

THE PERFORMANCE OF ABC-SPONSORED REGISTERED APPRENTICESHIP
PROGRAMS IN MICHIGAN: 2000-2016

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SUMMARY AND KEY FINDINGS

We compare the performance of the ABC-sponsored registered apprenticeship programs with those of the joint union-management and unilateral single-employer sponsored programs in Michigan construction Trades over the 2000-2016 period. We focus on the enrollment of new apprentices, occupational distribution, retention rates, wages, and demographic characteristics.

Our major findings are as follows:

- There have been five ABC-affiliated apprenticeship programs in Michigan that have been active during the period under study and currently only one program is in operation.
- The ABC programs account for a small fraction (4 percent) of all new apprentices who started training between 2000 and 2016, lagging behind the union-management joint programs (79%) as well as the unilateral single-employer programs (16%).
- A large majority (82 percent) of apprentices in ABC programs were in three trades: electrical, plumbing and pipefitting. In contrast, joint programs provided training in a more diversified portfolio of occupations.
- The ABC programs exhibit the highest rate of cancellation and the lowest rate of completion. Two-thirds of the ABC program apprentices have dropped out before completing apprenticeship requirements and 14 percent graduated. The corresponding figures were, respectively, 45 percent and 31 percent in the joint, and 57 percent and 17 percent in the unilateral single-employer programs.
- The ABC program apprentices' average starting wage was 13 percent lower than that of the joint-program apprentices, and their exit wage was lower by a factor of two. By the end of apprenticeship, the average training wage increased by 30 percent for the ABC program apprentices and 118 percent for the joint program apprentices.
- Apprentices in the ABC programs cancelled at a relatively fast rate and it is doubtful that many drop-outs had acquired a substantial quantity of skills by the time of exit.
- As a consequence of the low number of registrations and low completion rates, the ABC programs' contribution to the completed apprenticeships in Michigan was 2 percent.
- The share of ethnic/racial minorities among the new entrants in the ABC programs was 9 percent. Representation of apprentices of color in ABC-affiliated programs was below their overall share in the Michigan labor force (20 percent). The share of apprentices of color in the joint programs was 21 percent.
- Women constituted 1 percent of the new ABC-program apprentices and 4 percent of the joint program apprentices.
- The ABC programs account for 1 percent of the completed apprenticeships among both non-whites and women.
- The median age of new apprentices was lower in the ABC programs but the younger cohort of ABC apprentices also experienced a cancellation rate.
- Educational levels of new apprentices were similar across the programs although the ABC programs had relatively fewer new apprentices with post-secondary or technical training.

INTRODUCTION

In the U.S. the Office of Apprenticeship (OA) of the U.S. Department of Labor at the federal level and federally-recognized State Apprenticeship Agencies at the state level set and enforce standards for apprenticeship training, and provide technical assistance to establish and develop apprenticeship programs. Apprenticeship programs that agree to meet these standards register with either the federal or the state agencies. Michigan apprenticeship programs are registered with the OA. All OA-registered programs and state agency-registered programs from several states report individual-level information on the registered apprenticeship programs and apprentices to the OA. The OA compiles the data collected from all federally-registered programs and state-level registered programs in several states in the Registered Apprenticeship Partners Information Management Data System (RAPIDS). In this report we use this database to describe the recent trends in the construction sector registered apprenticeship training in Michigan with special emphasis on the performance of programs that are affiliated with the Michigan-based chapters of the Associated Builders and Contractors, Inc. (ABC).

In the US apprenticeship programs are sponsored either jointly by unions and employers (or in a few cases by a single employer) that are signatories to collective bargaining agreements (henceforth joint programs), or unilaterally by employers. In joint programs, the collective bargaining agreement specifies the training wages and apprentice-worker ratios. Employers contribute cents per every hour of labor hired to a training trust fund to finance training activities. The Joint Apprenticeship and Training Committee, composed of representatives of unions and employers in equal numbers, administers the training program.

Unilateral programs are sponsored either by an individual employer (unilateral single-employer programs or USEP) or by a group of employers (unilateral multiple-employer programs or UMEP). UMEP are usually organized under the leadership of a trade association, and financed by the participating employers. ABC-sponsored programs fall under this category. In contrast to the joint programs, however, participation in UMEP is voluntary.

The RAPIDS database lists seven ABC-affiliated apprenticeship programs in Michigan (Table 1). The earliest of these programs were registered in 1978. The most recent program registration was in 1993. In 2017, however, only one program was still active. Two programs were closed down as early as 1988 and 1994. The other four closed down between 2006 and 2014.

Table 1: ABC-affiliated Apprenticeship Programs in Michigan

ABC Chapter	Program number	Registration date	Status as of Dec 31, 2016	Closure date
Northern Michigan	MI009930004	12/31/1978	Closed down	1/6/1994
Western Michigan	MI006780023	12/31/1978	Closed down	1/11/2007
Saginaw Valley	MI004790005	9/12/1979	Closed down	8/15/1988
Southeastern Michigan	MI015850013	4/29/1985	Active	
Central Michigan	MI007880002	5/13/1988	Closed down	8/15/2014
Saginaw Valley	MI004920003	3/20/1992	Closed down	5/4/2006
Northern Michigan	MI009930004	12/29/1993	Closed down	8/20/2008

In addition to the apprenticeship programs, the ABC is also associated with non-apprenticeship training programs in Michigan. The Greater Michigan Construction Academy (GMCA), according to the ABC website, provides training that “has met and exceeded all required standards of the nationally standardized program” in eleven different trades.¹ These programs are not registered with the OA and they are not included in the RAPIDS database.

The GMCA reported on its website that it has graduated 500 trainees in 33 years.² Another source of information on GMCA program performance is the Pure Michigan Talent Connect: Michigan Training Connect. This is a state-run program which includes a website that offers prospective apprentices information on skilled trades training programs. The information provided includes the cost of a program, course length, number of graduates in the past year, completion and employment rates.³

On this website, the GMCA reported 14 courses with 73 graduates in the past year and a 100% completion rate.⁴ The information appears to be self-reported and unverified. Further, these courses are not comparable with registered apprenticeships. For instance, the length of the GMCA electrician course (which reportedly had 25 graduates last year) is 576 hours. This length coincides with the related-technical-instruction (RTI) requirement of modal OA-registered electrician apprenticeship program. In addition to RTI, however, the latter also requires 8,000 hours of on-the-job training (OJT).

One potential overlap between the GMCA and the registered apprenticeship programs is the RTI. Registered apprenticeship programs combine practical on-the-job training with in-class instruction. The GMCA states at it that it provides in-class instruction to the registered apprentices in Michigan. However, according to the RAPIDS, none of the ABC programs listed in Table 1 listed the GMCA as the RTI provider to its apprentices.

Due to the lack of systematic and verifiable information on their performance and their incomparability with the registered apprenticeship programs, the GMCA programs lie outside the scope of the present study.

¹ <http://www.abcgmc.org/en-us/educationandtraining.aspx> and <http://www.gmcacademy.org/> (accessed September 10, 2017).

² <http://www.gmcacademy.org> (accessed September 10, 2017).

³ <https://jobs.mitalent.org/mitc/Search/Training> (accessed September 30, 2017).

⁴ <https://jobs.mitalent.org/MiTC/Program/ProgramList> (accessed September 30, 2017).

SPONSORS OF APPRENTICESHIP PROGRAMS AND NEW REGISTRATIONS

In Michigan, there were 668 “active” apprenticeship programs in construction occupations between 2000 and 2016.⁵ We define an “active program” as one in which at least one new apprentice was registered between 2000 and 2016. Table 2 provides information on the number of programs and new registrations by program sponsor type. USEP were by far the most numerous, accounting for 83 percent of all active programs (Figure 1). There were, on the other hand, only ten UMEP programs, and five of these were affiliated with the ABC.

New apprentice registrations by program sponsor type, however, yields a different picture. Over the period under study 40,670 new registrations occurred in Michigan apprenticeship programs. A large majority of these apprentices (79 percent) were in the joint programs (Figure 2). Only 4 percent of the new apprentices registered in the ABC-affiliated programs.

Comparison of the number of programs with the number of registrations per program indicates that USEP were, on average, “small” in the sense that many of these programs registered very few apprentices over the period under study. Indeed, the median number of total new registrations in these programs was three. By comparison, median new registrations in the joint- and ABC-sponsored programs were, respectively, 133 and 208.

Table 2: Active Programs by Sponsor Type

Program sponsor type	Number of Programs	Number of Registrations
Joint	102	32,213
USEP	556	6,242
UMEP: ABC	5	1,714
UMEP: Non-ABC	5	501
Total	668	40,670

⁵ There are also also registered military and prison apprenticeship programs. We exclude these programs in this study.

