
Legislative Program Review and Investigations Committee
Connecticut General Assembly

Apprenticeship Programs and Workforce Needs

Staff Interim Update

October 1, 2015

**CONNECTICUT GENERAL ASSEMBLY
LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE**

The Legislative Program Review and Investigations Committee (PRI) is a bipartisan statutory committee of the Connecticut General Assembly. Established in 1972, its purpose is to “conduct program reviews and investigations to assist the General Assembly in the proper discharge of its duties” (C.G.S. Sec. 2-53g). From program review topics selected by PRI, the committee examines “state government programs and their administration to ascertain whether such programs are effective, continue to serve their intended purposes, are conducted in an efficient and effective manner, or require modification or elimination” (C.G.S. Sec. 2-53d). Investigations require broader legislative approval to begin. The committee is authorized to raise and report bills on matters under its review.

The program review committee is composed of 12 members. The president pro tempore of the Senate, the Senate minority leader, the speaker of the House, and the House minority leader each appoint three members. The committee co-chairs and ranking members rotate every two years between House and Senate members from each party.

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Legislative Program Review and Investigations Committee
Connecticut General Assembly
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Interim Update Contents

Apprenticeship Programs and Workforce

This interim update report:

- identifies research questions intended to be answered by the study's conclusion, based on the study scope approved by the committee (Appendix A);
- explains the study timeline;
- discusses completed and anticipated PRI staff study activities; and
- presents selected background information relevant to understanding the study topic.

The next and final staff report following this interim report will:

- answer the identified research questions;
- make findings; and
- propose recommendations, if needed.

The final staff report will be presented after PRI staff has completed its research and analysis, which is ongoing. As noted in the study timeline, the final staff report is expected to be presented December 16, 2015.

Acronyms

C.G.S.	Connecticut General Statutes
CSDE	Connecticut State Department of Education
CT DOL	Connecticut Department of Labor
DCP	Department of Consumer Protection
DECD	Department of Economic and Community Development
FFY	Federal Fiscal Year
FY	Fiscal Year (state)
PA	Public Act
U.S. DOL	United States Department of Labor

Research Questions and Study Timeline

Research Questions

1. What is Connecticut's apprenticeship system?
2. How effective is Connecticut's apprenticeship system at meeting workforce demand?
3. How well aligned are workforce supply (i.e., graduates) and demand (i.e., job openings) in occupations that require specific postsecondary courses of study?

Study Timeline

- **July 2015:** PRI voted to approve a study scope.
- **October 1, 2015:** PRI staff is scheduled to present this interim study update to the committee.
 - After the interim study update on the same day, PRI will hold an informational public hearing to gather input and viewpoints relevant to the study topic directly from interested parties.
- **On or about December 16, 2015:** PRI staff will present its final report containing background, findings, and recommendations to the PRI committee for its consideration of and action on recommendations.
- **After December 16, 2015:** The final committee-approved study report will be published.
- **During the 2016 legislative session,** the PRI committee may raise legislation for the 2016 legislative session to implement any study recommendations through statute. Any bills raised by PRI based on study recommendations would be the subject of a public hearing during the 2016 legislative session.

Study Activities

Completed

1. Interviewed Connecticut executive branch staff
 - Department of Labor (DOL)
 - Department of Consumer Protection (DCP)
 - Department of Economic and Community Development (DECD)
 - Connecticut State Department of Education (CSDE)
 - Connecticut State Colleges & Universities' Board of Regents
2. Interviewed representatives of affected parties
 - Associated Builders and Contractors, Inc., Connecticut chapter
 - Connecticut Business and Industry Association
 - Foundation for Fair Contracting of Connecticut, Inc.
3. Gathered observational information
 - Toured two labor-management schools for apprentices
 - Shadowed three DOL staff (field representatives) during meetings to register apprentices
 - Observed a State Apprenticeship Council meeting
4. Requested and gathered data from various organizations, and analyzed some of the limited data received to date
 - CSDE
 - DOL
 - DCP
 - Office of Higher Education
5. Drafted survey of apprentices
6. Reviewed federal and state laws and regulations regarding apprenticeship and occupational licensure

Anticipated

1. Distribute, collect, and analyze results from the survey
2. Analyze data from state agencies and other sources
3. Interview additional affected parties
4. Gather information on other states' apprenticeship systems and the reasons for choosing to be a federally-administered or state-administered system

Topic Background

Overview

The word “apprenticeship” may refer in common use to any arrangement in which a novice works for an employer to learn a trade. This study is focused on registered apprenticeships, specifically, and the general term “apprenticeships” (and “apprentice”) is used in this report refer only to registered ones. According to the U.S. Department of Labor (U.S. DOL), which oversees apprenticeships for the federal government, “Registered apprenticeships are innovative work-based learning and post-secondary earn-and-learn models that meet national standards for registration.”¹ A state may choose to receive U.S. DOL recognition to run its own registered apprenticeship programs within federal requirements, as Connecticut and 24 other states do (see map in Appendix B). Alternatively, a state can opt to have the U.S. DOL directly in charge of apprenticeships within the state’s borders.

Connecticut’s apprenticeship administration is handled by the state Department of Labor (CT DOL) Office of Apprenticeship Training. In state Fiscal Year (FY) 15, the office was staffed by 10 people and spent \$1,051,408.² It is responsible for:

- setting program standards consistent with the federal standards;
- registering sponsors (i.e., employers and labor-management partnerships) and apprentices;
- approving educational institutions and others that provide apprentices with mandatory coursework; and
- monitoring worksites to ensure compliance with federal and state requirements.

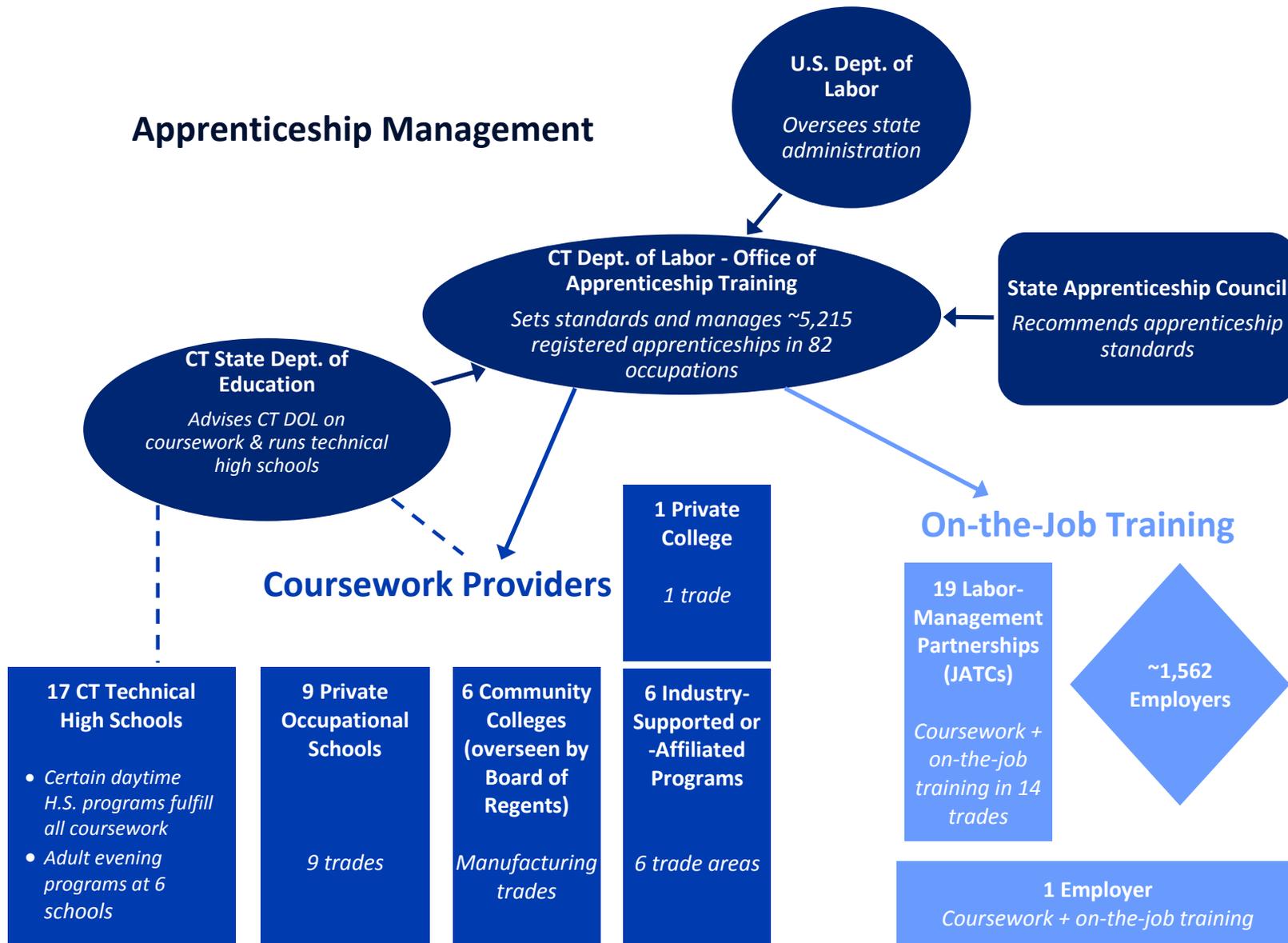
The office is advised by a 12-member gubernatorial-appointed State Apprenticeship Council. Although the CT DOL takes the lead role in administering apprenticeships in Connecticut, the council has an important place in the system. State law allows the council to recommend minimum standards of apprenticeship and for related instruction (i.e., coursework) to CT DOL, issue certificates of completion to apprentices, and encourage both employers to establish apprenticeships and individuals to participate in them.

