenticeship programs in Massachusetts are enrolled in union programs. Of the 6433 apprentices actively enrolled as of October 1, 2007, 82% (5274) were enrolled in union apprenticeship programs and 18% (1159) were enrolled in non-union programs (Figure 1). Similarly, of the 26,558 apprentices registered in an apprenticeship program between January 1, 1997 and October 1, 2007, 74% (19,777) were registered in union programs and 26% (6781) were registered in non-union programs.

Figure 1: Enrollment in Union and Non-Union Apprenticeship Programs



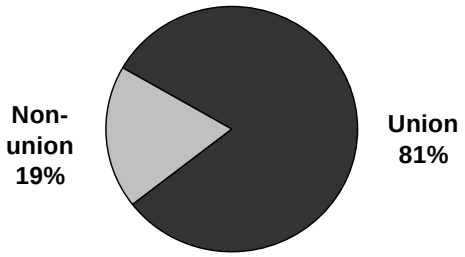
Union and non-union apprentice programs exist in all but two of the 23 trades included in this study. The exceptions are the Boilermaker and Pile Driver trades, where 100% of the apprentices have been enrolled in union apprenticeship programs due to the absence of any non-union programs. While the majority of construction apprentices have been registered in union programs, this is not the case for all trades. In four trades, the majority of apprentices registered from 1997-2007 were registered in non-union programs: Electricians (59% non-union), Heating & AC (61% non-union), Plumbers (55% non-union), and Sprinkler Fitters (59% non-union). Of the currently enrolled apprentices, the majority of apprentices are enrolled in union programs in all trades but one: Heating & AC (64% non-union). [See the Appendix for trade specific data.]

II. Apprenticeship Completion

In addition to enrolling more apprentices, apprentices in union apprenticeship programs complete their apprenticeships and attain journeyperson status at higher rates. We looked at four different measures of program completion, and in all measures union programs fared better.

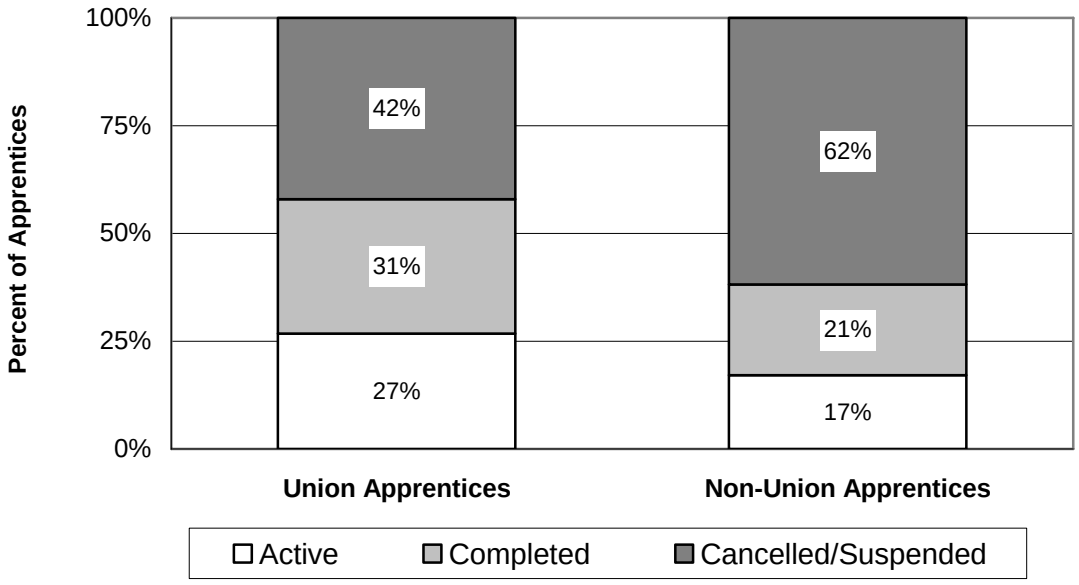
First, of the 7561 registered apprentices who successfully completed their apprenticeships from 1997 to 2007, 81% (6142) completed union apprenticeship programs and 19% (1419) completed non-union programs (Figure 2). In only one trade – Heating & AC – non-union programs produced more journey-level workers than union programs. [See Tables 2 and 3 in the Appendix for trade specific enrollment data.]

