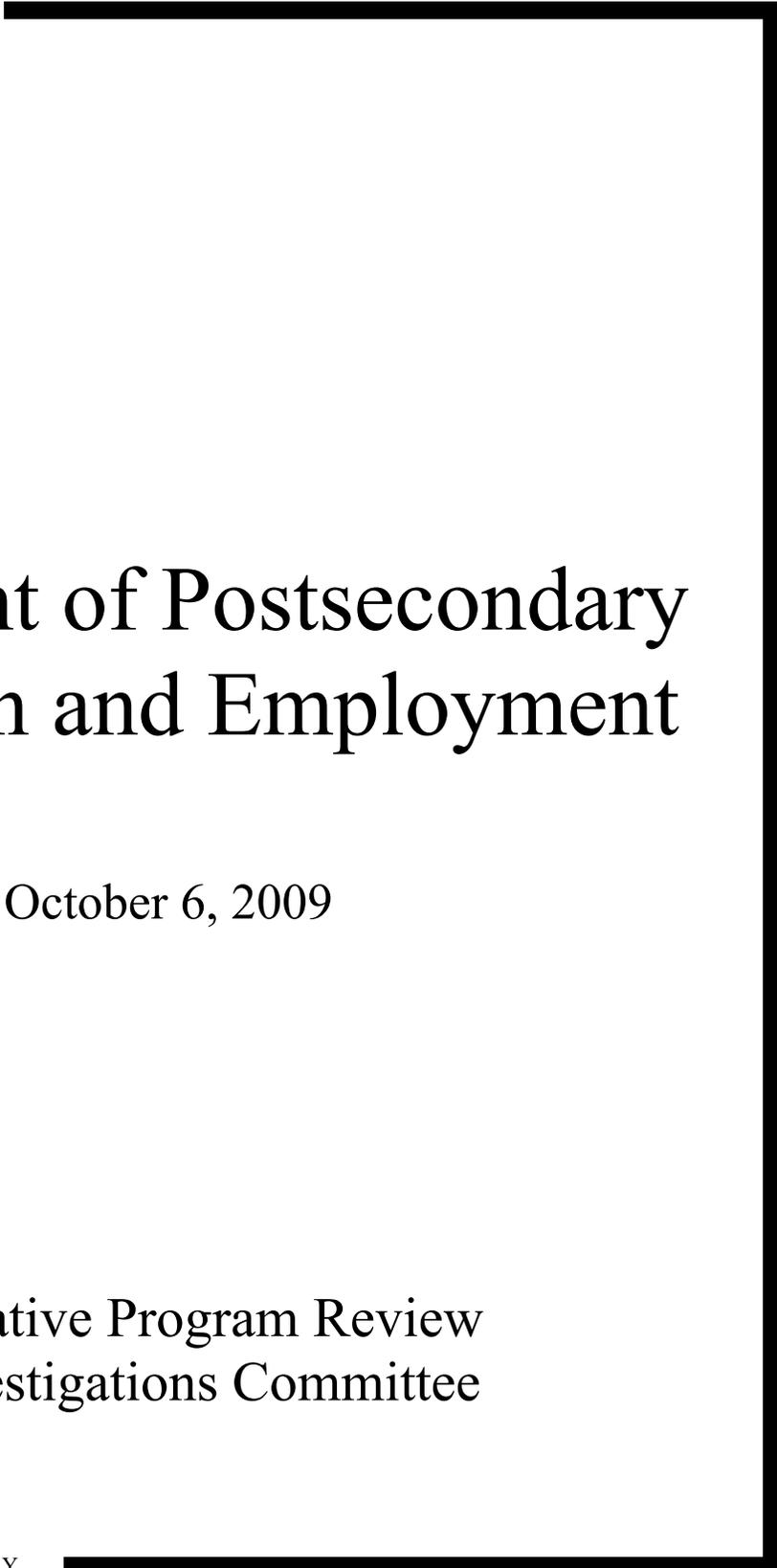


Staff Briefing



# Alignment of Postsecondary Education and Employment

October 6, 2009

Legislative Program Review  
& Investigations Committee

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# Introduction

## Study Overview

The Legislative Program Review and Investigations Committee voted to conduct this study examining *Alignment of Postsecondary Education and Employment* in April 2009.<sup>1</sup> Numerous reports have identified an increasing gap in how well Connecticut prepares its workforce for the demands of current and near-future employment. The focus of the study is to determine whether a formal alignment mechanism exists in Connecticut to match the production of skilled graduates from the state’s higher education institutions (including public and independent universities, four-year colleges, and community colleges) with the current and projected workforce needs of the state’s employers. The study also assesses current workforce supply and employer needs, and reviews whether pathways exist for technical high school graduates to pursue postsecondary education certificates and degrees.

Table 1 shows a simplified version of the conditions and results of an employment market. Low labor supply and high employer demand leads to employee shortages and the inability for markets to be fully productive, while high labor supply and low employer demand leads to unemployment. The purpose of promoting state policies that foster alignment is to achieve market equilibrium by ensuring an equal balance of supply and demand. If there were perfect alignment, individuals would become prepared for the workforce by obtaining a postsecondary degree or certificate and jobs requiring the skills obtained in college would exist. Figure 1 provides a diagram of the alignment of postsecondary education and employment.