A variety of other entities also are involved in the apprenticeship system, as displayed in Figure 1 and discussed on the following pages. For example, the U.S. DOL monitors and gives guidance to the Office of Apprenticeship Training. The office is required to share quarterly reports with U.S. DOL, as are all the state-run apprenticeship programs.

¹ United States Department of Labor, “Frequently Asked Questions.” Accessed August 20, 2015 at: <http://www.dol.gov/apprenticeship/faqs.htm>.

² For FY 15, expenditures were: General Fund expenditures of \$544,379; expenditures of \$381,670 from sponsor and apprentice registration fees received; and federal grant expenditures of \$125,360.

Figure 1: Connecticut's Apprenticeship System



Source: PRI staff.

When Were Registered Apprenticeships First Created?

In 1937, the Fitzgerald Act, officially known as the National Apprenticeship Act, authorized and established the national registered apprenticeship system. The legislation intended to build the workforce and protect entry-level workers in apprenticeable trades. It gives the U.S. Secretary of Labor authority over apprenticeship programs, establishes an office of apprenticeship within the U.S. DOL, and allows state governments to register and administer apprenticeship programs within the federal requirements.

What Standards Must a Registered Apprenticeship Meet?

A registered apprenticeship must be full-time and paid, as well as meet several other national standards, listed in Figure 2. The criteria could apply to entry-level positions in a variety of occupations, but registered apprenticeships must meet the criteria below and be registered with the state or federal government.

Figure 2: National Registered Apprenticeship Standards

- 1. Agreement:** A written apprenticeship agreement, listing program standards, is signed by the employer and the apprentice.
- 2. Wages:** Apprentices are full-time and earn wages from employers right from the beginning of training. Wages increase on a schedule as the apprentice gains experience.
- 3. On-the-job learning:** At least 2,000 structured hours, under the direction of at least one of the employer's workers, are required.
- 4. Coursework:** A minimum of 144 additional hours of classroom instruction each year is recommended.
- 5. Credential:** By completion, the apprentice has gained an industry-recognized credential.

Source: PRI staff analysis of U.S. DOL Code of Federal Regulations, Title 29, Part 29.5.

Which Occupations May Have Apprenticeships?

Registered apprenticeship programs are limited to skilled occupations and trades that meet basic criteria defined by the U.S. DOL. Apprenticeship or another formal type of training may be required for occupational licensure but be optional in non-licensed occupations, as

discussed below. There are currently over 1,000 occupations that have been recognized as apprenticeable by the U.S. DOL.³ Specifically, such occupations:

1. are customarily learned in a practical way through a structured, systematic program of on-the-job supervised training supplemented by usually simultaneous related technical instruction, with more hours in on-the-job training than in courses;
2. are clearly identified and commonly recognized throughout an industry; and
3. involve the acquisition of manual or technical skills and knowledge.

Apprenticeships traditionally have been offered or required in the building trades (e.g., carpenter, electrician) but recently there have been state and federal efforts to expand apprenticeships into new industries (e.g., business services), as discussed below.

Why Do Apprentices and Employers Participate in Registered Apprenticeships?

There are many reasons why employers and individuals participate in apprenticeship programs. Some are shown in Table 1.

Table 1: Apprenticeship Benefits

Benefits For Employers	Benefits for Apprentices
<ul style="list-style-type: none"> • More affordable than hiring licensed/more experienced workers • Possibly yield state tax credits or other financial benefits (<i>see below</i>) • Beginning workers trained in the company's/union's own processes and culture • Can encourage loyalty and improve retention • Contribute to upholding professional standards • Ensure supply of future labor 	<ul style="list-style-type: none"> • "Earn while you learn" model with wage progression as more experience and skill are gained • Potential for subsidized schooling • Assurance of learning skills and knowledge needed to succeed • Apprenticeship required for entry into most licensed trades • Potentially improved marketability in unlicensed trades

Source: PRI staff.

How Many Apprentices Are There Nationally and In Connecticut?

In Federal Fiscal Year (FFY) 14, there were 410,375 apprentices nationally with about 19,260 active apprenticeship programs (i.e., apprenticeship programs with apprentices at that

³ United States Department of Labor, "Frequently Asked Questions." Accessed September 22, 2015 at: <http://www.dol.gov/apprenticeship/faqs.htm>.

time). More than 44,400 apprentices completed such programs that year.⁴ In Connecticut, as of June 2015, there were 82 active apprenticeship programs with a total of 5,215 registered apprentices, according to CT DOL documents. On-the-job training was being provided by about 1,563 employers and 19 labor-management partnerships (described below).

Connecticut DOL staff report that the number of apprentices in this state and nationally is highly dependent on the economy. Indeed, the number of apprentices nationally fell from approximately 442,400 in FFY 08 to about 357,700 in FFY 11, and has climbed since the economy has improved.⁵ The same trend occurred in Connecticut, where the apprentice count dropped from 5,572 at the start of FY 08 to 3,560 at the beginning of FY 12, before it began to rise to its current number.

What Are the Steps to Begin and Complete an Apprenticeship?

In order to become an apprentice, one must be at least 16 years old and available to work full-time. No prior experience or knowledge in the trade is necessary.

An individual who is at least 16 and attends high school may become a pre-apprentice. A pre-apprentice goes through the registration process described below, and then accumulates on-the-job and coursework hours that “count” once the person graduates high school (or drops out) and becomes a full apprentice. State labor department staff estimate there are now between 150 and 200 pre-apprentices, most of whom are state technical high school students.

It is the responsibility of the individual seeking to become an apprentice (or pre-apprentice) to find a sponsor (an employer or labor-management partnership) that will abide by the rules and standards set out both federally and by the state. The Connecticut labor department maintains lists of sponsors it has approved (both recently and in the past) on its website but it is up to the individual to locate a sponsor (existing or new) and get hired. Once the individual and sponsor have established a working relationship, and the sponsor has received CT DOL approval if not previously obtained, the state labor department becomes involved.⁶

Figure 3 illustrates the steps that must be taken to become an apprentice in Connecticut. An apprentice registers during a meeting with the sponsor and CT DOL, when the person completes a registration form that contains the apprenticeship agreement among the parties (apprentice, sponsor, and CT DOL). The agreement spells out responsibilities and terms, including the wage progression schedule, the trade category in which the person will apprentice, and any credit for previous experience.