Figure 2: Union and Non-Union Share of Completed Apprenticeships (1997-2007)



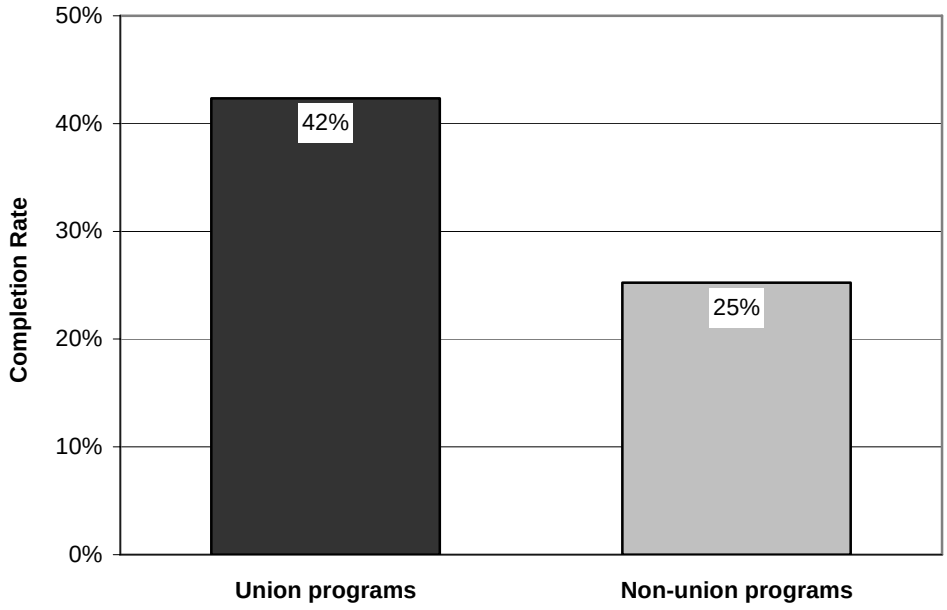
Second, Figure 3 shows that, in addition to having higher proportions of actively enrolled apprentices (27% in union programs and 17% in non-union programs), union programs have "graduated" a higher proportion of their enrolled apprentices (31%) over the past 10 years than have non-union programs (21%). Conversely, non-union programs have cancelled or suspended the apprenticeships of a higher proportion of their enrolled apprentices (62%) than have union programs (42%).

Figure 3: Apprentice Status in Union and Non-Union Programs (1997-2007)



Third, completion rates were calculated for union and non-union programs as the percentage of non-active apprentices who are recorded as having successfully completed their apprenticeship. Overall, the completion rate of union programs for the time period of 1997-2007 was 42%, while the completion rate of non-union programs for the same time period was 25% (Figure 4).

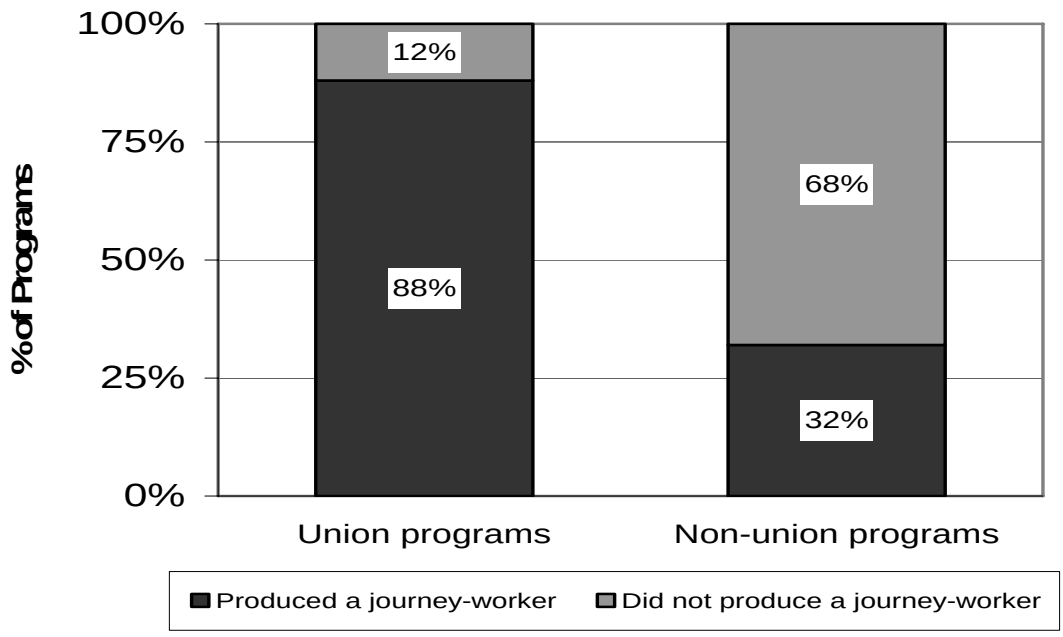
Figure 4: Completion Rates for Union and Non-Union Programs (1997-2007)



When examining completion rates by trade, the same pattern holds. Union programs' completion rates by trade varied from 11% to 86%; non-union programs' completion rates by trade varied from 0% to 64%. While these ranges overlap considerably, in only two trades was the completion rate of the union programs less than that of the non-union programs: the completion rate for union roofers was 11.1% while the rate for non-union roofers was 11.5%; and the completion rate for union laborers was 17% while the rate for non-union laborers was 26%. [See Table 4 in the Appendix for trade specific completion rates.]