<b>Table 1. Conditions Related to Labor Market Supply and Employer Demand</b>		
<b><i>Labor Supply</i></b>	<b><i>Employer Demand</i></b>	<b><i>Result(s)</i></b>
<b>Misalignment</b>		
low	high	employee shortages
high	low	unemployment
<b>Alignment</b>		
low	low	alignment
high	high	alignment

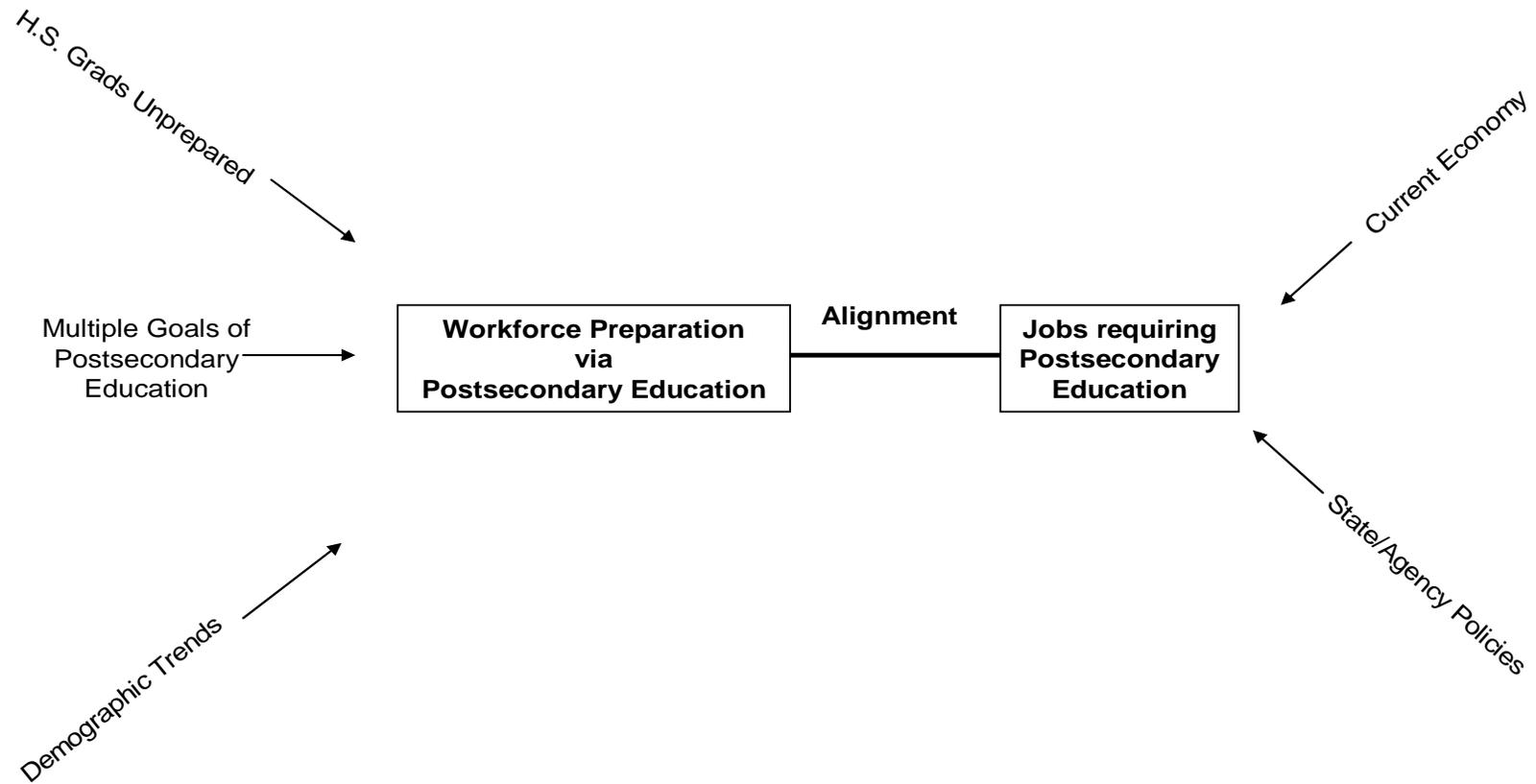
Source: PRI staff

There are a number of factors affecting the supply of workers, as well as employer demand for labor. On the supply side, they include these facts:

- many students graduating from Connecticut high schools either do not attend college or are unprepared for college-level work and need remedial English and math courses;

<sup>1</sup> The American Dictionary (2nd College Edition) defines alignment “to adjust (parts of a mechanism, for example) to produce a proper relationship or condition.”

Figure 1. Diagram Showing Alignment of Postsecondary Education and Employment Study



Source: PRI staff

- there are multiple goals of postsecondary education, and creating a ready supply of workers for employers is only one of the many goals of the higher education system; and
- students often are concerned not only with their own marketability in terms of their majors, but also on obtaining further education for their own personal growth.

Employer demand for workers is linked to economic cycles of various markets, increasing in boom times and decreasing in recession. In addition, other factors that influence employer demand for workers include:

- the introduction and adoption of new technology and productivity improvements;
- changing skill requirements; and
- state agency policies, such as financial and tax incentives or disincentives for businesses to locate in the state.

**Connecticut's workforce trends.** Today's global economy requires a highly dynamic, technologically advanced 21st century workforce. However, concerns about how Connecticut will meet these needs are twofold: 1) what are the workforce needs of Connecticut's employers now and in the future (demand); and 2) does Connecticut have a workforce that will meet these needs (supply).

A recent report by the Connecticut Office of Workforce Competitiveness<sup>2</sup> predicts that the state will face a significant challenge to remain economically competitive given current demographic trends as described later in Section I and highlighted here:

- Connecticut is considered to have one of the oldest populations in the country.
- There is concern about the decrease in Connecticut's young working population (i.e., 25 to 34 years old) and the education levels of those expected to remain in the state.
- Connecticut's increase in awarding bachelor's degrees outpaces national trends; however, Connecticut lags behind in the awarding of associate's degrees, and has experienced a 14 percent decrease in the awarding of postsecondary certifications from 2000 to 2006.

Additionally, Connecticut also must contend with changes in the types of employment opportunities available currently and in the near future. The manufacturing jobs that previously sustained the state's workforce fell 25 percent during the 1990s and those remaining require a

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<sup>2</sup> *A Talent-Based Strategy to Keep Connecticut Competitive in the 21<sup>st</sup> Century: Growing, Using and Enriching Connecticut's Talent Pipeline*, Prepared by Office of Workforce Competitiveness, February 2007.

different and more adaptable set of skills.<sup>3</sup> Further, community colleges in Connecticut estimate that almost 80 percent of new jobs will require training beyond high school.<sup>4</sup>

A 2008 survey by the Connecticut Business and Industry Association (CBIA) found that two-thirds of small and medium size businesses had difficulty finding qualified workers. The survey contained a number of questions related to business climate and growth in Connecticut, as well as questions related to the job-readiness of Connecticut's workforce. Of those employers that responded to a question on their greatest business concern over the next 12 months, 38 percent of employers were concerned about the price of energy, and 31 percent were concerned about the national economic uncertainties, while only 6 percent were concerned about the availability of skilled labor. A later survey question more specifically asked if they were having trouble finding qualified workers, and the percentage responding "yes" increased to 61 percent.