Figure 1: Distribution of Active Programs by Sponsor Type

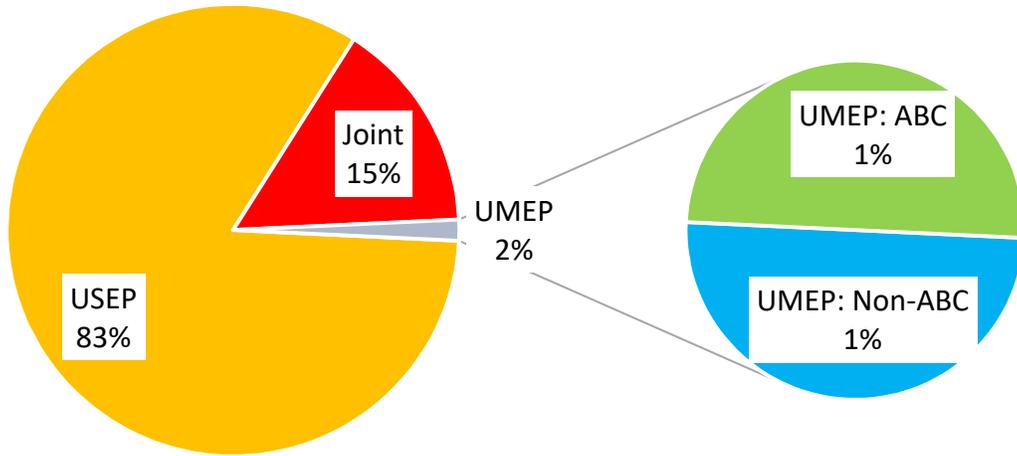
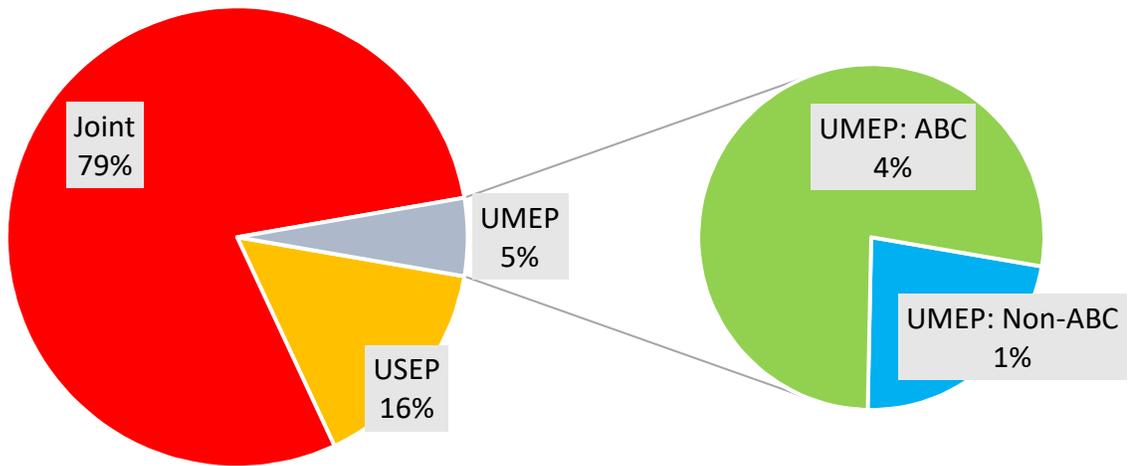


Figure 2: Distribution of New Registrations by Sponsor Type



New registrations in each ABC-affiliated program are presented in Table 3. The shaded cells indicate the years during which the program was not in operation. Empty cells, otherwise, indicate no new registrations occurring during the year. Table 3 indicates that there was only one program (sponsored by the Southeastern chapter) that admitted apprentices consistently over time.

Table 3: New Apprentice Registrations in the ABC-affiliated Programs in Michigan

	Northern	Northern	Saginaw Valley	Saginaw Valley	Western	Central	South-eastern	All ABC programs
2000		23			171	14	21	229
2001		20		3	197	24	29	273
2002		10		17	129	5	23	184
2003				1	48	15	10	74
2004				5		6	51	62
2005		1		5		10	47	63
2006						14	31	45
2007						30	32	62
2008						29	23	52
2009						6	20	26
2010						25	114	139
2011						22	99	121
2012						8	50	58
2013							56	56
2014							54	54
2015							143	143
2016							73	73
Total		54		31	545	208	876	1,714

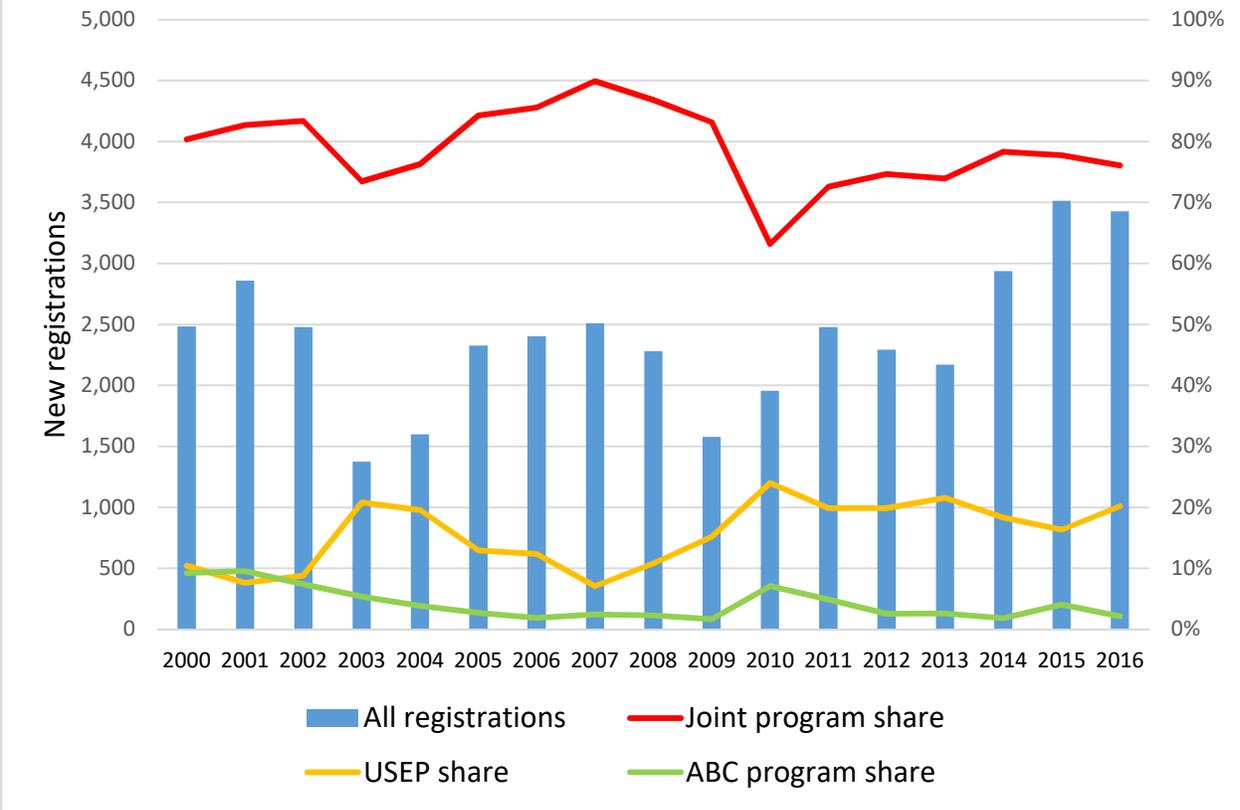
Table 4 shows annual new registrations by program sponsor type. Figure 3 illustrates the total registrations and the shares by sponsor type. New registrations dipped in 2003 and 2009-2010. The second dip coincides with the Great Recession, and recovery in new registrations during the following few years was anemic. Only after 2014 was there a robust growth in new apprentices entering the workforce. These variations largely reflect the fluctuations in the joint program registrations. Both the 2003 and 2009-2010 dips were associated with large declines in joint program registrations.

The ABC-program shares were at their largest in 2000 and 2001, reaching as high as 10%, but gradually declined over the years. The ABC-program share rose again in 2010 but this was temporary, since the increase in the absolute number of ABC-program registrations was not sustained and the numbers of new registrations in the jointly-sponsored programs recovered.