Finally, we examined the number of programs registered from 1997-2007 which successfully graduated at least one journeyworker (Figure 5). Of the 86 union programs, 88% (76 programs) successfully graduated at least one journeyworker. Of the 1198 non-union programs, 32% (383 programs) successfully graduated at least one journeyworker. Thus, while the majority of union apprenticeship programs successfully produced skilled journey-level workers, the majority of non-union programs did not produce a single journey-level worker.

Figure 5: Program Success at Graduating Journeypersons (1997-2007)



III. Enrollment and Completion of Non-Traditional Populations: Women, Racial/Ethnic Minorities, Veterans, and Individuals with Disabilities

Over the ten year period of this study, union apprenticeship programs were more successful at recruiting apprentices from non-traditional populations (i.e. women, racial and ethnic minorities, veterans, and individuals with disabilities) than were non-union programs (Figure 6). The vast majority of all such apprentices were enrolled in union programs: 87% of women apprentices, 79% of apprentices from racial or ethnic minorities, 73% of apprentices who are veterans, and 77% of apprentices who have disabilities were enrolled in union apprenticeship programs. These categories are not exclusive; thus, a Latino apprentice who is also a veteran would be counted in both categories.

When we compare the recruitment rates for these populations of apprentices in union and non-union apprenticeship programs, the same pattern holds of union programs recruiting non-traditional population apprentices at higher rates (Figure 7). Recruitment rates were calculated as the percentage of all apprentices enrolled in union or non-union programs who were a member of a non-traditional population. While recruitment rates for veterans and individuals with disabilities were essentially the same for the union and non-union programs, union programs

Figure 6: Number of Non-Traditional Population Apprentices (1997-2007)

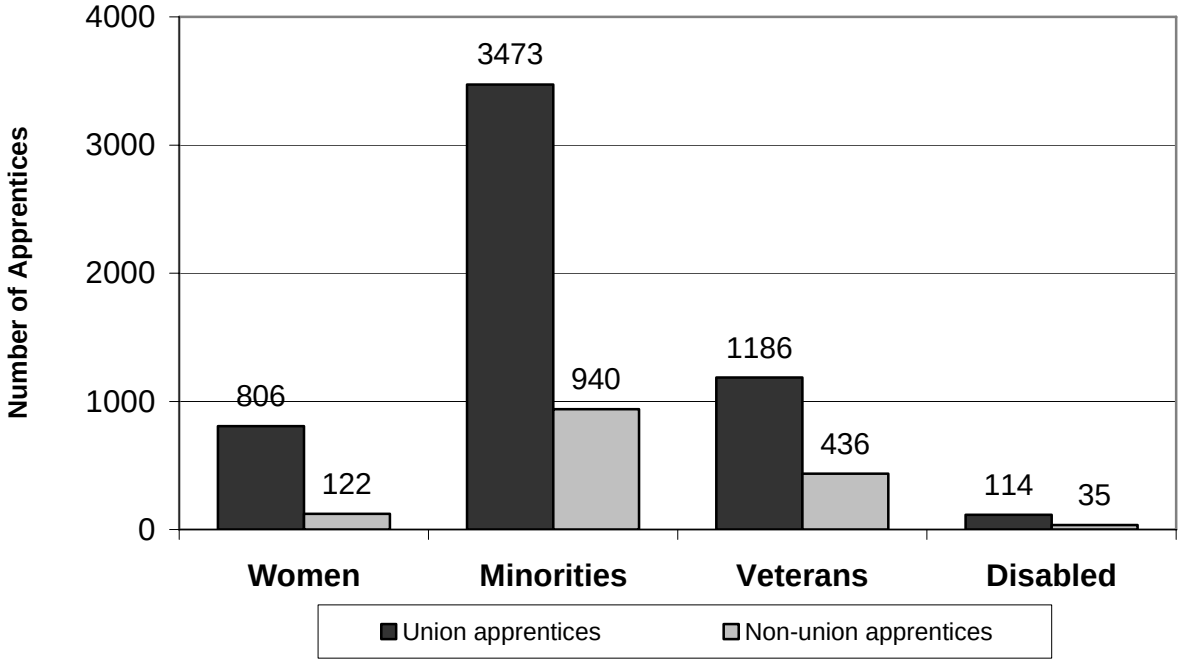
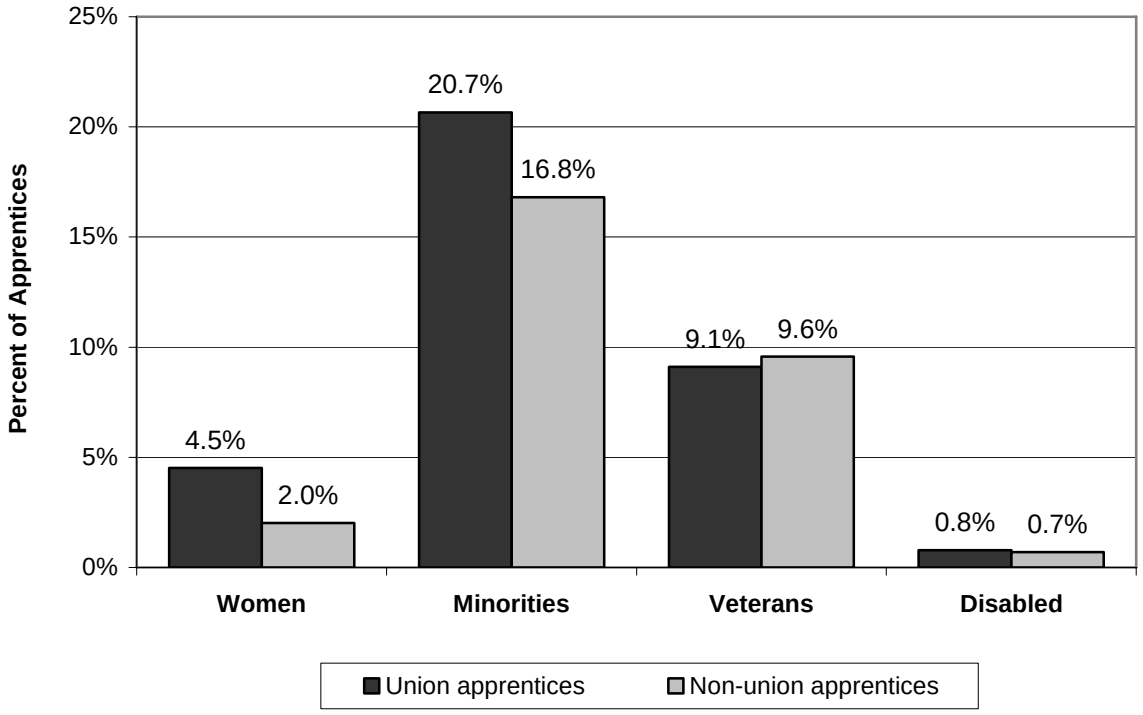