*Occupational projections.* Current and future workforce needs are officially projected at the state and national level. This briefing report identifies workforce needs within the next decade, as well as examines the accuracy of previous projections. The first step in linking postsecondary education to employer need is to identify the types of graduates that will be needed by Connecticut's employers. The next step is to design academic programs around these needs if it is an emerging field or create incentives for students to enter certain fields where employers are experiencing a shortage of qualified workers.

The Department of Labor is the state agency responsible for developing 10-year occupation projections, including identifying those areas that will experience occupational shortages. Although almost all states use the same methodology to calculate these projections, there are also other private and public organizations projecting need at the national, state, and regional levels that employ a variety of strategies. More information about how employer demand is determined is provided in Section II of this report.

**History of alignment efforts.** Postsecondary institutions play a critical role in the state's economic development because they supply employers with a skilled workforce. Although Connecticut's public and independent colleges and universities offer an array of certificate and degree programs, designing, offering, and marketing these programs to students in order to address employer need is often decentralized, with decisions made at the individual college level. This report focuses on the many state agencies and boards with responsibility for some aspect of postsecondary education (supply) and employer needs (demand) and describes the current status of Connecticut's workforce.

Attention to the importance of the relationship between postsecondary education and employers is not new -- proposals have been put forth by Connecticut's policymakers since at least 1982 with the creation of the Governor's Commission on Higher Education and the Economy. The report cited the:

*shortage of skilled labor in Connecticut and problems caused by poor academic preparation... Many cooperative programs are now underway among business, labor*

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<sup>3</sup> The South Central Regional Workforce Development Board, *State of the Workforce 2003*.

<sup>4</sup> Connecticut Community Colleges, *Career Programs & 21<sup>st</sup> Century Skills*.

*and education. But no framework currently exists to coordinate such efforts or to relate them to the educational needs of the state.*<sup>5</sup>

To create a better connection, the commission recommended improvements in career counseling, and the establishment of a committee to report on technological change and its effect on employment opportunities in Connecticut.

*Ongoing alignment efforts.* There has been a long-standing recognition that aligning postsecondary education with Connecticut's economy and employer need is important. Past and current efforts involve all the key players and progress has been made, albeit sometimes in a piecemeal manner. A significant piece of legislation passed during the 2009 session that requires a new longitudinal data system to track student success over the long term. In addition, the creation of the P-20 Commission, described later in this report, is examining issues related to better aligning prekindergarten through high school and higher education systems, as well as creating better alignment between those systems and the needs of Connecticut's employers. Finally, a new Workforce and Education Cabinet is proposed in September 2009, in the new Connecticut Economic Strategic Plan by the Department of Economic and Community Development.

**Roles and responsibilities of state entities.** There are multiple organizations in state government that are mandated to foster linkages; the effectiveness of this "system" in aligning postsecondary education and employment, however, is unclear. Connecticut currently has multiple state agencies involved in projecting demand, identifying the current state of the workforce, and funding programs for a variety of workforce development initiatives. On the higher education side, there is a Board of Governors for Higher Education that statutorily serves as the coordinating body over four constituent units – the University of Connecticut, Connecticut State University System, Connecticut Community College System, and the Board for Academic Awards (i.e., Charter Oak State College and on-line distance learning). The technical high schools fall under the State Board of Education, Connecticut's governing board for K-12 public education.

**Research methods.** To date, program review committee staff have conducted several interviews with staff from: the State Department of Education (SDE); the Departments of Higher Education (DHE), Labor (DOL), and Economic and Community Development (DECD); and the Office of Workforce Competitiveness (OWC). Interviews were also held with college administrators at the University of Connecticut, and the Connecticut State University, and Community College Systems. On-site visits were made to Central Connecticut State University and two community colleges, Asnuntuck and Manchester, including a visit to the middle college, Great Path Academy located at Manchester Community College. The superintendent of the technical high schools was also interviewed. Background data were collected from various state agencies and statutes were reviewed. Committee staff also reviewed numerous studies, including ones specific to either New England or Connecticut only. Committee staff also interviewed representatives from the Connecticut Conference of Independent Colleges, Goodwin College, and the Connecticut Business and Industry Association.

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<sup>5</sup> *Report of the Governor's Commission on Higher Education and the Economy*, January 1982, p. 2.

Also, data were gathered on the workforce supply including postsecondary graduates from Connecticut's public and independent postsecondary schools, and those currently employed in particular occupations. Information was also compiled on workforce demand, including occupational projections and job vacancy surveys. An assessment of the current and near-future alignment of supply and demand was also conducted. Information on potential barriers to alignment was also compiled.

**Report organization.** Section I presents information on the current and future workforce supply in Connecticut. Section II describes employer demand, including a discussion of how demand is determined and a snapshot of jobs in greatest demand. Section III makes an assessment of the alignment between supply and demand using numbers of graduates of post secondary education and the estimated employer demand for this educated workforce. Section IV provides an overview of Connecticut's system of higher education and describes each of the constituent units that oversee Connecticut's public colleges and universities. Section V discusses the state agencies and other coordinating bodies that have been created to better link the higher education system to workforce development and employer need. Finally, Section VI discusses some possible barriers to the alignment of postsecondary education and employment.

### What is the Current and Near Future Workforce Supply in Connecticut?

As noted in the introduction, today's global economy requires a highly dynamic, technologically advanced 21<sup>st</sup> century workforce. Numerous reports have identified an increasing gap between Connecticut's workforce preparation and the demands of current and near-future employment. Does Connecticut have a sufficient supply of skilled and educated workers to meet the needs of employers now and in the near future?