Table 4: New Registrations in Construction Trades by Program Sponsor Type and Year

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
2000	1,995	259	229	0	2,483
2001	2,365	217	273	5	2,860
2002	2,067	218	184	10	2,479
2003	1,010	286	74	5	1,375
2004	1,220	313	62	4	1,599
2005	1,962	301	63	2	2,328
2006	2,056	297	45	4	2,402
2007	2,256	178	62	13	2,509
2008	1,980	246	52	3	2,281
2009	1,312	239	26	0	1,577
2010	1,237	470	139	111	1,957
2011	1,799	492	121	66	2,478
2012	1,711	455	58	68	2,292
2013	1,604	468	56	42	2,170
2014	2,300	538	54	45	2,937
2015	2,732	573	143	67	3,515
2016	2,607	692	73	56	3,428
Total	32,213	6,242	1,714	501	40,670

Figure 3: New Apprenticeship Registrations in Construction Trades



OCCUPATIONAL DISTRIBUTION OF NEW REGISTRATIONS

The largest occupations were electricians, laborers, and carpenters, which jointly account for 53 percent of all registrations (Table 5).⁶ Jointly-sponsored programs, however, exhibit greater occupational diversity than the ABC-sponsored programs.

In joint programs electricians, laborers, and carpenters occupations accounted for 49% of the total number of registrations. These programs provided training to a large number of workers in 30 other occupations (Table 5, Figure 4).

In contrast, occupations in the ABC programs were far less evenly distributed. ABC programs offered training in fewer trades and 68% of all registrations were in the electrical trades (Figure 5). The next two largest trades were pipefitting and plumbing, bringing up the share of the top three occupations to 83 percent. In terms of occupational distribution this finding is consistent with the pattern observed across the U.S: ABC-sponsored training programs offer training primarily in the electrical and mechanical trades.

⁶ Identification of the construction occupations is not always clear-cut. The dataset associates an occupation sometimes with several industries. Line erectors/installers/maintainers or telecommunication technicians, for instance, are sometimes listed under construction and at other times under utilities industries; or, sheetmetal workers or millwrights are associated sometimes with construction and at others with manufacturing. Where occupations are associated with industries in addition to construction, we decided to be inclusive and listed them as construction occupations unless there was additional information (e.g. related to the program sponsor) that clearly suggested that such classification would be inappropriate. In the final construction occupations list we grouped together certain occupations.

Table 5: Registrations by Occupation and Program Sponsor Type

Occupation	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
Assembler-installer	74				74
Bricklayer	636	16	11		663
Build maintenance repair	20	25			45
Carpenter	4,413	284	93	12	4,802
Cement mason	295	2	4		301
Drywall	104	26	1		131
Electrician	4,251	3,947	1,161	20	9,379
Elevator	481	8			489
Floor layer	451	73			524
Glazier	260	10	2		272
HVAC	272	148	27		447
Insulator	315	118	43		476
Ironworker	1,461		3		1,464
Laborer	7,023	65			7,088
Line erect/install/maintain	487	140			627
Millwright	1,054	3			1,057
Operating engineer	619	1			620
Painter	798	25			823
Pipefitter	2,677	416	153	1	3,247
Plasterer	71				71
Plumber	717	476	98	32	1,323
Protect-signal installer	219	25		435	679
Rigger	85				85
Roofer	2,420	67	44		2,531
Sheet metal worker	1,315	208	60	1	1,584
Stationary engineer	79				79
Telecom technician	872	25	14		911
Tile setter/finisher	158	101			259
Tree trimmer (line clear)	575	15			590
Other trades	11	18			29
Total	32,213	6,242	1,714	501	40,670

Figure 4: New Registrations by Occupation: Joint Programs

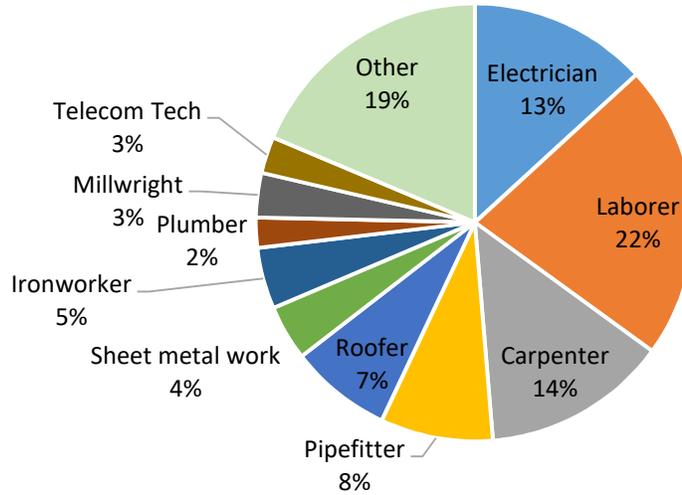
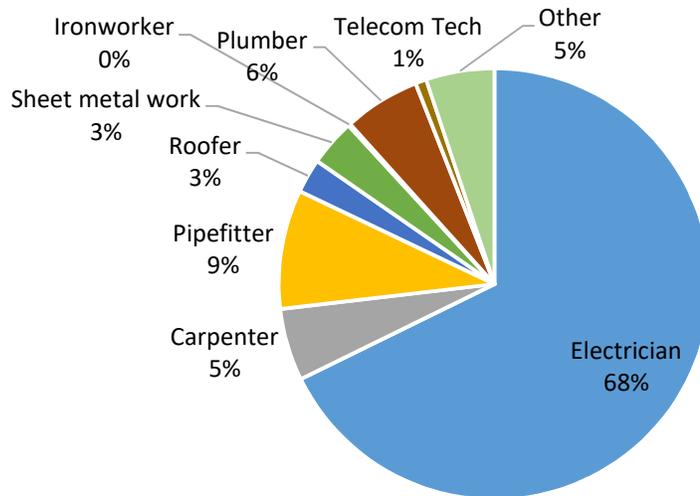


Figure 5: New Registrations by Occupation: ABC Programs



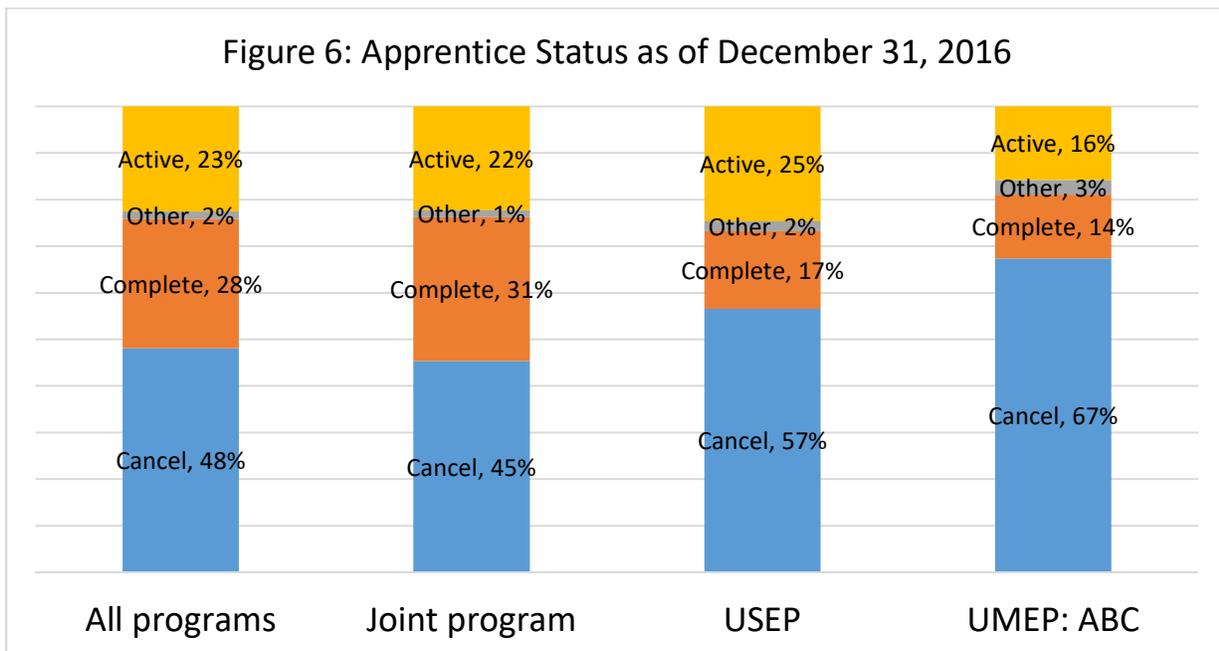
THE RATES OF COMPLETION AND CANCELLATION

Table 6 and Figure 6 show the status of apprentices as of December 31, 2016. Overall, the first column of Figure 6 shows that 48 percent of all apprentices who registered between 2000 and 2016 dropped out while 28 percent completed the required training. Another 23 percent were still in training. The category of “Other” includes apprentices who transferred to other programs (they were recorded as cancellations in the RAPIDS database), apprentices who died or had to terminate due to health reasons (also recorded as cancellations in the RAPIDS), and suspended apprentices.

There were wide variations in the performance of the apprentices across program sponsor types. In the joint programs, the cancellation and completion rates were 45 percent and 31 percent, respectively. In the ABC-programs, a much larger share of the apprentices cancelled (67 percent) while far fewer completed the program (14 percent).