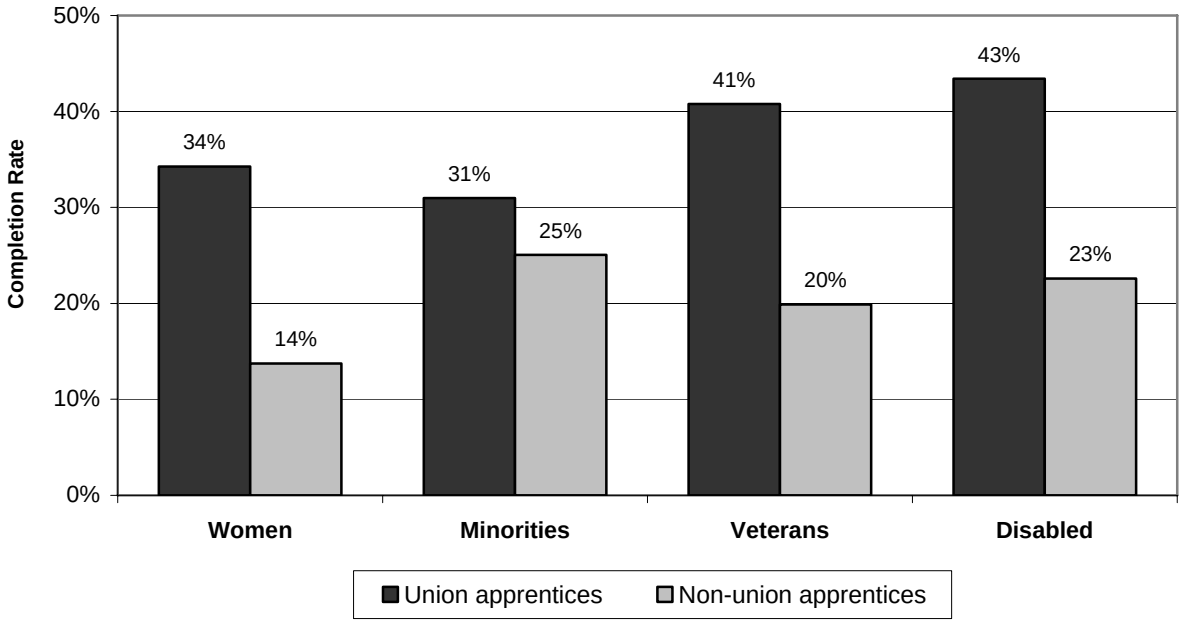
Figure 7: Enrollment of Non-Traditional Population Apprentices (1997-2007)



recruited racial/ethnic minorities at higher rates than non-union programs, and union programs recruited women at over twice the rate of the non-union programs.

In addition to recruiting more apprentices from these populations, union apprenticeship programs consistently maintained higher completion rates for apprentices from non-traditional populations than did non-union apprenticeship programs (Figure 8). Completion rates were calculated as the percent of non-active non-traditional population apprentices that have completed union and non-union apprenticeship programs. In the cases of women, veterans and apprentices with disabilities, the completion rates from union programs were double those from non-union programs.