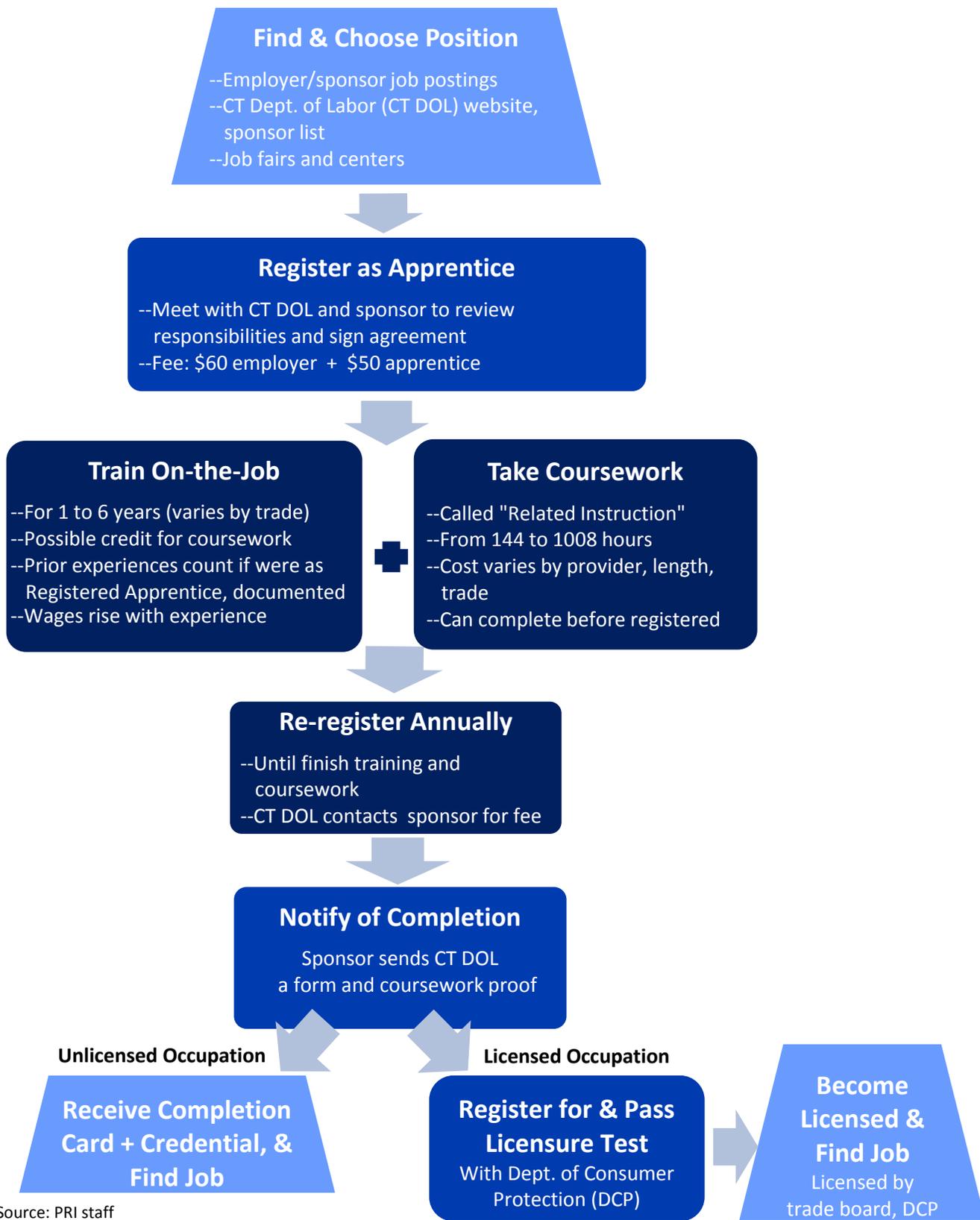
Also at registration, each apprentice receives a handbook, published by CT DOL and the apprenticeship council. The handbook enumerates the responsibilities of all three parties. It additionally includes a log, in which the apprentice must record on-the-job training hours and coursework provider, with a supervisor signing off on on-the-job training progress monthly.

⁴ United States Department of Labor, “Apprenticeship USA: Data and Statistics; National Registered Apprenticeship Results.” Accessed September 22, 2015 at: http://www.doleta.gov/oa/data_statistics.cfm.

⁵ Ibid.

⁶ If a company has had no apprentices in the last five years, re-approval by CT DOL is required before a new apprentice may be sponsored.

Figure 3: How to Begin and Complete an Apprenticeship



Source: PRI staff

What Types of Programs Are Available in Connecticut and What Does Each Require?

Apprenticeship programs are offered in a range of trade areas, including building (e.g., carpentry; plumbing; electrician; heating, piping, and cooling), manufacturing, automotive, and culinary arts, among others. An “apprenticeship program” refers to apprenticeships in any specific trade, as they must abide by the same requirements.

Each apprenticeship program has a certain amount of on-the-job training hours and coursework hours that must be completed. In addition, the training and coursework are to cover particular areas related to the trade to ensure the apprentice acquires skills and experience in all aspects of the trade.

The requirements of an apprenticeship program depend on the complexity of the occupation. As noted above, to qualify as an apprenticeship under the federal criteria, it must have a minimum of 2,000 hours in on-the-job training – which equates to 50 forty-hour work weeks – and typically at least 144 hours of coursework (also called “related instruction”) per year of the apprenticeship. Most programs require four years for completion, provided the person continues to work throughout (e.g., is not laid off, fired, or incapacitated). The specific requirements for each apprenticeship program (in addition to the number of apprentices, as of June 2015) are listed in Appendix C.

For the licensed occupations, a period of training – generally in the form of an apprenticeship – is mandatory before a person is allowed to take a Connecticut state examination and become licensed. In Connecticut, licensed trades include, but extend far beyond, plumbers and electricians. Some licensed occupations have training that is overseen by the Department of Consumer Protection (DCP), not CT DOL, as discussed below.

For unlicensed occupations, such as carpenters and most manufacturing occupations, formal training (e.g., an apprenticeship) may be offered but it is not required. Apprenticeship completion in an unlicensed occupation results in an industry-recognized credential issued by the State Apprenticeship Council or other recognized body. In interviews, PRI staff was told anecdotally that apprenticeship completion rates for unlicensed trades were lower. The theory is that as the individual advances through the apprenticeship, the skills needed to secure a position are acquired without fully completing the program. No hard data, however, is available at this point to confirm these statements.

The types of active apprenticeship programs (those which currently have apprentices) are listed in Figure 4 and grouped by occupational category. The figure additionally shows whether state occupational licensure is required for post-apprenticeship work. More than half of the 82 active programs (50 programs, or 61 percent) are for occupations that do not require a license to work upon apprenticeship completion.

There are also 78 programs that are inactive (i.e., no apprentices currently). It is unclear which programs are considered obsolete and which are only temporarily without apprentices, due to lack of interest. Information on those programs is contained in Appendix D.