Table 6: Apprentice Status as of December 31, 2016

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
Cancel	14,608	3,528	1,154	260	19,550
Complete	9,954	1,042	236	43	11,275
Active	7,170	1,541	270	197	9,178
Other	481	131	54	1	667
Total	32,213	6,242	1,714	501	40,670



The relatively small number of new registrations in combination with the larger share of cancellations imply that the ABC-programs' contribution to the crafts workforce of Michigan was modest. The total number of construction occupation apprentices who completed their programs and received certification was 11,275. Figure 7 shows that an overwhelming number of the completions, 88 percent, were joint program apprentices. USEP contributed another 9%. ABC-program apprentices accounted for only 2 percent of the completed apprenticeships.

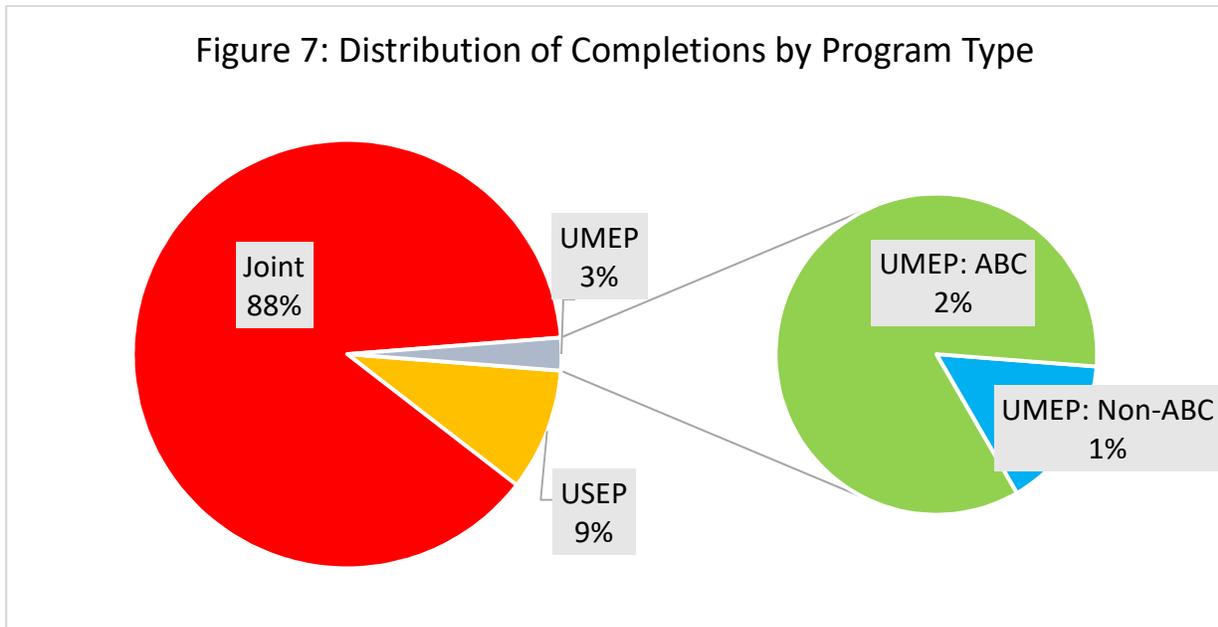
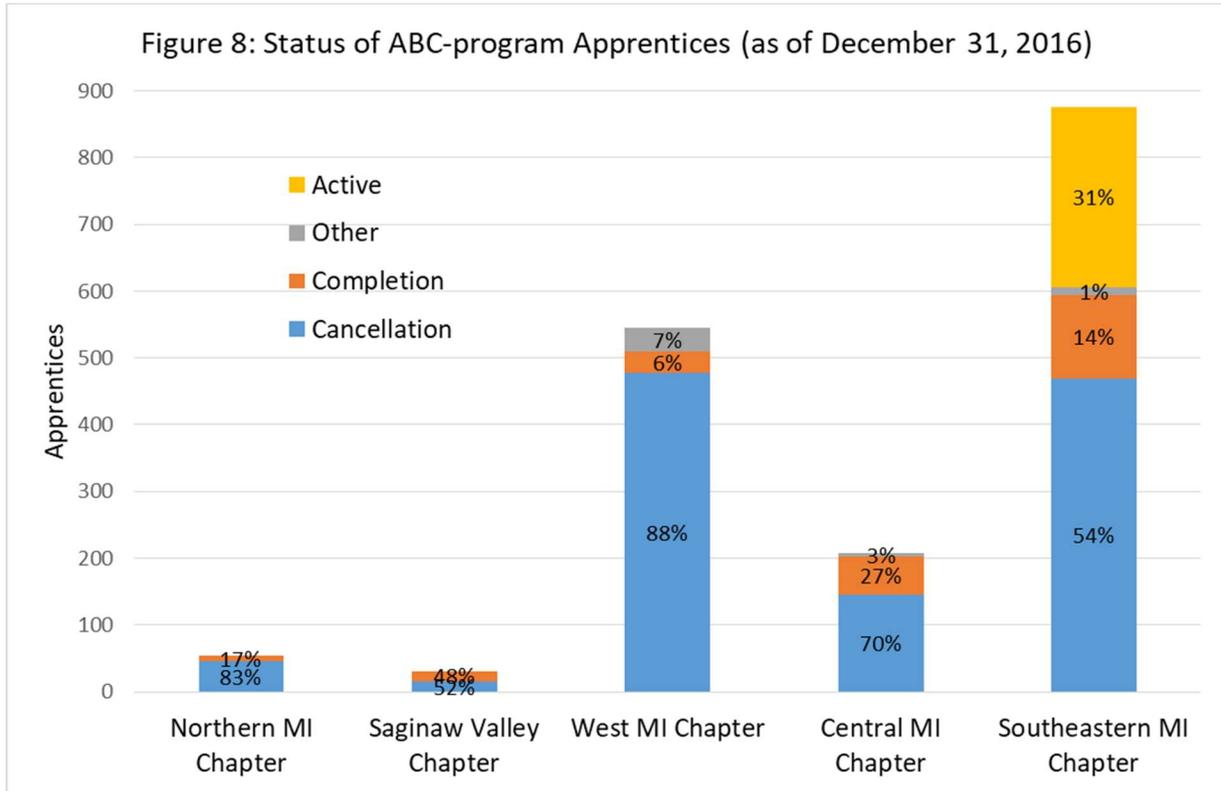


Figure 8 shows apprentices’ performance in individual ABC-programs. Only the Saginaw Valley chapter has an outstanding completion rate (48 percent), but this program had very few apprentices (31 new registrations) and has been closed down in 2007. While a substantial fraction of apprentices are still in training in the Southeastern ABC chapter, the cancellation rate is very high (54 percent) in this program. Furthermore, even if all currently active apprentices in this program graduate, given the absolute number registrations (876 registrations), the program’s contribution to the crafts workforce will not be significant.



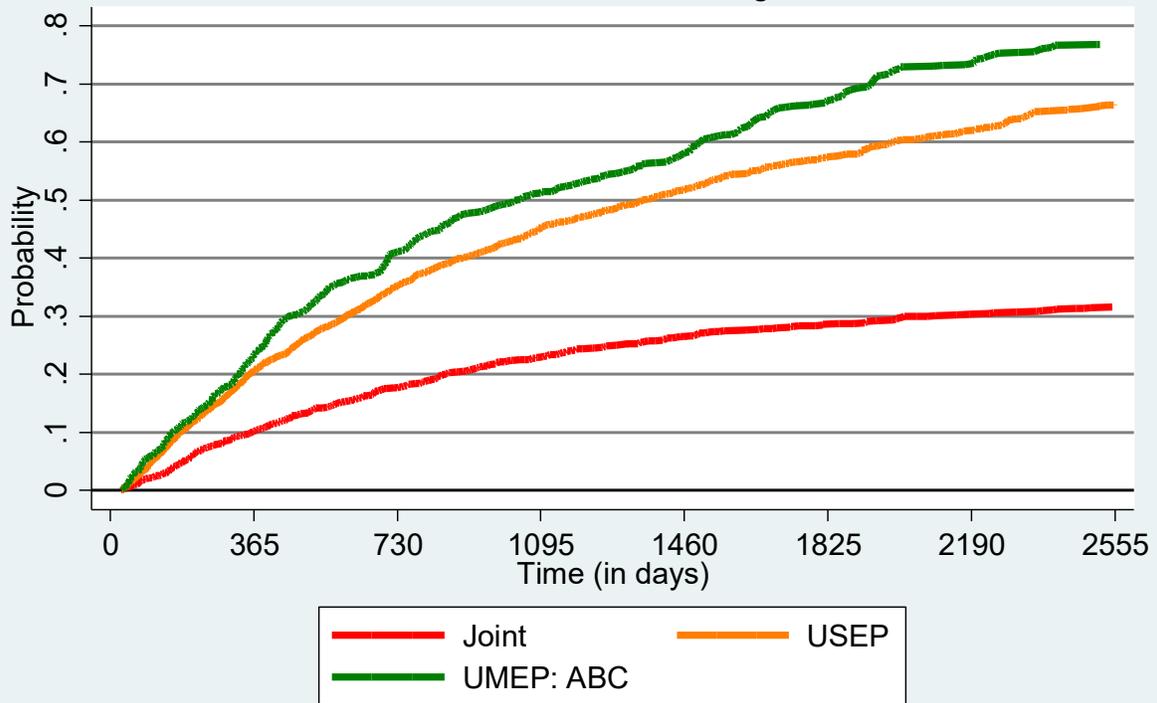
Cancellation of an apprenticeship does not necessarily signal a failure. It is conceivable that an apprentice may terminate training after acquisition of a quantity of skills that is sufficient to access well-paying jobs. Further training may be a waste of time and loss of non-training job opportunities, and, thus, be sub-optimal. Unfortunately, there is no information on the skill level of the apprentices who cancelled (such as the completed OJT hours at the time of cancellation). The closest available proxy to such a measure is the duration of apprenticeship or the calendar time that has elapsed between the dates of registration and exit.