Figure 8: Completion Rates of Non-Traditional Populations (1997-2007)

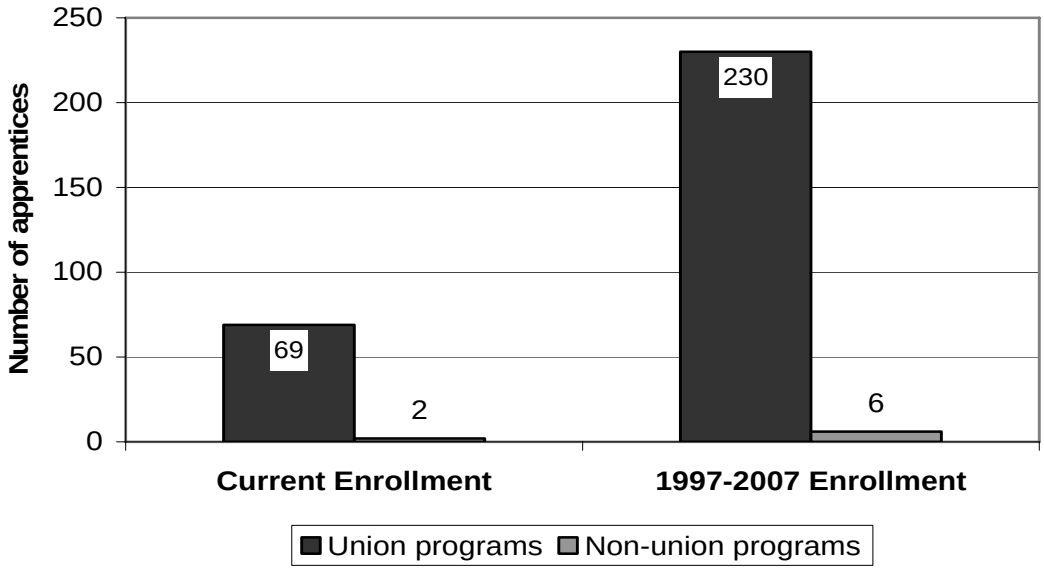


It is important to note, however, that for both union and non-union programs, the completion rates of most non-traditional population apprentices is lower than the overall completion rates for apprentices. The union apprentice programs had an overall completion rate of 42%, higher than the completion rates for women (34%) and minorities (31%) enrolled in the union programs. The non-union apprentice programs had an overall completion rate of 25%, higher than the completion rates for women (14%) and veterans (20%) enrolled in the non-union programs.

IV. Apprenticeship Program Size and Sustainability

The final data we analyzed to compare union and non-union apprenticeship programs concerned the size and sustainability of apprenticeship programs. The size difference between union and non-union programs is striking. Over the past ten years, union programs on average have enrolled 230 apprentices, while non-union programs on average have enrolled 6 apprentices (Figure 9). Of the currently operating programs, union program have 69 active apprentices on average, while non-union programs have an average of 2 active apprentices.

Figure 9: Average Size of Union and Non-Union Programs



In addition to analyzing program size, we examined the sustainability of Massachusetts building trades apprenticeship programs. We measured sustainability in two ways: as the cancellation rate of programs, and as the average age of the programs. A total of 1284 apprenticeship programs were included in the database: 86 union programs plus 1198 non-union programs. The majority of the union programs (88%) were operating as of October 2007, while the minority of the non-union programs (41%) were operating at that time (Figure 10). Thus, the union programs had a cancellation rate of 12% and the non-union programs had a cancellation rate of 59% during the ten year period of this study.

Sufficient data were available to calculate the years of operation of 1265 of the 1284 apprenticeship programs in the dataset. Of these, 1191 were non-union programs and 74 were union programs. The average years of operation of the non-union programs was 6.08 years, while that of the union programs was 21.81 years. Non-union cancelled programs on average lasted 5 years, and the non-union programs still operating are on average 7.5 years old. By

contrast, the average years of operation of the union programs that were cancelled was 20 years, and the average years of operation of the union programs still operating is 22.0 years.