Figure 4: Types of Active Registered Apprenticeships in Connecticut, June 2015

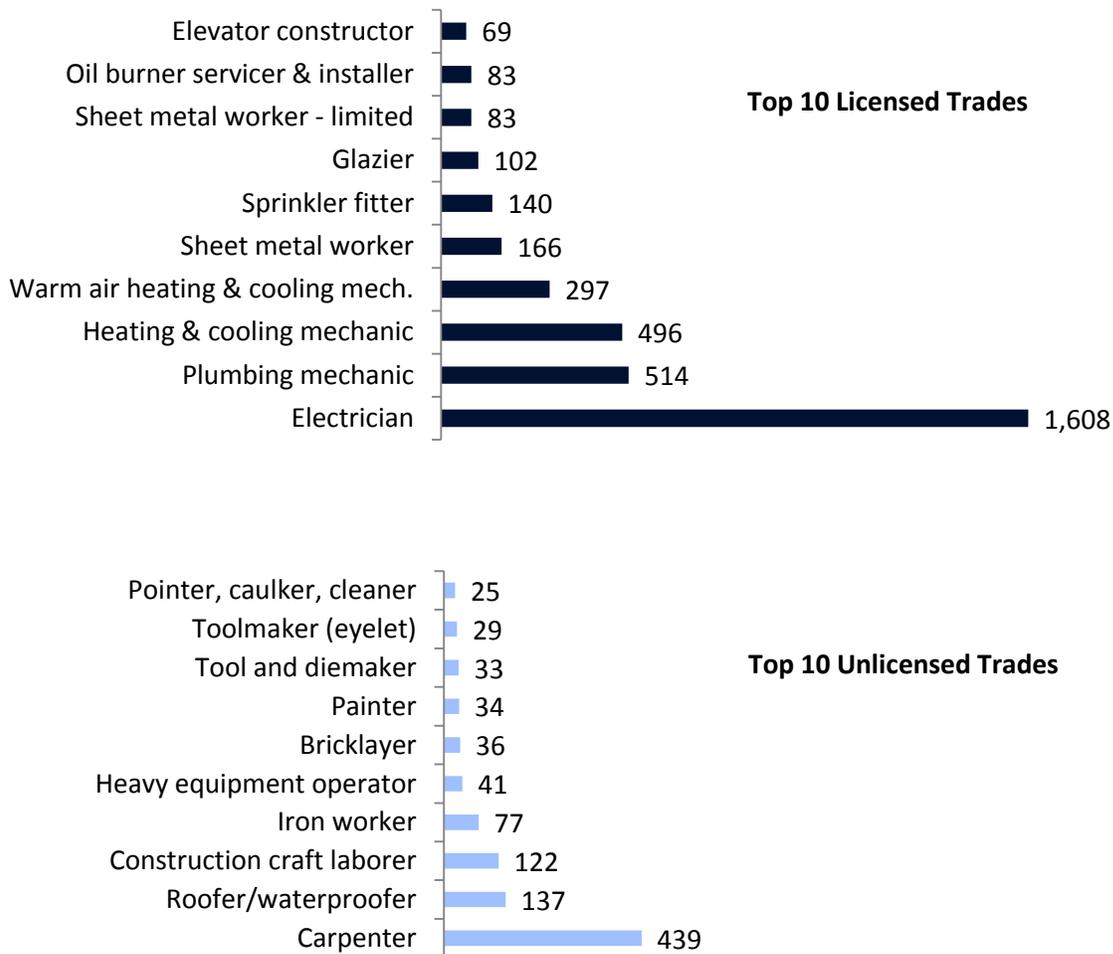
		LICENSED OCCUPATIONS ¹	UNLICENSED OCCUPATIONS
AUTO	Automotive	Auto glazier	<i>None</i>
	Electrical	Cable splicer Electrician: 4 types	Electrical draftsman Electrician – Industrial maintenance
BUILDING	Plumbing, Heating, Piping, and Cooling	Gas and oil burner: 3 Heating, piping, and/or cooling: 7 Plumbing and related: 4	Heating and cooling mechanic – Industrial maintenance
	Other Building Trades	Elevator-related: 2 Fire / sprinkler: 2 Glazier	Bricklayer Carpenter Cement finisher Drywall finisher Iron worker Millwright Painter: 2 Terrazo and tile: 2 Construction craft laborer Heavy equipment: 2 Pointer, caulker, cleaner Roofer and related: 2
	Metal and Sheet Metal	Sheet metal: 3	Machinist: 2 Tool/die: 3 Mold and model maker: 2
MANUFACTURING & METAL	Machine Trades	<i>None</i>	CNC wireforming Plastic: 1 Screw machine: 1 Tool: 4 Electroplating technician Machine and machinist: 8 Painter – Industrial specialist Quality control and assurance: 1 Springmaker: 1
	Service and Technician	Gasoline tank installer and repair Lawn sprinkler installer/maintainer Pump servicer and installer Stationary engineer	Insulator: 2
SERVICE	Other	<i>None</i>	Firefighter Nuclear plant: 2

Note: ¹A number after a trade name indicates the number of apprenticeship types within the trade. The different types are listed in Appendix C.

Source: PRI staff using CT DOL information.

Most (77 percent) of Connecticut’s 5,215 apprentices in June 2015 were employed in licensed trades. Figure 5 shows the ten licensed and unlicensed programs with the most apprentices. The top ten programs accounted for 89 percent of all apprentices in licensed trades and 80 percent for unlicensed.

Figure 5: The Trades with the Most Apprentices, June 2015



Source: PRI staff analysis of CT DOL data.

Who Provides Apprentices with On-The-Job Training?

Two types of organizations may take on an apprentice, which is called “sponsoring.” First, an employer can sponsor an apprentice program on its own. Second, a formal labor-management partnership that includes representatives from multiple companies as well as a union may do so. Generally the partnerships directly provide the coursework component and assist their apprentices in locating on-the-job employment with the union’s contractors.

Every sponsor must register with, and be approved by, CT DOL. To be eligible for approval and registration, each sponsor must meet detailed state labor department and apprenticeship council standards. An employer, on a prescribed form, must report its criminal, labor law, environmental, and occupational licensing violations over the previous five years – and include whether it has been barred from any state or federal projects because of them – before approval is granted.

As part of the apprentice registration process, the sponsor must show that the company’s payroll will not exceed a specific ratio of apprentices to experienced workers – called the “hiring ratio” – when the sponsor takes on a new apprentice. The hiring ratio varies by company size, as shown in Appendix E.

In Connecticut, every sponsor must pay \$60 annually to register each apprentice, and the apprentice must pay \$50 a year to participate.^{7, 8} An apprentice must be supervised on all job sites by at least one journeyman, who is an experienced worker. A job site ratio of one journeyman to each apprentice is required by CT DOL regulation.

It is important to note that an apprentice may change sponsors frequently, and each time a new apprenticeship agreement is required. In that situation, the new sponsor typically is encouraged by CT DOL staff to accept the apprentice’s previously accumulated on-the-job training hours, as long as the apprentice documented the hours and acquired them as part of a registered apprenticeship.

The state labor department expects apprentices to complete the on-the-job training component of the program within a reasonable time frame and all coursework and, if applicable, occupational licensing must be completed within seven months after that. However, PRI staff was told that because of the way in which the data is entered into the CT DOL system, the aggregate length of time is not tracked by the office.

Where Do Apprentices Take Courses?

Connecticut apprentices may complete their coursework through a variety of instruction providers, though the precise options depend on the occupation. Across the occupations, apprenticeship coursework is offered by:

- Connecticut technical high schools, either for high school students⁹ or, at six of the 17 schools, for adult evening students;
- six community colleges;
- nine private postsecondary occupational schools, including two online providers;
- one nonprofit college;
- 19 labor-management partnership programs;

⁷ The employer may choose to pay the apprentice’s fee.

⁸ The money generated by registration fees is dedicated to funding the CT DOL Office of Apprenticeship Training.

⁹ Vocational-Technical high school students can receive up to 1,500 on-the-job training hours and all coursework hours (720 hours) as an apprentice if, after graduation, they decide to enter an apprenticeship program.

- six industry-supported or affiliated programs; and
- employers themselves.

The specific providers within these categories are listed in Appendix F.

The coursework cost to the apprentice varies widely depending on the instructional provider and length of study. In some apprenticeship programs, coursework can also lead to college credit or a degree, thereby providing the individual with an opportunity to earn both academic and occupational credentials simultaneously.