The analysis of duration of training is confounded by the fact that apprenticeship completion requirements vary by occupation and sometimes even by training program within the same occupation. In order to isolate these confounding problems, we selected electrician apprentices who were registered in programs that require completion of 8,000 hours of on-the-job training (which is the model length of electrician programs and equivalent to four years of full-time work). Since the unilateral program apprentices are mostly electricians, this occupation is appropriate choice for making apprenticeship duration comparison across sponsor types.

After deleting “involuntary” cancellations (e.g. due to death or program closure) and observations with missing data, there were 6,950 workers who joined electrician programs between 2000 and 2016, 1,964 of whom were in the joint programs, 3,835 in the USEP, and 1,143 were in the ABC-programs. The number of apprentices who cancelled were 489 in the joint programs, 1,950 in the USEP, and 712 in the ABC-sponsored programs.

Figure 9 summarizes the timing of cancellations. According to this figure, 23 percent of the apprentices in the ABC programs dropped out by the end of the first year of apprenticeship. By the end of the second year 41% of the ABC program apprentices cancelled. In comparison, the corresponding numbers of the joint-program apprentices are 10% and 18 percent, respectively. Thus, in comparison with the joint program apprentices, ABC apprentices dropped out of training at a much faster rate. Bearing in mind that the first full-year equivalent of apprenticeship in the 8,000-hour programs is usually the probationary period and that apprentices perform, especially early on, more rudimentary tasks, it is unlikely that many of the drop-outs from the ABC programs have acquired a significant amount of skills by the time they dropped out.

Figure 9: Cumulative Probability of Cancellation
8000-hour Electrician Programs



APPRENTICE WAGES

An alternative measure of the skill progression of apprentices is to compare their starting and exit wages. Wages across apprentices are influenced by a variety of factors including the occupation and the term-length of the program. In order to facilitate a sensible comparison we select electrician apprentices who enrolled in programs with 8,000-hour OJT requirement and did not receive any OJT-credit when they first registered. Table 7 shows the mean and median starting and exit wages (not inflation corrected) of these apprentices who eventually cancelled or completed training, and the percentage change in the average training wage by the exit and program sponsor types.⁷ Figure 10 illustrates the key information from Table 7.

Joint-program apprentices earned higher training wages than the unilateral program apprentices both at the times of entry and exit, and wage differentials across programs were higher at the time of exit.

At the time of entry to training, on average, ABC-program apprentices earned \$11.15, 13 percent less than the joint-program apprentices and 12 percent more than the USEP apprentices.

The mean exit wages of the apprentices who dropped out ranged from \$11.59 in USEP to \$14.67 in joint-program apprentices. Relative to their entry wages, the mean wage of the joint program apprentices increased by 15 percent by the time of cancellation, whereas that of the ABC apprentices increased by 11 percent. When median wages are used instead of the mean, the rankings of wages and wage gains by program sponsor type do not change.

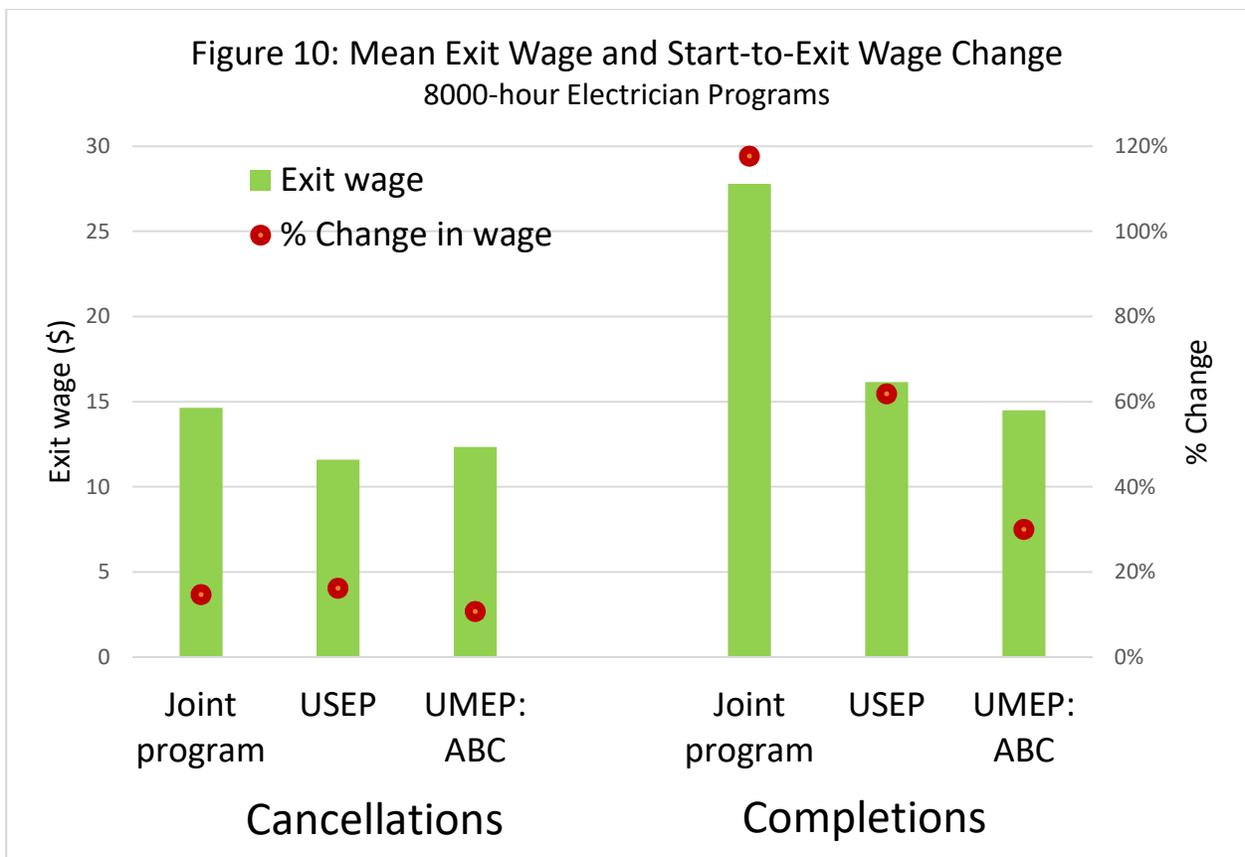
For the apprentices who completed the program, the wage outcome varied across sponsor types vary far more widely. The mean training wage of the graduating joint program apprentice was \$27.79 and this wage is higher than the starting wage by 118 percent. In contrast the mean wages of the graduating USEP and UMEP apprentices were, respectively, \$16.15 and \$14.49. The mean wage of the ABC-program graduates was higher than the starting wage only by 30 percent. When median wages are used instead of the mean, the magnitudes of percentage wage gain are higher for the joint-program and USEP apprentices but the rank-ordering by program sponsor type does not change.

⁷ Ideally, the comparison of mean or median wages and their change over time across programs should use real wages.