Figure 10: Cancellation of Union and Non-Union Programs

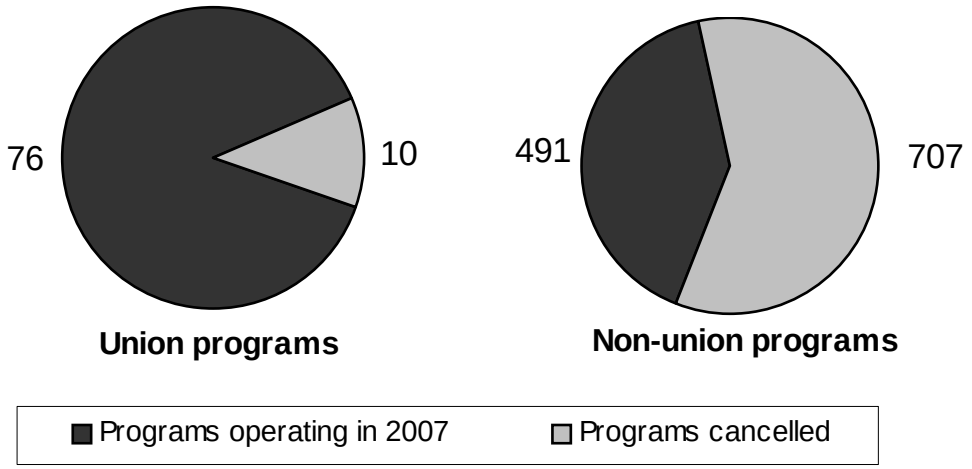
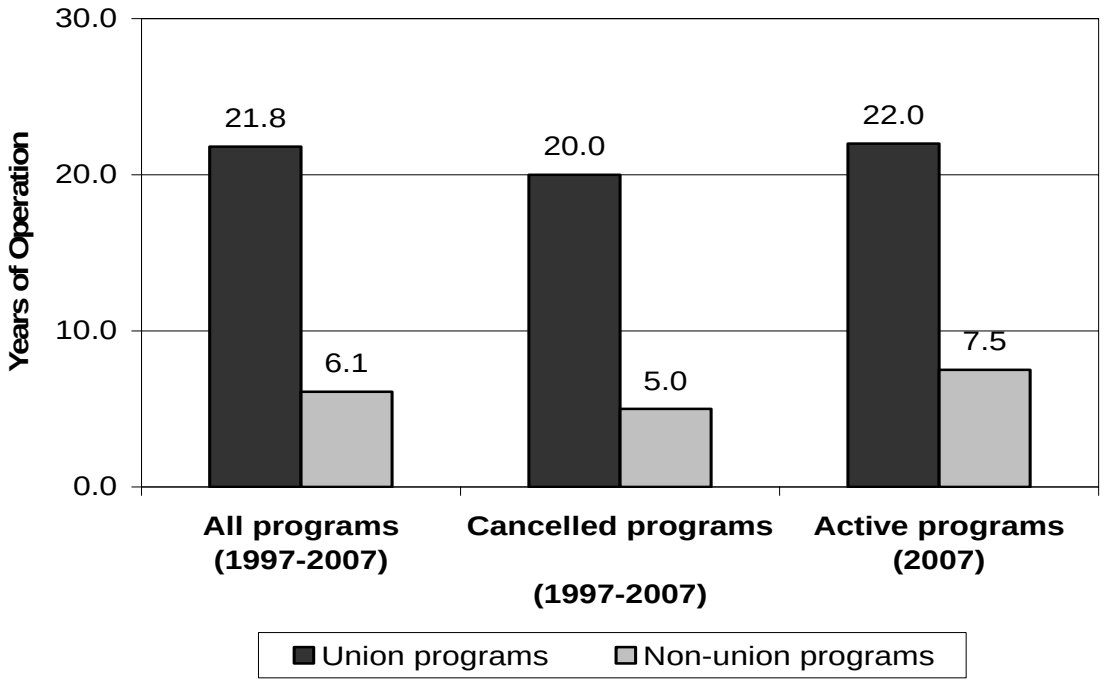


Figure 11: Average Years of Operation of Union and Non-Union Programs



Conclusions and Recommendations

The findings of this study show that union apprenticeship programs in Massachusetts are more successful at enrolling apprentices and producing journey-level workers than are non-union programs. Our specific findings for registered building trades apprentice programs in Massachusetts mirror those of other state-specific and national studies. Specifically, we find that:

- union programs enroll the majority of building trade apprentices (Londrigan and Wise, 1997; Bilginsoy, 1998; Etherton et al., 2002; Vincent, 2004; Byrd and Weinstein, 2005; Johansson and Feinstein, 2005; U.S. GAO, 2005),
- the apprentice completion rates from union programs is higher than from non-union programs (Londrigan and Wise, 1997; Bilginsoy, 1998; Etherton et al., 2002; Byrd and Weinstein, 2005; Johansson and Feinstein, 2005; U.S. GAO, 2005),
- union programs enroll non-traditional populations in higher numbers and at higher rates than do non-union programs (Londrigan and Wise, 1997; Bilginsoy, 1998; Vincent, 2004; Byrd and Weinstein, 2005; Johansson and Feinstein, 2005), and
- the apprentice completion rates of non-traditional populations from union programs is higher than from non-union programs (Londrigan and Wise, 1997; Bilginsoy, 1998; Byrd and Weinstein, 2005; Johansson and Feinstein, 2005).