For a few instructional options, an apprentice might have lower or shared costs for training. An apprentice who enrolls in adult evening courses at a technical high school evenly splits the instruction fees with the employer, with each paying about \$3,000 for an entire four-year program. The cost of the coursework for apprentices of labor-management partnerships is typically borne by contractors, who contribute to the union for each hour a union worker is on the job.

The cost of coursework at other instructional providers is borne solely by the apprentice, unless the employer offers to pay in part or whole. The cost of attending community college depends on whether the coursework is offered on a for-credit or noncredit basis; a year of full-time for-credit classes is \$3,600 in tuition.¹⁰ Private occupational schools tend to have the highest costs, with some exceeding \$25,000 for a complete one-year program. Financial aid may be available for some programs at particular institutions.

Coursework providers are approved by CT DOL with some assistance from the Connecticut State Department of Education. The education department's staff reviews coursework for compliance with apprenticeship program requirements, and recommends to CT DOL whether the provider's program(s) should be approved for apprenticeships. Someone who wishes to have his or her coursework under a non-approved provider be applied to apprenticeship requirements may request evaluation by the labor and education departments, whose staff determine whether to accept it.

The state labor department recently reviewed many of the approved non-public instruction providers to determine each program's adequacy. The review used the adult technical education trade curriculum as a comparison standard. To date, curriculum used by 17 providers for 31 different programs (trades) have been reviewed. Thirteen of these providers were deficient, five industry-supported and eight private occupational schools. Several programs were excluded from the review because they were previously approved under the comparison standard now being applied to the other providers.¹¹

Letters were sent in August 2015 advising the deficient providers that they have until January 1, 2016 to revise and resubmit their curricula to meet the comparison standard or lose approval to operate an instructional program. According to the state labor department, even if a

¹⁰ Fees are determined and charged by each college.

¹¹ The providers excluded from the review were the community college Advanced Manufacturing Centers' programs, Goodwin College, and two online schools.

program loses approval, all apprentices who have received credit in the past will not lose that classroom credit. The department is in the process of determining how currently enrolled students' studies would be treated.

What Role Does the Department of Consumer Protection (DCP) Play in Apprenticeships and Occupational Licensure?

The Department of Consumer Protection is responsible for setting standards and administering licensure exams – including to completed apprentices – for licensed occupations. It also works with the occupational boards to ensure those who pass the licensing exams and meet other criteria become licensed. In addition, DCP investigates and takes enforcement action against employers who do not follow occupational licensure requirements. For licensed trades, an individual must either be licensed or a registered apprentice who is being directly supervised, at a minimum, by at least one journeyman in order to work. When these requirements are violated and detected, DCP fines the contractor, not the individual working for the contractor. Based on three years of closed complaint data (FY 13 – FY 15) provided by the DCP Trade Practices Division, there were:

- 28 “unregistered apprentice” violations – contractor fines equaled \$35,750; and
- 14 “allowing an apprentice to work before registering” violations – contractor fines totaled \$12,250.

According to the division, there were other violations involving apprentices but they were part of broader categories (i.e., unlicensed and billing complaints) and therefore could not be exclusively assigned to complaints about apprentices.

Finally, the department has set trainee criteria for entry-level workers in licensed trades that do not have CT DOL registered apprenticeships. There are about 21 licensed occupations for which DCP recognizes trainees. Of these, approximately six require training for under one full year, which means 15 (71 percent) involve training that is at least a year long (i.e., meet that particular criterion for an apprenticeable trade). As of August 2015, there were 215 DCP trainees.

What Financial Incentives Does Connecticut Offer to Participating Employers?

There are several state financial incentives for employers in certain industries to sponsor apprentices. The incentives range from tax credits to reimbursements (i.e., subsidies).

Company tax credits. State corporate tax credits for companies with apprentices have been available since 1979, when authorized by Public Act (P.A.) 79-475. Construction and plastics-related employers may be able to receive up to \$4,000 and \$4,800, respectively, in corporate tax credits per apprentice. Manufacturing employers may be eligible for up to \$7,500 in credits per apprentice (available for multiple years, for each apprentice).¹² In order to claim the credits, employers are to complete an online worksheet and submit it to CT DOL for

¹² C.G.S. Sec. 12-217g

approval.¹³ Because some employers structure their businesses in a way that they do not pay corporate income tax, which makes them ineligible for corporate tax credits, recent legislation (P.A. 14-217) allows companies to sell, assign, or transfer their credits to other companies that would be able to use them.¹⁴ However, it does not seem that this option has been widely used, according to program review committee staff interviews to date.

Company reimbursements from the Manufacturing Innovation Fund. Manufacturing companies might be eligible for a recently-announced package of financial incentives to take on registered apprentices. Such companies who register new apprentices starting July 1, 2015 can apply for funding from the Department of Economic and Community Development (DECD) Manufacturing Innovation Fund Apprenticeship Program. The program consists of partial reimbursements to manufacturers for new apprentices' wages, coursework costs, and credentials. The three components each have maximum amounts, with a combined top amount of \$9,500 and \$9,250 for each apprentice's first and second years, respectively. The program application is available on the CT DOL apprenticeship office's website and is also linked from DECD's website.

The Manufacturing Innovation Fund began in 2014 to promote manufacturing in the state. The fund is part of the state's bond package. The Fund's Apprenticeship Program (as the incentive package is called) is the fund's third initiative. The fund's goal is to boost the number of manufacturing apprentices from about 200 to 400 over the next two years, using just under \$7.8 million in incentives.

Company wage subsidies from Step Up. Small and medium-sized manufacturers in certain towns may be eligible for wage subsidies for new registered apprentices and pre-apprentices, under CT DOL's Subsidized Training and Employment Program known as Step Up. Step Up's apprenticeship component took effect in July 2014. It offers manufacturers with no more than 100 full-time employees a wage subsidy for hiring apprentices or pre-apprentices who are high school or postsecondary students. The subsidy begins at 100 percent of wages for the individual's first 30 days and gradually declines to 25 percent, before stopping at the six-month point. The overall subsidy is capped at \$10 per hour.¹⁵

Assistance with tuition and training costs. Connecticut recently has been awarded a federal American Apprenticeship Initiative grant, starting in FFY 16. The grant will offer funds to apprentices and/or employers for coursework and training components of apprenticeships in advanced manufacturing, healthcare, and business services occupations. Specific details on funding eligibility and amounts will be announced in coming weeks. The state's goal is to register 1,000 new apprentices and 500 pre-apprentices in these industries, which have not traditionally participated in apprenticeships in large numbers, according to CT DOL staff.

¹³ Data on tax credit applications and decisions have been requested.

¹⁴ C.G.S. Sec. 12-217g

¹⁵ Connecticut Department of Labor, "Step Up for Apprentices: Apprenticeship Subsidized Training and Employment Program." Accessed September 21, 2015 at: https://www.ctdol.state.ct.us/progsupt/appren/2015/Revised_Step%20Up%20for%20apprentices%20fact%20sheet%206-16-15.pdf.

What Areas Will Be Further Examined?

During the course of interviews and other research conducted by PRI staff, several areas for further exploration have been identified:

1. How well is CT DOL recruiting and marketing apprenticeship programs to both potential apprentices and sponsors?
2. How often do sponsors choose not to recognize previously acquired on-the-job training and coursework? Is sponsor discretion in those areas beneficial to sponsors, apprentices, and apprenticeship overall?
3. What data are available that allow CT DOL to measure the success of the apprenticeship system?
4. What is the role of CT DOL in developing apprenticeship programs in response to employer need?
5. How is the quality of related instruction (i.e., coursework) provided to apprentices examined by CSDE and CT DOL?
6. What is the level of coordination and information-sharing among the multiple state agencies responsible for various components of the apprenticeship system?