Table 7: Starting and Exit Wages of 8000-hour Electrician Apprentices

	Starting wage			Exit wage			% Change	
	Mean	Median	<i>N</i>	Mean	Median	<i>N</i>	Mean	Median
Cancellations								
All programs	10.99	10.00	2,745	12.27	11.00	1,961	12%	10%
Joint	12.77	12.88	766	14.64	13.88	316	15%	8%
USEP	9.98	9.35	1,449	11.59	10.50	1,196	16%	12%
UMEP: ABC	11.15	10.00	522	12.34	10.00	444	11%	0%
Completions								
All programs	10.99	10.00	2,745	22.67	19.00	784	106%	90%
Joint	12.77	12.88	766	27.79	30.00	450	118%	133%
USEP	9.98	9.35	1,449	16.15	16.65	253	62%	78%
UMEP: ABC	11.15	10.00	522	14.49	13.00	78	30%	30%

Note: *N* is the number of apprentices. Apprentices who received OJT-credit at registration are not included.



COMPOSITION OF APPRENTICES BY RACE/ETHNICITY

Stakeholders in apprenticeship training and policy-makers have expressed interest in increasing opportunities and access to apprenticeship training to demographics that are traditionally under-represented in the trades, including workers of color, women, and youth.

Table 8 and Figure 11 show the distribution of apprentices by ethnicity/race. These figures exclude registrations in year 2000 because ethnicity and race information was highly incomplete for this year. Apprentices of color include Hispanic (of all races), African, and Asian Americans, and the Pacific Islanders. The last column in Figure 10 shows the average share of each group in Michigan labor force over the 2001-2016 period.⁸

The first and last columns of Figure 11 shows the workers of color constituted about 20 percent of both all new registrants and the Michigan labor force. Relative to their overall share in the labor force, however, Hispanics are over-represented in construction trade apprenticeship workforce.

Although their critics often accuse trade unions of engaging in exclusionary practices, union-management programs fare better in including workers of color in apprenticeship than the unilateral programs. The share of ethnic-racial minorities was 21 percent in the joint programs, which is similar to their share in the overall labor force (20 percent). Among the new apprentices, Hispanics were over-represented in the joint programs (8 percent) while the “Other” is under-represented (2 percent). In the ABC-affiliated programs only 9 percent of new registrations were workers of color. The most seriously under-represented non-white group in the ABC programs is the African Americans whose share in apprenticeship is 4 percent, lagging behind their overall labor force share by eight percentage points.

Table 8: Ethnic/racial Composition of New Apprentices, 2001-2016

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
African American	2,939	325	48	23	3,335
Hispanic	2,049	210	48	1	2,308
Other	505	77	17	1	600
White	20,347	3,126	1,192	36	24,701
Total	25,840	3,738	1,305	61	30,944

⁸ Shares of demographic groups in the Michigan labor force are calculated by the authors from the CPS-ORG files (<http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/cps-org-data/>).

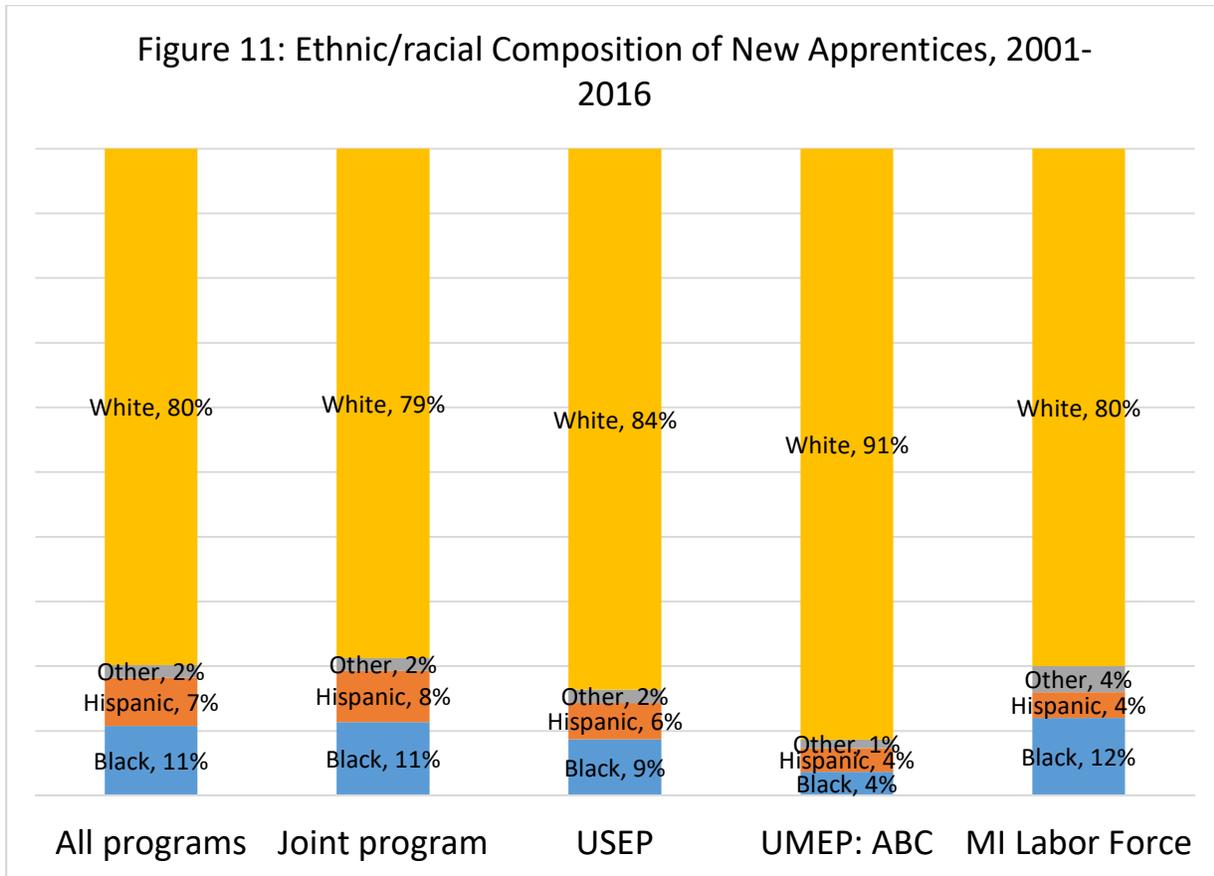


Table 9 shows the distribution of completed apprenticeships by race/ethnicity and program sponsor type. The total number of apprentices of color who completed training was 1,124 or 18 percent of all non-white registrations. This is substantially below the percentage of white apprentices who graduated (32 percent). Figure 12 shows that the majority (91 percent) of African-Americans who completed apprenticeship were trained in joint programs. The contribution of the ABC-affiliated programs to completed apprenticeships was 0 percent (3 apprentices). Among the Hispanics who completed training 92% were from the joint- and 1 percent were from ABC programs (Figure 13).

Table 9: Completions by Race/Ethnicity and Program Type

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
African American	556	46	3	9	614
Hispanic	338	27	4		369
Other	134	6	1		141
White	7,106	670	159	5	7,940
Total	8,134	749	167	14	9,064

Figure 12: Graduating African-American Apprentices by Program Sponsor Type

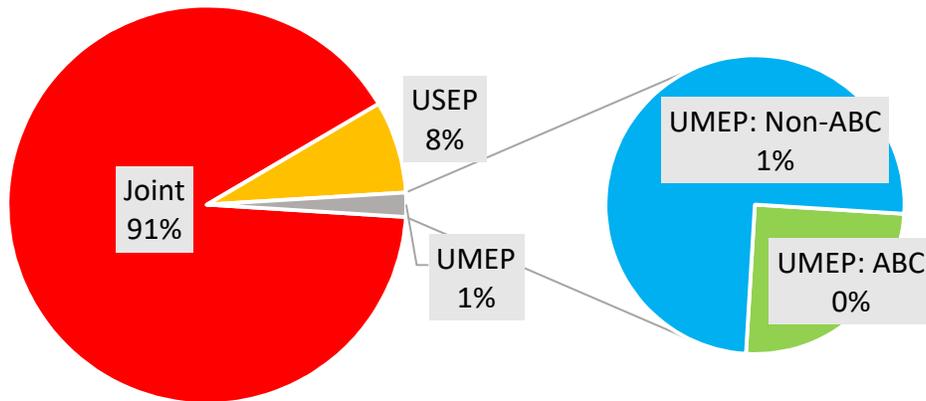
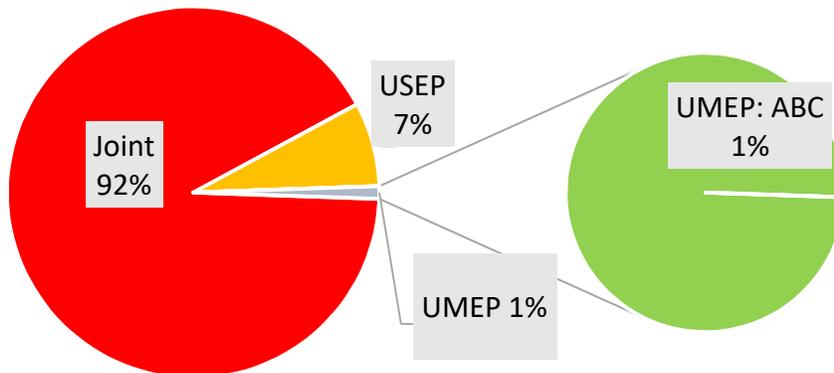


Figure 13: Graduating Hispanic Apprentices by Program Sponsor Type



GENDER COMPOSITION OF NEW APPRENTICES

Nationwide, women are under-represented in apprenticeship training for construction crafts. During the 2000-2016 period, women apprentices made up 3 percent of total new registrations in the U.S. As Table 10 and Figure 14 show, the gender composition of new apprentices in Michigan is consistent with this pattern. Women apprentices were 3 percent of all new registrations in Michigan.