One critique of joint labor-management building trades apprenticeship programs that we set out to explore was that union programs fail to serve women, minorities, and other non-traditional populations. While we found that apprentices from these non-traditional populations are enrolling and completing union programs at higher rates than non-union programs, it is important to note that enrollment and/or completion rates for these populations remain lower than the overall enrollment and completion rates. Great strides have been made in enrolling apprentices from racial and ethnic minorities; indeed the enrollment rates for minority apprentices in union programs (21%) exceeds the estimated 16-19% of the Massachusetts civilian workforce that ethnic and racial minorities constitute.[3] Similarly, union and non-union programs are enrolling veterans at rates (9.1% and 9.6%, respectively) that exceed veterans' participation in the Massachusetts workforce (5.6%). However, enrollment rates for women and people with disabilities remain very low. Women are estimated to make up 48% of the Massachusetts civilian workforce, but they enroll in union and non-union apprenticeship programs at the rates of 4.5% and 2.0%, respectively. Disabled people are estimated to make up 5.2% of the Massachusetts workforce, yet make up less than 1% of the enrollees in both union and non-union programs.

In addition, our study has found that the completion rates for these non-traditional populations are often lower than the completion rates for all apprentices. Women are completing union and non-union programs at lower rates than the average apprentice, and minority apprentices are completing union programs at lower rates. These findings suggest that potential barriers to recruitment and completion exist in Massachusetts, as have been found in other states (Taylor, 2006), which should be explored. The DAT's enforcement of the requirement that all apprentice programs with more than five apprentices develop and submit an affirmative action plan provides an opportunity to identify and address any such barriers.

While our findings are typical of similar studies, we were struck by a pattern in the data that suggests that more oversight of non-union programs may be needed. In exploring the sustainability of apprenticeship programs, we noted that the union programs are both larger and longer lasting than the non-union programs. In addition we noted that the majority of non-union programs fail to produce even a single journey-level worker. When looked at together, these findings question the claim that non-union programs are as effective as joint labor-management programs. Indeed, we believe these findings suggest that non-union businesses may be registering apprenticeship programs that are never intended to provide the education and work experience sufficient to develop journey-level building trades workers. If this is the case, then these programs should not enjoy the privileges of being recognized as registered apprenticeship programs. We recommend that the DAT use the available data to determine what further oversight is needed to ensure that its established standards are being met by all registered apprenticeship programs.

Our final recommendation is that the DAT redesign its data collection tools in order to duplicate the data collected by OATELS. Specifically, the DAT should collect SIC and SOC codes for all apprentice programs and program sponsors. This will aid the DAT, and other interested parties, in analyzing industry and occupation specific apprenticeship programs. In addition, making the data from Massachusetts compatible with the federally collected data will allow national analyses to be conducted which incorporate the Massachusetts experience.

Apprenticeship programs will continue to play an important role in our economy and society. The projected growth in the construction industry shows the increasing need for skilled construction crafts people. In addition, with the shrinkage of the unionized manufacturing sector in the United States, construction has gained importance as an industry with good jobs that is accessible to our citizens with limited academic credentials. For these reasons, it is vitally important that serious steps are taken to ensure that all apprenticeship programs are complying with the standards set by the Massachusetts DAT, and are providing all enrolled apprentices with the skills and knowledge to become successful construction journey-level workers.

Endnotes

[1] The phrase "good jobs" is widely used in the public discourse on workforce and economic development. However, it is rarely defined. We choose to use the following definition from http://www.aflcio.org/issues/politics/issues_goodjobs.cfm:

"Good jobs support families and communities, pay decent wages and provide good health care and retirement benefits, …enable employees to freely exercise their freedom to form unions and bargain collectively, …ensure fair and nondiscriminatory treatment, are safe and healthy, give workers the flexibility and resources they need to nurture their families and provide them with skills and opportunities for advancement."

[2] Educational attainment was excluded from the analysis due to the large number of missing values for this variable in the data set.

[3] Estimates are based on the U.S. Census Data, 2006 American Community Survey: http://factfinder.census.gov

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Appendix:

Trade Specific Data

Table 2: Trade Specific Enrollment Data (1997-2007)

Trades	Number of Apprentices			Number of Apprentice Programs		
	Total	Union (%)	Non-union (%)	Total	Union (%)	Non-union (%)
Asbestos worker	191	168 (88%)	23 (12%)	6	2 (33%)	4 (67%)
Boilermaker	217	217 (100%)	0	1	1 (100%)	0
Bricklayer	1077	1001 (93%)	76 (7%)	30	9 (30%)	21 (70%)
Carpenter	5166	4993 (97%)	173 (3%)	80	12 (15%)	68 (85%)
Cement mason	118	90 (76%)	28 (24%)	18	5 (28%)	13 (72%)
Electrician	5658	2320 (41%)	3338 (59%)	437	4 (1%)	433 (99%)
Elevator constructor	689	684 (99%)	5 (1%)	3	2 (67%)	1 (33%)
Floor layer	659	563 (85%)	96 (15%)	8	2 (25%)	6 (75%)
Glazier	235	221 (94%)	14 (6%)	7	2 (29%)	5 (71%)
Heating & AC	832	326 (39%)	506 (61%)	104	6 (6%)	98 (94%)
Insulation worker	85	71 (84%)	14 (16%)	7	1 (14%)	6 (86%)
Iron worker	1783	1739 (98%)	44 (2%)	21	5 (24%)	16 (76%)
Laborer	1060	898 (85%)	162 (15%)	45	1 (2%)	44 (98%)
Millwright	173	114 (66%)	59 (34%)	29	1 (3%)	28 (97%)
Operating Engineer	423	380 (90%)	43 (10%)	28	6 (21%)	22 (79%)
Painter	959	850 (89%)	109 (11%)	40	3 (8%)	37 (92%)
Pile Driver	117	117 (100%)	0	2	2 (100%)	0
Pipefitter	900	602 (67%)	298 (33%)	84	5 (6%)	79 (94%)
Plumber	1174	525 (45%)	649 (55%)	146	6 (4%)	140 (96%)
Roofer	2199	1990 (91%)	209 (9%)	24	3 (13%)	21 (87%)
Sheet metal worker	1361	1067 (78%)	294 (22%)	59	2 (3%)	57 (97%)
Sprinkler fitter	494	202 (41%)	292 (59%)	57	2 (4%)	55 (96%)
Telecom	988	639 (65%)	349 (35%)	48	4 (8%)	44 (92%)
TOTALS	26,558	19,777 (74%)	6,781 (26%)	1,284	86 (7%)	1,198 (93%)