APPENDICES

Appendix A

Legislative Program Review and Investigations Committee

Senate Members
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Henry Genga
Philip Miller
Cara Pavalock

STUDY SCOPE

Apprenticeship Programs and Workforce Needs

Focus

The study will examine the effectiveness of Connecticut apprenticeship programs in meeting workforce demand. The study will analyze the alignment of supply (i.e., apprenticeship program graduates obtaining a license) and demand (job openings by trade). The various types of apprenticeship programs offered will be inventoried and described, including the programs' entry and completion requirements.

In addition, the study will update certain information contained in the 2009 PRI committee study entitled *Alignment of Postsecondary Education and Employment*. Specifically, figures that provided a broad view of projected graduate supply and employer demand in certain selected occupations requiring a postsecondary education will be updated to determine if changes in alignment have occurred.

Background

According to the U.S. Department of Labor's (U.S. DOL) Office of Apprenticeship, Training, Employer, and Labor Services, "Registered Apprenticeships are innovative work-based learning and post-secondary earn-and-learn models that meet national standards for registration." The registration is with the U.S. DOL or a federally-recognized state agency (e.g., a state department of labor).

Registered Apprenticeship (called "apprenticeship" for the remainder of this document) training is distinguished from other types of workplace training by several factors:

1. participants who are newly hired (or already employed) earn wages from employers during training;
2. programs must meet national standards for registration with the U.S. Department of Labor (or federally-recognized state agencies);

3. programs provide on-the-job learning and job-related technical instruction;
4. on-the-job learning is conducted in the work setting under the direction of one or more of the employer's personnel; and
5. training results in an industry-recognized credential.

Apprentices start working from day one with incremental wage increases as they become more proficient on the job. Apprenticeships range from one to six years, but the majority are four years long. According to a 2013 PRI study, upon program completion, almost all apprentices (91 to 98 percent) in Connecticut were subsequently hired as journeymen.¹⁶

There were 1,515 Connecticut employers sponsoring apprenticeship programs in FY 14, with more than 4,635 individuals actively enrolled in these programs.¹⁷ The trades with the most apprentices in 2013 were electrician (1,515 apprentices), heating and cooling mechanic (472), plumbing mechanic (463), and limited heating and cooling (416), according to the Connecticut Department of Labor (CT DOL).

In Connecticut, apprenticeship programs are overseen by CT DOL's Office of Apprenticeship Training. The office, which has ten staff, is funded by the state and federal governments, as well as by program participants (both employers and apprentices).¹⁸

Areas of Analysis

Apprenticeship Programs

1. Describe the apprenticeship system in Connecticut, including the roles of CT DOL, trade unions, participating employers, and educational institutions
2. Evaluate how apprenticeship opportunities are made known to potential participants, both employers and workers
3. Develop an inventory of apprenticeship programs available in Connecticut
4. Using the inventory, compare and analyze apprenticeship programs, including but not limited to:
 - a. types and number of positions offered;
 - b. demand among potential apprentices;
 - c. length;
 - d. sponsorship;
 - e. cost;
 - f. entry and completion requirements;
 - g. participant number and demographics;

¹⁶ Includes those hired by either the employer who provided the on-the-job training or another employer. (PRI Committee, *Reemployment of Older Workers*, 2013.)

¹⁷ FYs 2016-17 Biennium Governor's Budget.

¹⁸ Ibid.

- h. wages earned from entry through completion;
 - i. coursework cost and availability of academic credit;
 - j. completion rates;
 - k. post-completion employment rates; and
 - l. availability of career pathways.
- 5. Examine historical trends in Connecticut apprenticeship programs, including the number and types of programs, employer participation, and enrollment
 - 6. Compare Connecticut's apprenticeship opportunities to those in similar states

Update Supply and Demand Alignment

- 7. Update the alignment assessment of supply and demand for the occupations in the 2009 PRI committee study *Alignment of Postsecondary Education and Employment*, using the most recent data available

Area Not Under Review

The study would not review unregistered apprenticeship programs.

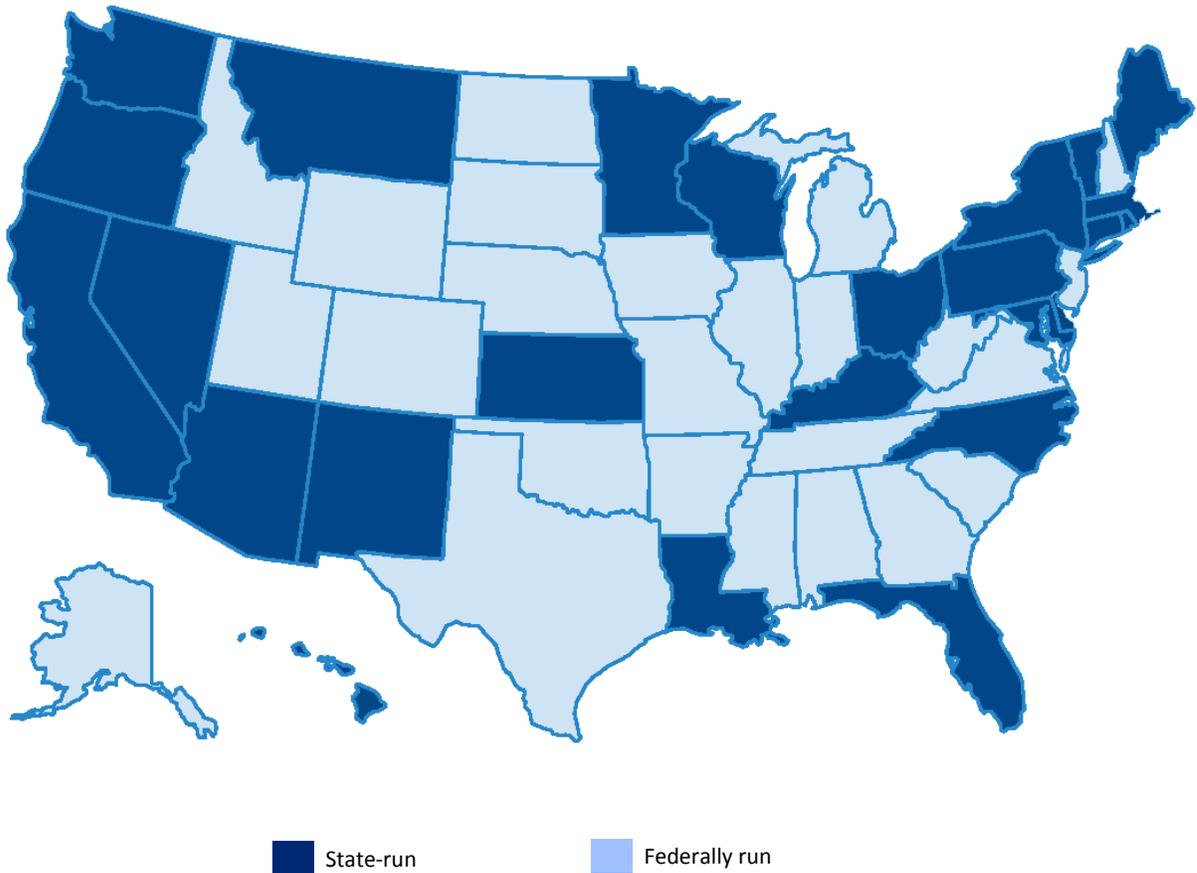
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Appendix B

Figure B-1: State-Run Apprenticeships



Source: PRI staff using information from the National Association of State and Territorial Apprenticeship Directors (<http://nastad.us/links.html>, accessed September 15, 2015).

Appendix C

The following tables show the occupations for which apprenticeships are available. The tables also indicate, for each occupation's apprenticeship: the number of apprentices (as of June 30, 2015); whether the occupation is licensed; the approximate years of on-the-job training required (with 2,000 hours equal to a year); and the number of coursework hours required.