The gender composition, however, varied across program sponsor types. In the ABC-affiliated programs, women's share was smaller (at 1 percent) while in joint programs it was substantially higher (4 percent). Thus, women's representation in the apprenticeship programs remain low but it is even more inadequate in ABC-affiliated programs.

Table 10: Gender Composition of New Apprentices

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
Women	1,135	87	22	12	1,256
Men	31,078	6,155	1,692	489	39,414
Total	32,213	6,242	1,714	501	40,670

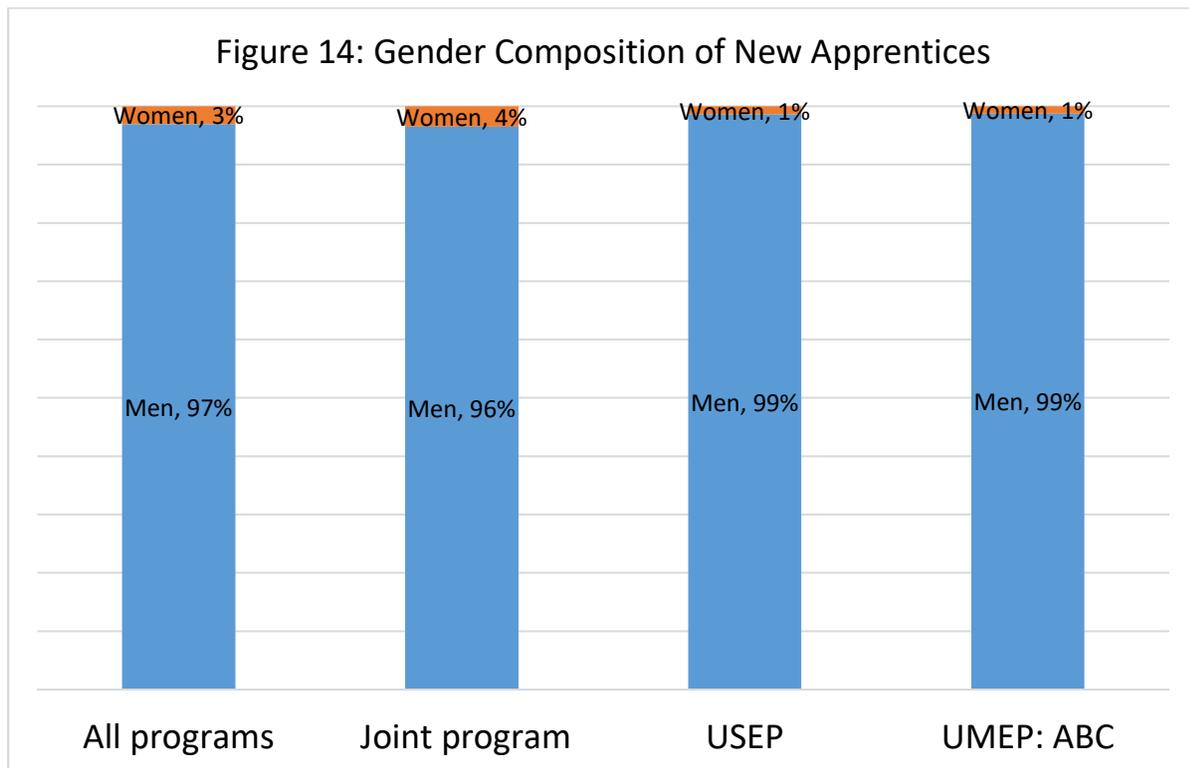
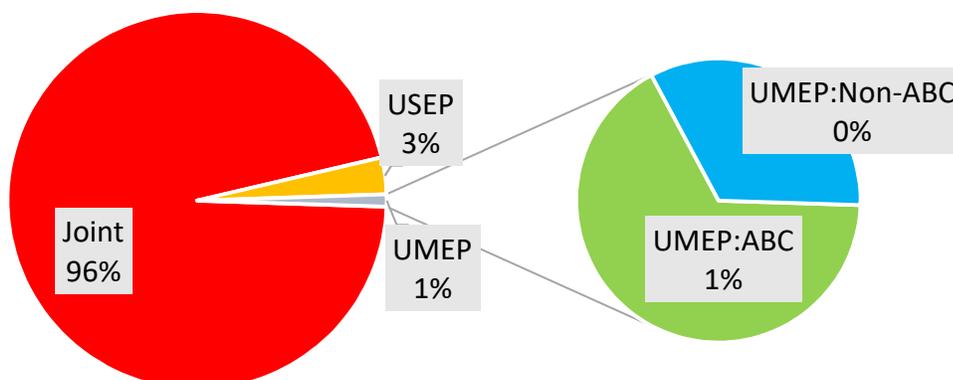


Table 11 shows the performance of women apprentices by program type. The total number of women who completed apprenticeship training was 287 or 23 percent of all women who registered. The corresponding figure for men was 28 percent. Figure 15 shows that the overwhelming majority of women who completed apprenticeship, 96 percent, were trained in joint programs. The contribution of the ABC-affiliated programs to the new women journey worker workforce was 1 percent.

Table 11: Completed Apprenticeships by Gender and Program Sponsor Type

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
Women	275	9	2	1	287
Men	9,679	1,033	234	42	10,988
Total	9,954	1,042	236	43	11,275

Figure 15: Graduating Women Apprentices by Program Type



AGE DISTRIBUTION OF NEW APPRENTICESHIPS

Relative to other industrialized countries, workers enter apprentice workforce at an older age in the U.S. This is also true for Michigan. Age distribution of Michigan apprentices at the time of registration is skewed to the right (Figure 16, Table 12). The mean and the median ages of registration are 28 and 26 years. The mass of new registrants were between the ages of 18 and 27. Of all registrations, 58 percent were in this age bracket.

The median age at entry is higher in the joint programs, 26 years, in comparison with the USEP (24 years) and ABC programs (25 years). The differences in age structure is also apparent in Figure 12. Among the ABC apprentices, 63% were in the 18-27 year age range, whereas this figure is 57 percent in joint programs. It is noteworthy that the relatively larger number of apprentices in the cohort of 18 to 22 years accounts for the difference in the age structure of the joint and the ABC-affiliated programs.

As Table 12 shows, in absolute numbers, joint programs recruit more new apprentices than the ABC-programs and the USEP in all age cohorts. As a percentage of their total registrations, however, the unilateral programs appear to be doing a better job at reaching out to the youth that has presumably completed secondary education recently. However, this is not an unqualified success. The rate of cancellation among the apprentices who started training between the ages of 18 and 22 are inordinately high in the ABC and USEP programs, at 65 percent and 58 percent, respectively. In comparison, 47 percent of the joint program apprentices in this age group cancelled out of training. The tradeoff the unilateral programs encountered probably was that the younger workers also tend to be less qualified or motivated to pursue apprenticeship.