This section addresses this question, beginning with a discussion of how supply figures are determined, and a snapshot of workforce industry and occupational areas. Information about the education and age of employees is also given as those factors impact the availability of a skilled and knowledgeable workforce.

How to assess the future supply of workers with postsecondary degrees or certificates is then discussed. Information on the talent pipeline is provided, including the number of high school graduates with plans to attend college, college graduation rates, and the most popular certificate and degree areas. The initial impact of college graduates on workforce supply is then provided using estimates of job placement rates in Connecticut within nine months of graduation.

#### Current Workforce Supply

**How is current workforce supply determined?** Prior to understanding if Connecticut has a sufficient supply of skilled and educated workers to meet the needs of employers, one must define what is meant by workforce supply. There is no consensus on how to measure current workforce supply. One way to describe the current workforce supply is to count how many people are employed in various *industry sectors* such as retail or government. A drawback to this methodology, however, is that it does not provide information about the kinds of occupations in which people are employed.

A second way to measure current workforce supply is to count how many people are working in broad *occupational sectors* such as office/administrative support or architecture/engineering. A challenge to this methodology is that occupational sectors employ people in many types of jobs that require different levels and types of education and training.

Because the focus of this study is on the alignment of postsecondary education and employment, the current workforce supply needs to be defined in terms of *specific occupations* such as pharmacists or automotive service technicians/mechanics. Particular occupations can then be matched with specific postsecondary degrees or certificates.

While this latter methodology will be used for this study, current workforce supply will be briefly described in terms of industry and occupational sectors to provide a context for these future report analyses.

**What are the industry/cluster sectors people are employed in?** The federal and state Departments of Labor categorize industries using the North American Industry Classification System (NAICS). Table I-1 shows that, apart from government employees — mainly local government — the largest concentration of Connecticut’s nonfarm workforce is employed in the trade, health care, and manufacturing sectors.

<b>Table I-1. Industry Sectors In Which Connecticut Workers Are Employed</b>		
<b>Industry Sector</b>	<b>Number Employed<sup>a</sup></b>	<b>Percent of Total Employed</b>
Government: federal, state, and local	254,100	15.4%
Trade: retail and wholesale	246,400	14.9%
Health care and social assistance	243,000	14.7%
Manufacturing	174,200	10.5%
Finance and insurance	120,100	7.3%
Accommodation and food services	114,300	6.9%
Professional, scientific & technical svcs.	88,000	5.3%
Other services	62,800	3.8%
Educational services	58,600	3.5%
Construction	54,800	3.3%
Transportation and warehousing	43,300	2.6%
Information	35,000	2.1%
Other (Misc.) <sup>b</sup>	158,800	9.6%
<b>Total Nonfarm Employment</b>	<b>1,653,400</b>	<b>100%</b>

Source: Connecticut Department of Labor, Labor Market Information on May 2009 employment by industry sector ([www.ctdol.state.ct.us/lmi/ces/nfstacm.htm](http://www.ctdol.state.ct.us/lmi/ces/nfstacm.htm)).

<sup>a</sup>CT DOL workforce estimates exclude those in federal jobs, the military, self-employed, or living in Connecticut but working in another state.

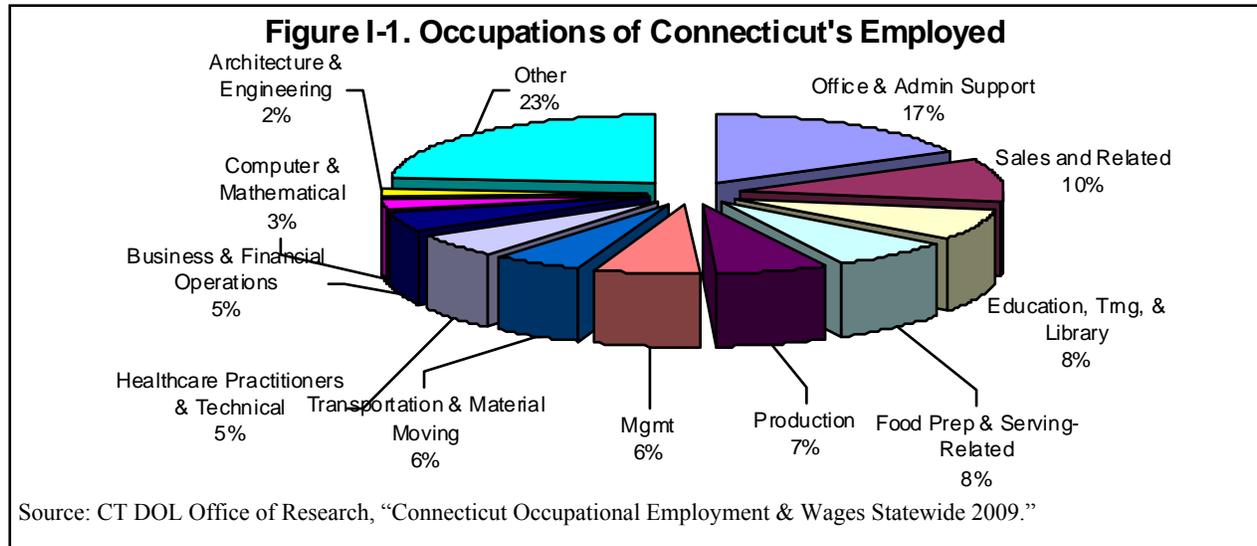
<sup>b</sup>Examples of “Other” industry sectors include: arts, entertainment, and recreation; real estate and rental and leasing; and utilities.

**What occupational sectors are people employed in?** According to the Connecticut DOL Occupational Employment Statistics (OES) survey, the state’s current workforce consists of more than 1.6 million citizens employed in a variety of occupations. As shown in Figure I-1, more than one in four are employed in the office and administrative support occupational sector (e.g., secretaries, office clerks, customer service reps) or the sales and related occupational sector (e.g., retail salespersons, cashiers, and sales reps), both typically considered lower paid and lower skilled occupational areas.

The computer and mathematical occupational sector (e.g., computer software engineers, programmers, and analysts) and the architecture and engineering occupational sector (e.g., civil, industrial, and mechanical engineers and technicians), key areas for the new global economy, make up less than five percent of Connecticut’s workforce.