Table C-1: Automotive Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Mechanic: 4				
Auto body and fender mechanic (with painting)	---	---	4	576
Auto mechanic	---	---	4	576
Auto service mechanic	---	---	2	300
Diesel mechanic	---	---	4	600
Other: 2				
Auto glazier (AG-2)	31	Yes	1	144
Auto and truck painter	---	---	3	450

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-2: Electrical Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Electrician: 5				
Electrician (E-2)	1,608	Yes	4	720
Electrician – Industrial/maintenance	20	---	4	756
Electrician low voltage (L-6)	63	Yes	2	288
Electrician low voltage (C-6 - cables)	51	Yes	2	360
Photovoltaic electrician (PV-2)	7	Yes	2	288
Other: 2				
Cable splicer (L-2)	9	Yes	4	576
Electrical draftsman	1	---	4	576

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-3: Plumbing, Heating, Cooling Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Gas and oil burner: 3				
Gas and oil burner mechanic (limited) (B-2/B-4)	2	Yes	2	288
Gas and oil burner servicer/installer (limited: domestic and light commercial) (B-2)	83	Yes	1	288
Gas and oil burner servicer/installer (limited: any scale, for contractor) (B-4)	1	Yes	2	360
Heating, piping, and/or cooling: 10				
Boiler maker	---	---	3	432
Cooling mechanic (limited) (D-4)	8	Yes	2	396
Heating and cooling mechanic – Industrial maintenance	1	---	4	576
Heating, hot water, and steam mechanic (limited) (S-6)	2	Yes	4	576
Heating, piping, and cooling mechanic (limited) (S-4)	33	Yes	4	576
Heating, piping, and cooling mechanic (unlimited) (S-2)	496	Yes	4	720
Heating-cooling mechanic (limited) (S-10)	54	Yes	3	612
Journeyman / mechanic (limited: heating, hot water, steam, oil burners, gas burners, gas piping) (S-8)	14	Yes	4	576
Piping draftsman	---	---	4	576
Warm air, air conditioning, and refrigeration mechanic (limited) (D-2)	297	Yes	2	432
Plumbing and related: 5				
Plumbing – Industrial maintenance	---	---	4	576
Plumbing, heating, piping, and cooling mechanic (P-2/S-2)	10	Yes	6	1008
Plumbing mechanic (unlimited) (P-2)	514	Yes	4	576
Sewer, storm and water journeyman (P-6)	41	Yes	1	180
Well driller (W-2)	2	Yes	3	288

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-4: Other Building Trades' Apprenticeship Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Brick and cement: 3				
Bricklayer	36	---	4	576
Bricklayer and cement finisher	---	---	4	576
Cement finisher	8	---	4	576
Elevator: 2				
Accessibility journey person (R-6)	2	Yes	1	144
Elevator constructor (R-2)	69	Yes	6	864
Heavy equipment: 2				
Heavy equipment mechanic	24	---	4	432
Heavy equipment operator	41	---	3	432
Paint: 3				
Painter	34	---	3	432
Painter – Decorator/taper	2	---	3	432
Painter – Ornamental	---	---	3	432
Roof: 2				
Roofer	20	---	3	432
Roofer/waterproofer	137	---	3	432
Terrazo/tile: 4				
Terrazo mechanic	1	---	4	576
Tile finisher	2	---	2	288
Tile finisher/terrazo	---	---	2	288
Tile setter	---	---	4	576
Other: 16				
Arrangements draftsman	---	---	4	576
Cabinet maker	---	---	4	576
Carpenter	439	---	4	576
Construction craft laborer	122	---	2	288
Drywall finisher	19	---	4	576
Fire suppression systems technician (F-4)	11	Yes	3	432
Glazier (FG-2)	102	Yes	3	432

Table C-4: Other Building Trades' Apprenticeship Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Iron worker	77	---	4	576
Millwright	6	---	4	576
Plasterer	---	---	4	576
Pointer, caulker, cleaner	25	---	3	432
Solar mechanic (ST-2)	---	Yes	2	288
Sprinkler fitter (F-2)	140	Yes	4	576
Stone/marble	---	---	4	576
Structural draftsman	---	---	4	576
Ventilation draftsman	---	---	4	576

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-5: Metal and Sheet Metal Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Sheet metal: 3				
Sheet metal worker – Limited (SM-4)	1	Yes	2	288
Sheet metal worker – Limited (HVAC) (SM-2)	166	Yes	4	576
Sheet metal worker (SM-2)	83	Yes	4	576
Other metal: 15				
Die maker	---	---	4	600
Die maker (four-slide)	---	---	4	600
Die sinker	---	---	4	600
Experimental machinist	---	---	4	600
Gage maker	---	---	4	600
Machinist	18	---	4	600
Maintenance machinist	1	---	4	600
Model maker	1	---	4	600
Mold maker (plastic)	2	---	4	600
Pattern maker	---	---	4	600
Tool and die maker	33	---	4	600
Tool and die maker (fourslide)	1	---	4	600
Toolmaker	24	---	4	600
Toolmaker (bench)	---	---	4	600
Toolmaker (carbide)	---	---	4	600

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-6: Machine Trades' and Manufacturing Apprenticeship Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Engineer: 3				
Service engineer	---	---	2	288
Service engineer (laser)	---	---	2	288
Service engineer (punch)	---	---	2	288
Machine and machinist: 12				
CNC production machinist	17	---	3	450
Industrial machine service engineer	3	---	2	288
Machine repairer	4	---	4	600
Machine setter (fourslide)	2	---	3	450
Machine setup mechanic	---	---	3	432
Machining technician	---	---	2	288
Machinist (EDM)	15	---	3	432
Machinist (CNC)	8	---	3	432
Machinist toolmaker	1	---	4	576
Maintenance mechanic	4	---	4	576
Tapping and threading machine setter	---	---	2	300
Toolroom machinist	---	---	3	432
Plastic: 5				
Injection molding setter (plastic)	---	---	2	288
Injection molding technician (plastic)	1	---	2	288
Plastic mold repairer	---	---	3	450
Plastic technician (blow molding)	---	---	4	576
Plastic process technician	---	---	4	576
Quality control and assurance: 5				
Electronic test technician	---	---	4	576
Non destructive test inspector	---	---	1.2	304
Quality assurance inspector	3	---	2	288
Quality assurance technologist	---	---	1.2	304
Quality control specialist	---	---	3	432

Table C-6: Machine Trades' and Manufacturing Apprenticeship Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Screw machine: 4				
Automatic screw machine setter	---	---	3	432
Screw machine operator and setter	---	---	3	432
Screw machine repairer	---	---	3	450
Swiss automatic screw machine operator and set-up	1	---	3	~400
Springmaker: 3				
Springmaker (coiler)	---	---	3	576
Springmaker (torsion)	1	---	3	435
Springmaker (torsion CNC)	---	---	3	432
Tool: 11				
Tool and diemaker (carbide)	---	---	4	576
Tool and diemaker (progressive)	---	---	4	576
Tool cutter / grinder	---	---	3	432
Tool cutter / grinder (CNC)	2	---	3	150
Tool designer	---	---	4	576
Tool grinder (precision form)	---	---	3	432
Toolmaker (carbide)	---	---	4	576
Toolmaker (CNC)	---	---	3	432
Toolmaker (eyelet)	29	---	4	576
Toolmaker (fourslide)	1	---	4	576
Toolmaker (progressive)	1	---	4	576
Other: 8				
Aerospace fabrication	---	---	2.24	660
Armature winder	---	---	3	432
CNC wireforming	1	---	4	576
Electroplating technician	1	---	3	432
Heat treater	---	---	4	576
Mechanical draftsman	---	---	4	576
Painter – Industrial coating and lining application specialist)	7	---	3	432

Table C-6: Machine Trades' and Manufacturing Apprenticeship Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Vertical turret lathe set-up operator	---	---	1.5	216

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-7: Service and Technician Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Electronic technician – radio/TV (V-2)	---	Yes	3	432
Electronic technician – cable installer	---	---	3	440
Energy efficiency technician	---	---	1	200
Insulator	19	---	2	288
Lawn sprinkler installer and maintainer (J-4)	19	Yes	1	144
Maintenance repairer	---	---	4	576
Maintenance technician	---	---	4	576
Mechanical insulator	1	---	3	432
Pump servicer and installer (J-2)	26	Yes	2	288
Gasoline tank installer and repair (P-8)	7	Yes	1	144
Stationary engineer (OE-2)	Not avail. ¹	Yes	3	432
Telephone equipment servicer and installer (T-2)	49	Yes	2	288

Notes:

¹Data possibly kept by Department of Consumer Protection.