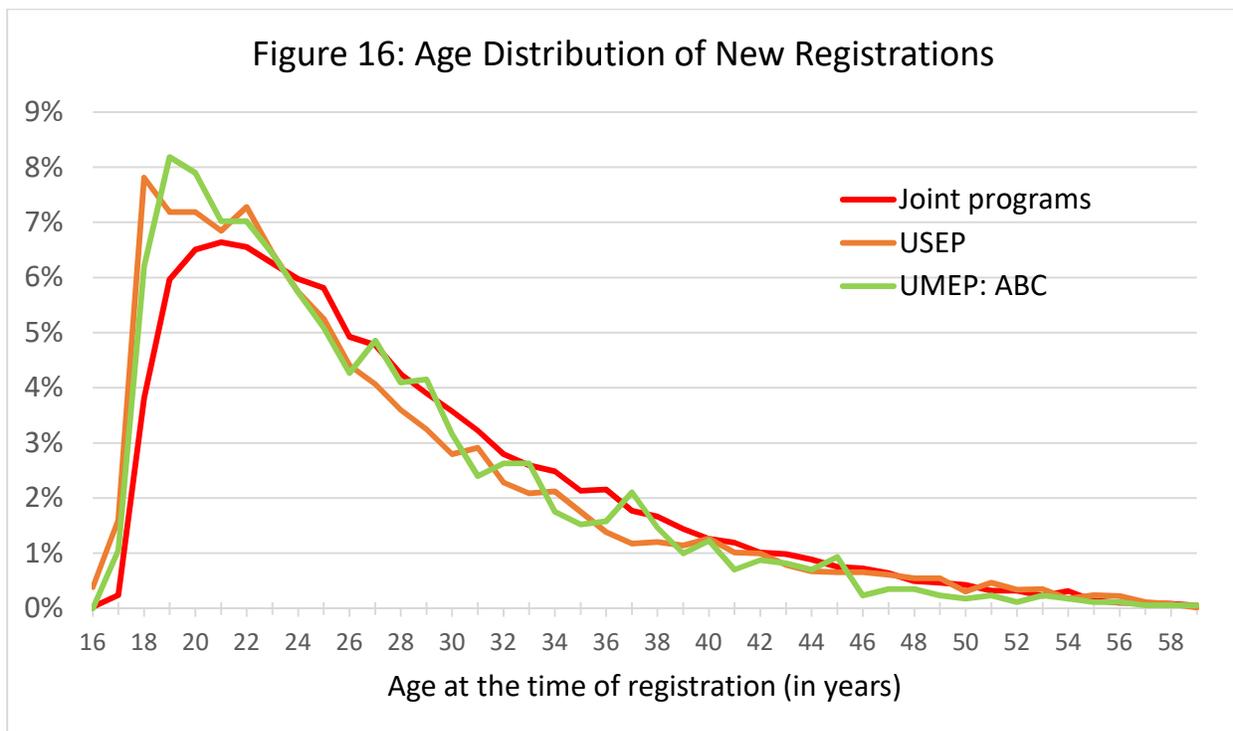


Table 12: Age Distribution of New Apprentices

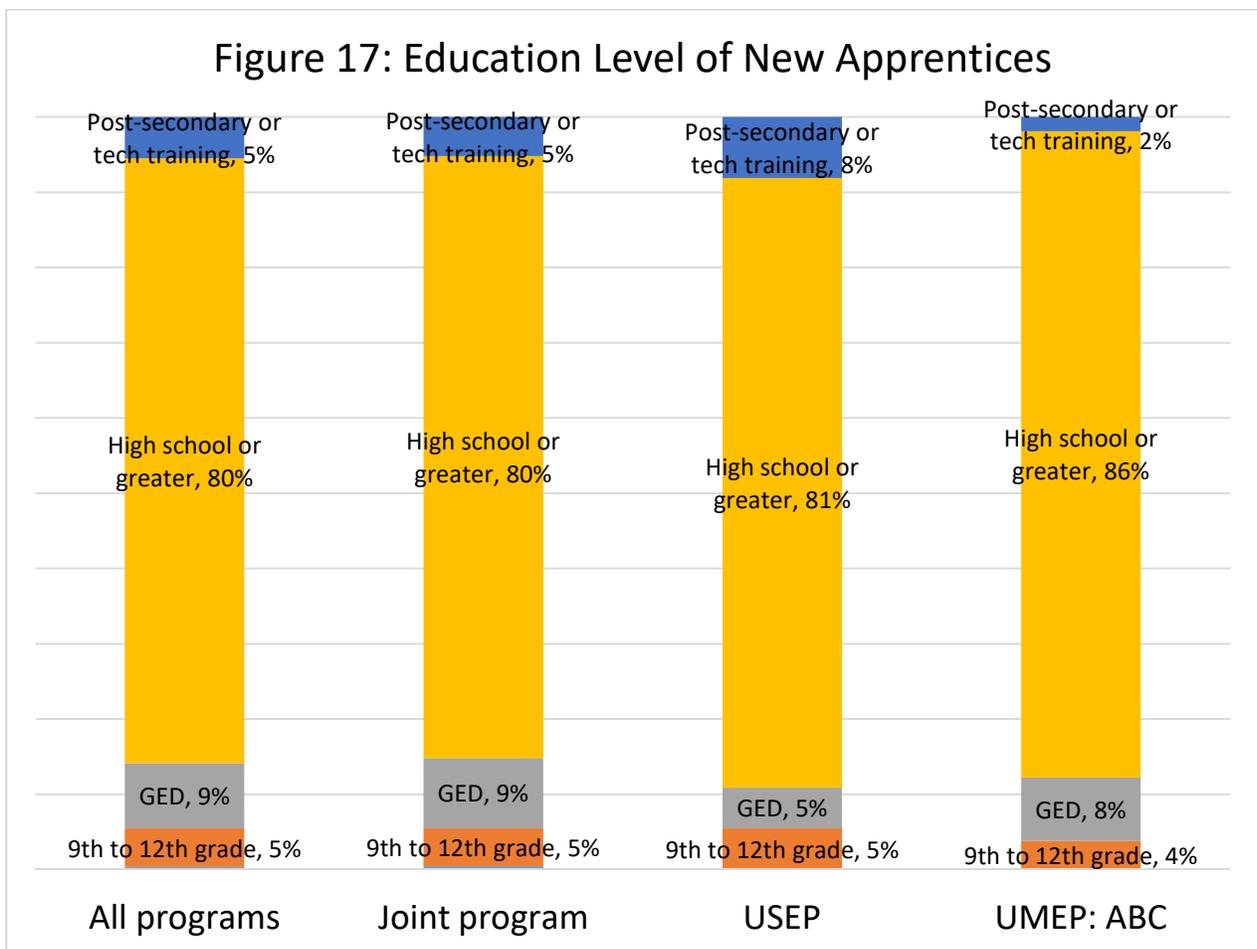
Age at registration	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
16	8	24		4	36
17	78	100	18	11	207
18	1,226	486	106	10	1,828
19	1,917	447	140	5	2,509
20	2,092	447	135	6	2,680
21	2,135	426	120	8	2,689
22	2,107	453	120	14	2,694
23	2,013	401	110	13	2,537
24	1,920	357	98	20	2,395
25	1,868	327	87	18	2,300
26	1,583	274	73	18	1,948
27	1,536	253	83	29	1,901
28	1,367	224	70	19	1,680
29	1,253	202	71	11	1,537
30	1,150	174	54	16	1,394
31	1,036	181	41	27	1,285
32	900	142	45	18	1,105
33	835	130	45	17	1,027
34	799	132	30	13	974
35	686	109	26	13	834
36	693	86	27	13	819
37	569	73	36	15	693
38	535	75	25	17	652
39	463	71	17	15	566
40	405	79	21	17	522
41	384	63	12	8	467
42	327	62	15	8	412
43	317	49	14	13	393
44	286	42	12	6	346
45	242	41	16	15	314
46	234	41	4	14	293
47	206	38	6	6	256
48	160	34	6	4	204
49	150	34	4	9	197
50	136	19	3	7	165
>50	536	125	20	37	708
All apprentices	32,152	6,221	1,710	494	40,577

EDUCATIONAL COMPOSITION OF APPRENTICESHIPS

The educational composition of apprentices was largely similar across program sponsor types (Table 13, Figure 17). Only 5 percent of the new registrants did not have high school diplomas or GED. The only difference is that the share of apprentices with post-secondary or technical training is smaller in the ABC-sponsored programs.

Table 13: Educational Level of New Apprentices

	Joint program	USEP	UMEP: ABC	UMEP: Non-ABC	All programs
Less than 8th grade	136	1	1	1	139
9th to 12th grade	1,578	320	64	19	1,981
GED	2,916	319	144	7	3,386
High school or greater	25,002	4,763	1,466	33	31,264
Post-secondary or tech training	1,625	477	32	6	2,140
Total	31,257	5,880	1,707	66	38,910



CONCLUSION

Over the 2000-2016 period, about 41,000 workers registered for apprenticeship training in construction crafts in Michigan. The majority of these apprentices was trained in programs that were sponsored jointly by labor and management. On the open-shop sector of the industry, there were ABC-sponsored training programs, but they were few and only one was in operation continuously throughout the period under study. Apprentices in ABC-sponsored programs constituted a small fraction of all new registrations. They also experienced a relatively higher attrition rate. Consequently, the size of ABC-sponsored programs' contribution to the skilled labor pool of Michigan was not significant. The returns to completed apprenticeships in the ABC programs were substantially lower: the average wage of graduating ABC-program apprentices was lower than their peers in the joint programs by a factor of two, and their wage gain over the training period was lower by a factor of four. ABC-sponsored programs offered training in a narrower portfolio of occupations that concentrated in the electrical and mechanical trades in comparison with the joint programs. Finally, incoming apprentice pool in the ABC-sponsored programs, relative to those in joint programs, was less diversified in terms of race/ethnicity and gender.