The occupational sectors in the “other” category include: life, physical, and social science occupations (e.g., biochemists, physicists) (1%); community and social services occupations (e.g., probation officers, medical, and public health social workers) (2%); legal occupations (1%); arts, design, entertainment, sports, and media occupations (2%); healthcare support occupations (e.g., dental assistants, medical transcriptionists) (3%); protective service

occupations (2%); building and grounds cleaning and maintenance occupations (4%); personal care and service occupations (e.g., fitness trainers and aerobics instructions) (3%); farming, fishing, and forestry occupations (<1%); construction and extraction occupations (4%); and installation, maintenance, and repair occupations (4%).



**What is the education of the workforce?** The educational qualifications of Connecticut’s workforce are important because this study focuses on the alignment of supply and demand for jobs that require postsecondary education. The Connecticut Employment and Training Commission recently called for all Connecticut workers to have “access to and acquire the equivalent of at least two years of education or training beyond high school, leading to an associate’s degree, a comparable vocational credential, or similar industry certification...”<sup>6</sup> Although there may be some question about the alignment of postsecondary education and employment, Connecticut is well-positioned to meet this overall education challenge. Table I-2 shows that Connecticut is ranked fifth in the U.S., ahead of all New England states but Massachusetts, in the percent of heads of households with at least four years of college.

Connecticut’s strong position is further enforced by the 20 percent increase in the number of postsecondary education degrees and certificates<sup>7</sup> awarded in Connecticut during the five-year period between state FY 01 and FY 06. Figure I-2 shows the largest increase was for bachelor’s degrees (27 percent). However, there was a decrease (14 percent) in postsecondary certificates. Encouraging people to enroll in and graduate from certificate programs is extremely important because they provide the education and training that is necessary for many of the jobs in the “middle skill” areas.<sup>8</sup>

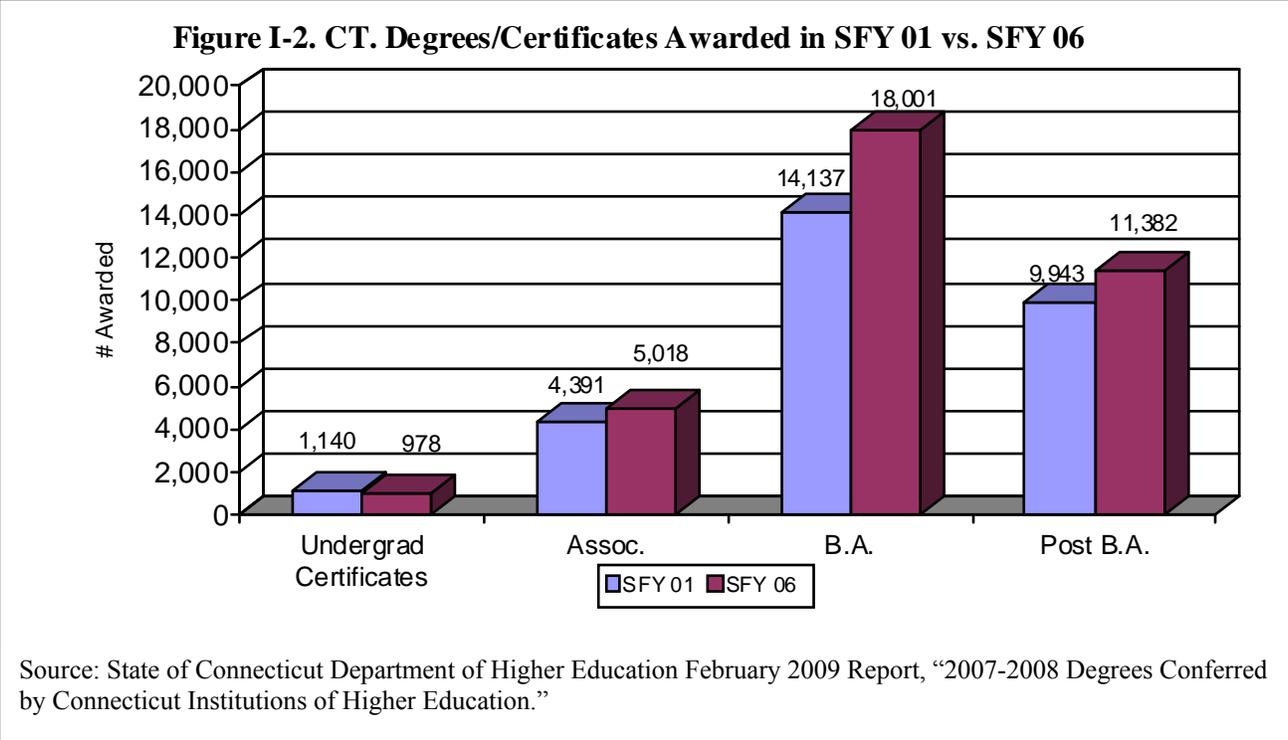
<sup>6</sup> Connecticut Employment and Training Commission, “2009 Annual Report/Card: A Talent-Based Strategy for Economic Competitiveness.”

<sup>7</sup> A certificate is an academic credential earned through programs of shorter duration than an associate’s degree, varying from three to 45 credits of training (e.g., Lean Manufacturing or Paralegal) or credit-free training (e.g., CNA).