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Table C-8: Other Apprenticeships' Basic Requirements

	Number of Apprentices	Occupation Licensed?	Years on-the-job	Coursework Hours
Culinary arts: 3				
Chef	---	---	3	432
Chef	---	---	4	576
Cook (hotel and restaurant)	---	---	3	432
Nuclear plant: 3				
Plant equipment operator	---	---	3	432
Reactor operator - nuclear	3	---	3	432
Senior reactor operator-in-training - nuclear	3	---	2.5	360
Press: 4				
Press operator	---	---	4	576
Press operator (offset)	---	---	4	600
Pressman (offset)	---	---	2	288
Pressroom mechanic	---	---	4	576
Other: 6				
Child care development specialist	---	---	2	Specific program ¹
Firefighter	9	---	4	576
Locksmith	---	---	3	432
Shipbuilder	---	---	4	576
Veterans disability advocate	---	---	1	144
Youth development specialist	---	---	1	144

Notes:

¹ CT Charts-a-Course

Source: PRI staff analysis of CT DOL website and information provided by CT DOL personnel.

Appendix D

Figure D-1: Types of Inactive Registered Apprenticeships in Connecticut, June 2015

		LICENSED OCCUPATIONS ¹	UNLICENSED OCCUPATIONS
AUTO	Automotive	<i>None</i>	Auto and truck painter Mechanic: 4 types
	Electrical	<i>None</i>	<i>None</i>
BUILDING	Plumbing, Heating, Piping, and Cooling	<i>None</i>	Boiler maker Piping draftsman Plumbing – Industrial maintenance
	Other Building Trades	Solar mechanic	Cabinet maker Arrangements draftsman Bricklayer and cement finisher Painter – Ornamental Stone/marble Structural draftsman Terrazo and tile: 2 Ventilation draftsman
MANUFACTURING & METAL	Metal and Sheet Metal	<i>None</i>	Die-related: 3 Gage maker Patternmaker Toolmaker: 2 Experimental machinist
	Machine Trades	<i>None</i>	Armature winder Engineer: 3 Heat treater Plastic: 4 Springmaker: 2 Tool: 7 Aerospace fabrication Machine and machinist: 4 Mechanical draftsman Quality control and assurance: 4 Screw machine: 3 Vertical turret lathe set-up operator

Figure D-1: Types of Inactive Registered Apprenticeships in Connecticut, June 2015, Continued

		LICENSED OCCUPATIONS	UNLICENSED OCCUPATIONS
SERVICE	Service and Technician	Electronic technician: 1 type	Electronic technician: 1 type Energy efficiency technician Maintenance: 2 Television cable installer
	Other	<i>None</i>	Chef / cook: 3 Locksmith Nuclear plant: 1 Press: 4 Childcare development specialist Shipbuilder Veterans disability advocate Youth development specialist

Note: ¹A number after a trade name indicates the number of apprenticeship types within the trade. The different types are listed in Appendix C.

Source: PRI staff using CT DOL information.

Appendix E

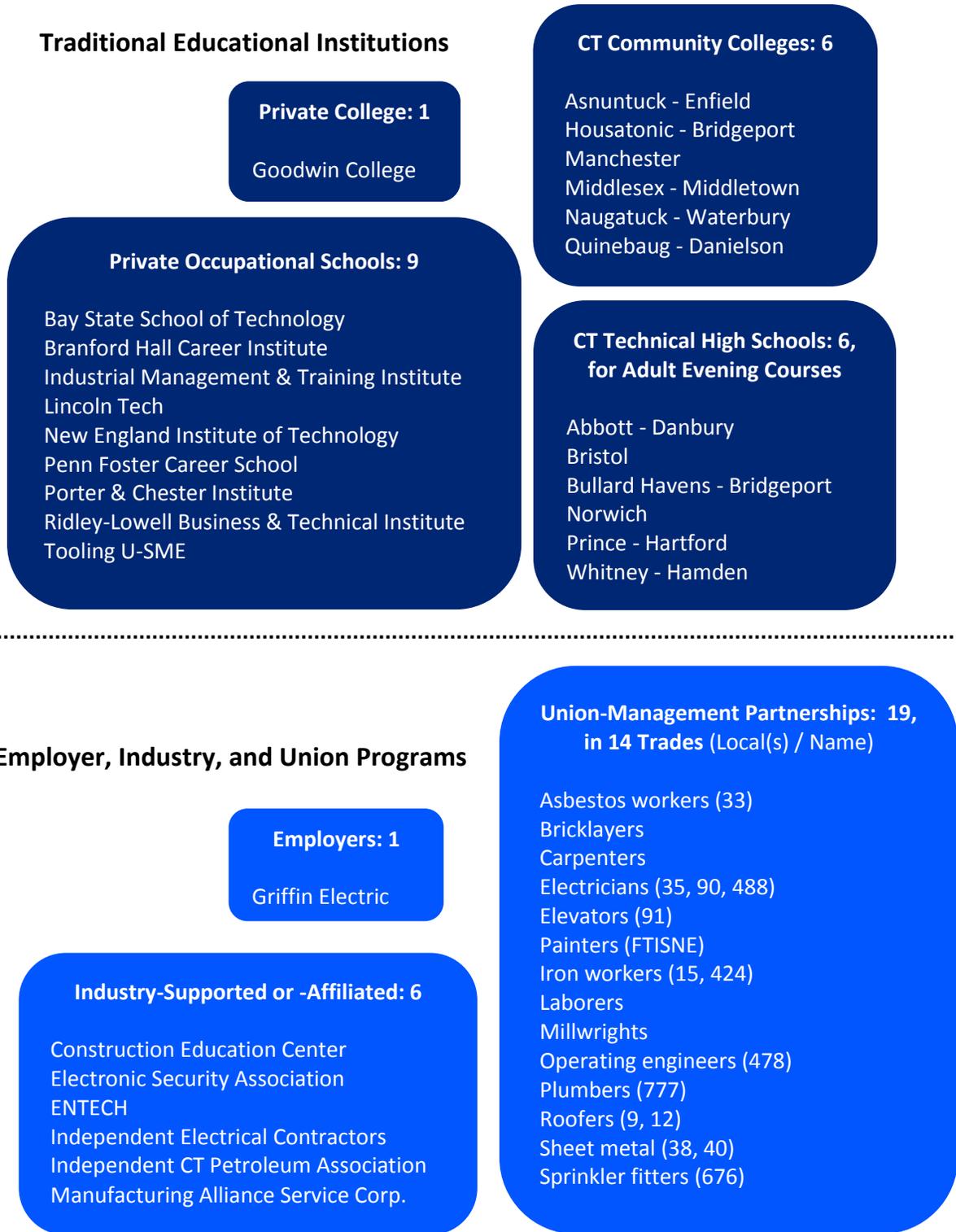
HIRING RATIO CHART

<u>ALL TRADES</u>	
Apprentices	Licensee (Journeyman or Contractor)
1	1
2	2
3	5
4	8
5	11
6	14
7	17
8	20
9	23
10	26
Ratio continues at 3 journeyman to 1 apprentice	

Source: CT DOL. Accessed September 22, 2015 at: <https://www.ctdol.state.ct.us/progsupt/appren/online/HiringRatioChart.pdf>.

Appendix F

Figure F-1: CT DOL-Approved Coursework Providers



Source: PRI staff based on CT DOL information.