Table 3: Trade Specific Enrollment Data for Currently Operating Programs (2007)

* Includes data on apprentices active in operating programs as of October 1, 2007.

Trades	Number of Apprentices			Number of Apprentice Programs		
	Total	Union (%)	Non-union (%)	Total	Union (%)	Non-union (%)
Asbestos worker	13	8 (62%)	5 (38%)	2	1 (50%)	1 (50%)
Boilermaker	38	38 (100%)	0	1	1 (100%)	0
Bricklayer	307	296 (96%)	11 (4%)	17	9 (53%)	8 (47%)
Carpenter	1285	1257 (98%)	28 (2%)	25	6 (24%)	19 (76%)
Cement mason	25	18 (72%)	7 (28%)	13	4 (31%)	9 (69%)
Electrician	1472	972 (66%)	500 (34%)	168	4 (2%)	164 (98%)
Elevator constructor	405	401 (99%)	4 (1%)	3	2 (67%)	1 (33%)
Floor layer	167	161 (96%)	6 (4%)	3	2 (67%)	1 (33%)
Glazier	39	37 (95%)	2 (5%)	4	2 (50%)	2 (50%)
Heating & AC	375	136 (36%)	239 (64%)	58	5 (9%)	53 (91%)
Insulation worker	33	31 (94%)	2 (6%)	4	1 (25%)	3 (75%)
Iron worker	227	216 (95%)	11 (5%)	9	3 (33%)	6 (67%)
Laborer	398	356 (89%)	42 (11%)	31	1 (3%)	30 (97%)
Millwright	16	14 (88%)	2 (12%)	8	1 (13%)	7 (87%)
Operating Engineer	74	67 (91%)	7 (9%)	15	6 (40%)	9 (60%)
Painter	164	153 (93%)	11 (7%)	13	3 (23%)	10 (77%)
Pile Driver	11	11 (100%)	0	2	2 (100%)	0
Pipefitter	285	233 (82%)	52 (18%)	43	4 (9%)	39 (91%)
Plumber	254	190 (75%)	64 (25%)	46	5 (11%)	41 (89%)
Roofer	205	195 (95%)	10 (5%)	9	3 (33%)	6 (67%)
Sheet metal worker	302	263 (87%)	39 (13%)	33	2 (6%)	31 (94%)
Sprinkler fitter	180	94 (52%)	86 (48%)	31	5 (16%)	26 (84%)
Telecom	158	127 (80%)	31 (20%)	24	4 (17%)	20 (83%)
TOTALS	6433	5274 (82%)	1159 (19%)	562	76 (14%)	486 (86%)

Table 4: Apprenticeship Completion by Trade (1997-2007)

Trades	Number Completed		Completion Rates*	
	Union	Non-Union	Union	Non-union
Asbestos worker	95	4	59%	22%
Boilermaker	86	--	48%	--
Bricklayer	397	13	56%	20%
Carpenter	1388	28	37%	19%
Cement mason	29	4	40%	19%
Electrician	841	694	62%	24%
Elevator constructor	200	0	71%	0%
Floor layer	116	8	29%	9%
Glazier	103	2	56%	17%
Heating & AC	163	171	86%	64%
Insulation worker	28	1	70%	8%
Iron worker	608	6	40%	18%
Laborer	90	31	17%	26%
Millwright	49	3	49%	5%
Operating Engineer	188	6	60%	17%
Painter	254	14	36%	14%
Pile Driver	33	--	31%	--
Pipefitter	187	84	51%	34%
Plumber	230	153	69%	26%
Roofer	200	23	11%	12%
Sheet metal worker	495	55	62%	22%
Sprinkler fitter	88	64	81%	31%
Telecom	274	55	54%	17%
TOTALS	6142	1419	42%	25%

** Completion rate = [(completed apprentices)/(total apprentices-active apprentices)]%*