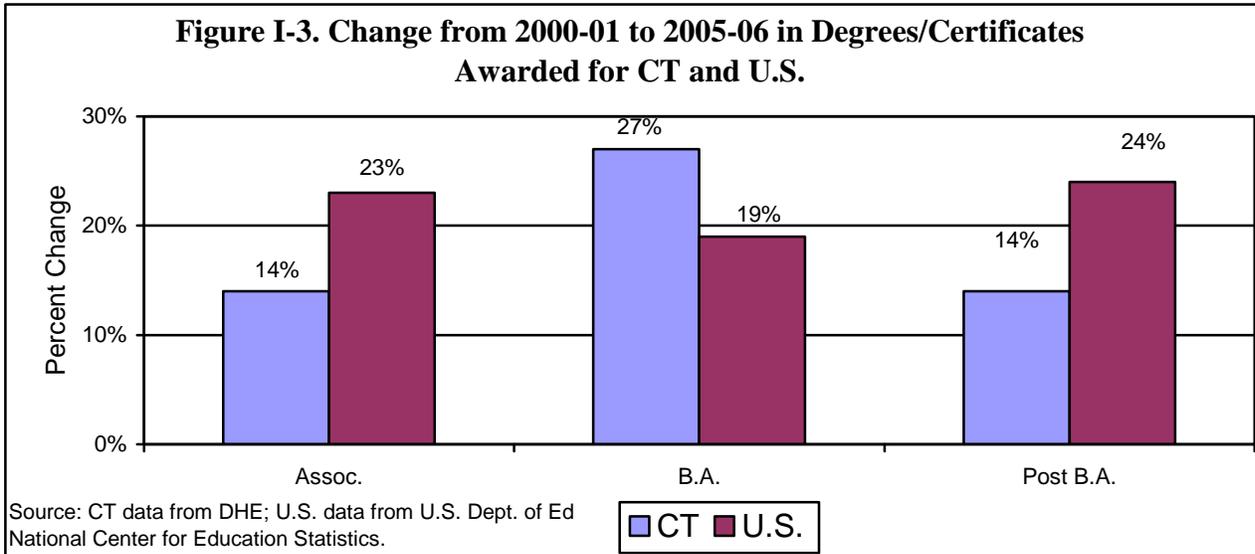
<sup>8</sup> A “middle-skill” job is one that requires education or training beyond high school, but not a four year degree.

State	Ranking	Percent
District of Columbia	1	45.4%
Massachusetts	2	37.1%
Maryland	3	34.7%
Colorado	4	34.6%
<b>Connecticut</b>	<b>5</b>	<b>34.3%</b>
New Jersey	6	33.7%
Virginia	7	32.9%
Vermont	8	32.7%
New Hampshire	9	31.8%
New York	10	31.2%
Rhode Island	13	29.4%
Maine	25	25.9%

Source: 2005-2007 American Community Survey Three-Year Estimates.



Connecticut’s increase in the award of bachelor’s degrees outpaces national trends (Figure I-3). However, compared with the U.S., Connecticut has made less progress in awarding associate’s degrees and advanced degrees beyond the bachelor’s degree. Although there is no national information available on the awarding of postsecondary certificates, there has been a 14 percent decrease in such awards within Connecticut.



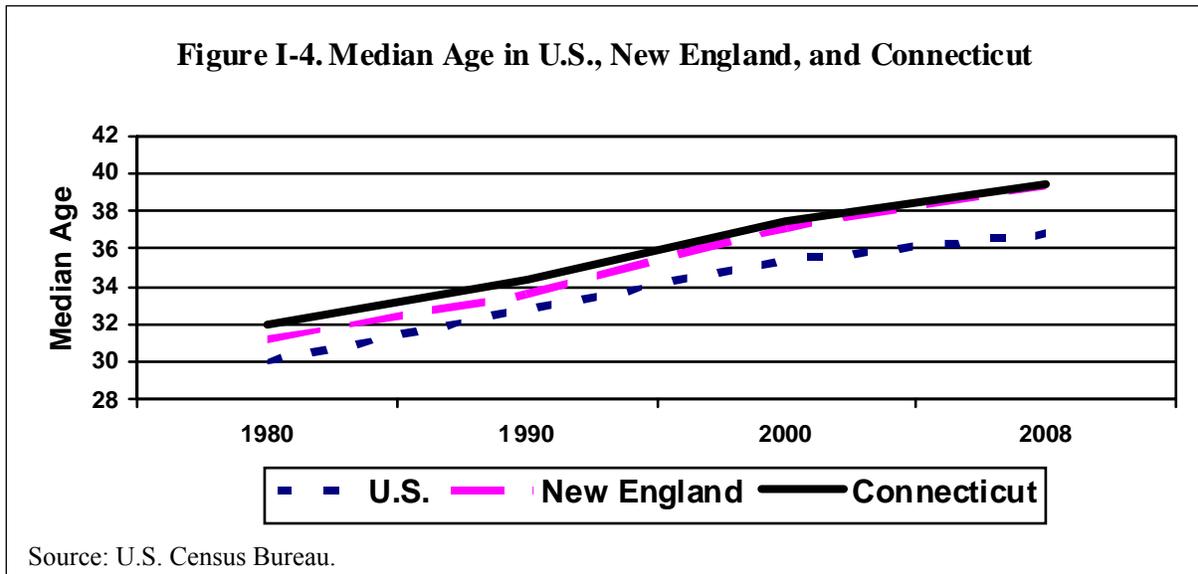
**What is the age of the workforce?** The age distribution of a state’s population has important implications for the availability of workers. An older population is more likely to have retired citizens and thus represent a shrinking available workforce for employers. Connecticut is considered to have one of the oldest populations in the United States. Table I-3 shows the 10 states with the highest median age. Connecticut and four other New England states all have populations that are among the oldest in the country (Massachusetts has the 11 highest median age, 38.6).

Rank	Median Age	State
1	42.0	Maine
2	41.2	Vermont
3	40.6	West Virginia
4	40.2	Florida
4	40.2	New Hampshire
6	39.9	Pennsylvania
<b>7</b>	<b>39.4</b>	<b>Connecticut</b>
8	39.3	Montana
9	38.8	Rhode Island
10	38.7	New Jersey

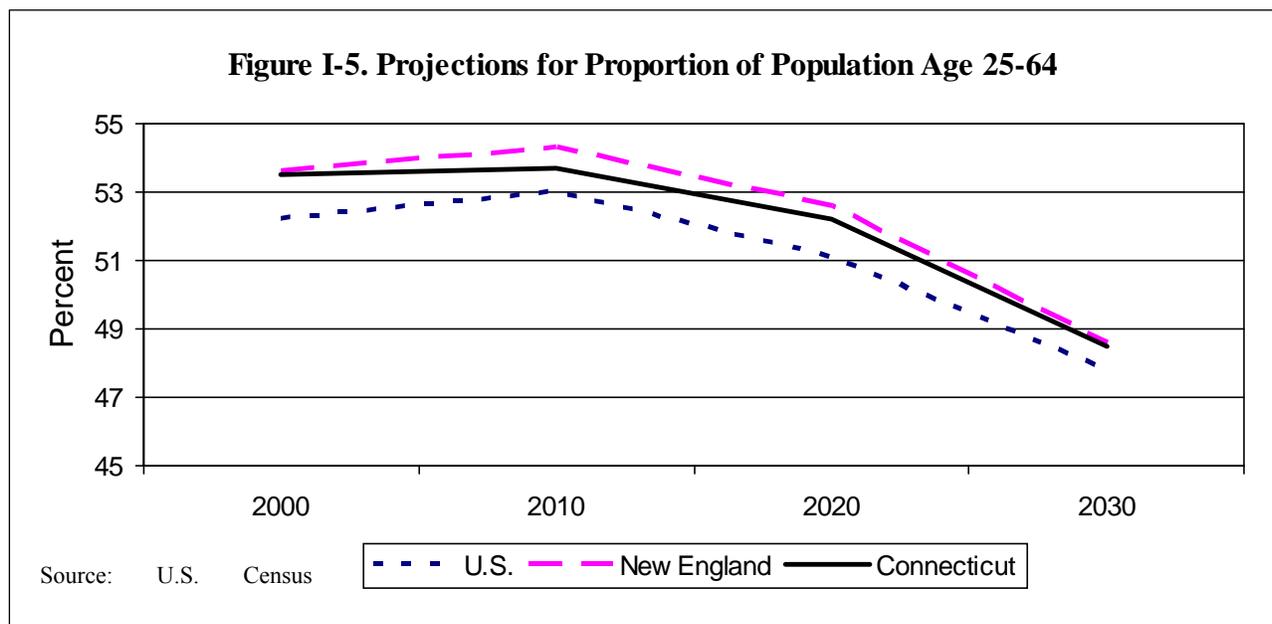
Source: July 1, 2008 U.S. Census Bureau estimates.

*Is this a new problem?* In general, New England states have had older populations than the rest of the United States for almost the last 30 years. Figure I-4 shows the median ages since 1980. Overall, the country has been aging, with a similar trend found in New England and Connecticut. While Connecticut was ranked the fourth oldest state in 1980, it has actually dropped to the seventh oldest state, behind Maine, Vermont and New Hampshire, as of the July 2008 U.S. Census estimates. Although the relatively older median age of Connecticut citizens is

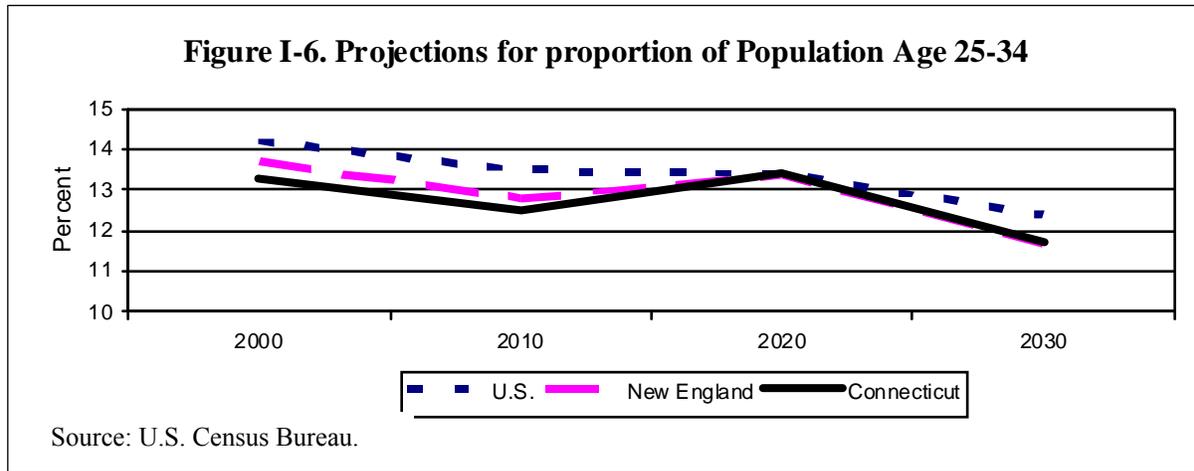
not a new development, its impact on the proportion of the state's working age population still needs to be examined.



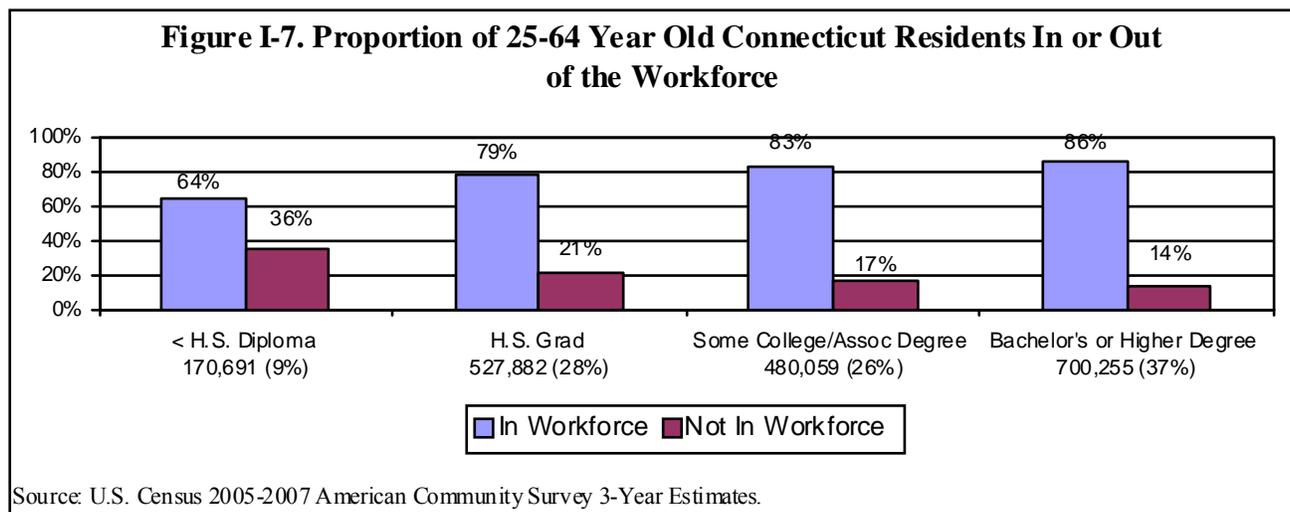
**How much of Connecticut's population is of working age?** Residents in the 25-64 year old age range are considered the primary working age population of a state. According to the U.S. Census 2005-2007 American Community Survey 3-Year Estimates, Connecticut has 1,878,887 residents in the 25-64 year old working-age population. Figure I-5 shows projections for the proportion of Connecticut residents age 25-64. The decreasing state trend is similar to that of the nation and all New England states.



A closer examination of projections of the size of Connecticut’s “young adult” or “young professional” population (i.e., 25-34 year olds) shows a slight increase from 12.5 to 13.4 percent during the next decade (Figure I-6). This slight increase contrasts with the relatively flat national trend for this same age group. Connecticut is projected to join New England in doing worse than the U.S. trend of fewer young professionals, however, in the subsequent decade. Beyond population trends in the traditional working age groups, one can examine the proportion of residents who are actually employed.

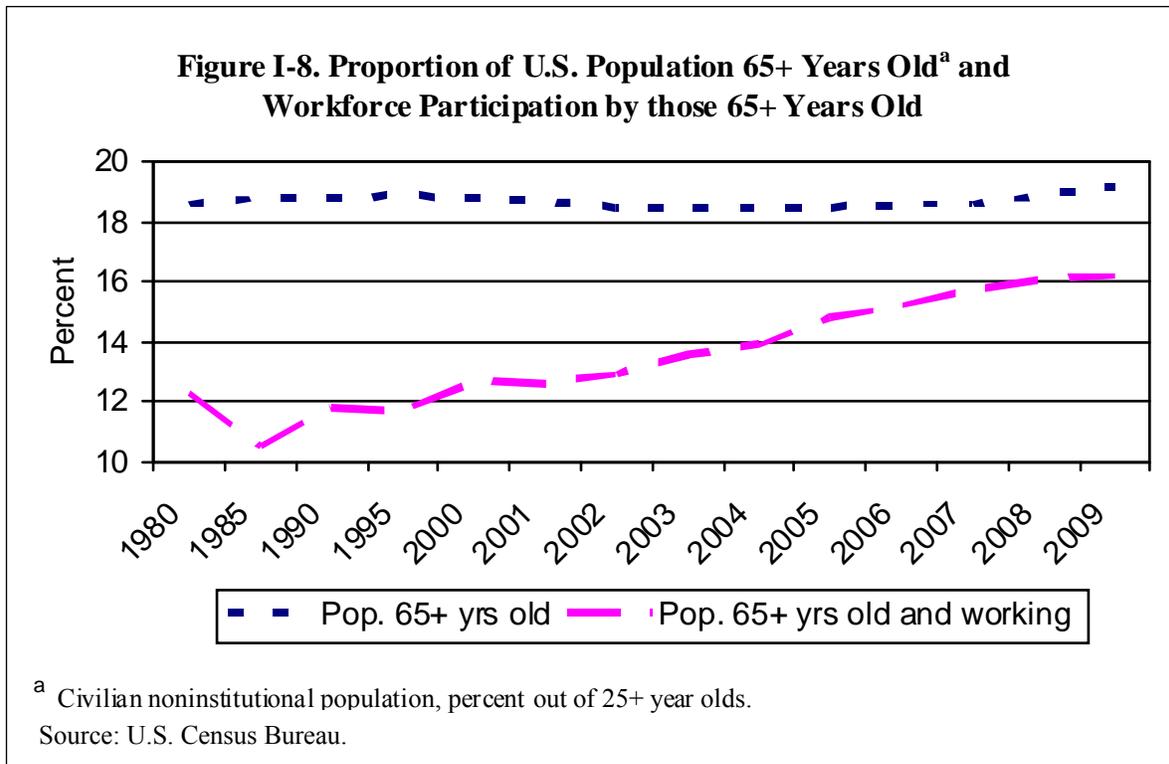


**How much of Connecticut’s population is employed?** Approximately 81 percent of working age residents are actually in the labor force and of those, two-thirds (66 percent) have at least some college (Figure I-7). Approximately 17 percent of working age Connecticut residents with some college or an associate’s degree, and 14 percent with at least a bachelor’s degree, are *not* currently in the workforce and may be a source of new workers. There are also more than 79,000 Connecticut residents age 65 and over who are still working (approximately 16 percent of the 65+ age group).



Nationally, since the year 2000, an increasingly larger percent of the 65 years and older population is working. Thus, the decrease in the 25-64 year old population may be mitigated by

U.S. Census Bureau statistics showing an increasing proportion of employment for those who have reached what has traditionally been considered retirement age (Figure I-8). However, no data were available on the types of jobs they are filling (e.g., low skilled vs. high skilled).



At a recent conference on meeting New England’s skilled workforce needs,<sup>9</sup> the role that older workers can play over the coming decades was explored. It was noted that the strong link between educational attainment and labor force participation for 55-74 year olds will be beneficial to the region, given New Englanders have the highest education level in the nation.

### Near Future Workforce Supply

**How is the near future workforce supply determined?** Before assessing whether Connecticut is producing an adequate supply of new skilled and educated workers to meet employer demands, one must decide how to measure this new workforce supply. As was the case with measuring the current workforce, there is also no consensus on how to measure the near future workforce supply for jobs requiring postsecondary education. One strategy for making these projections is to look at the number of *high school graduates with plans to attend college*, a statistic gathered by the Connecticut State Department of Education. This provides information about the talent pipeline; however, a complicating factor is that high school graduates may change their plans or delay enrollment.

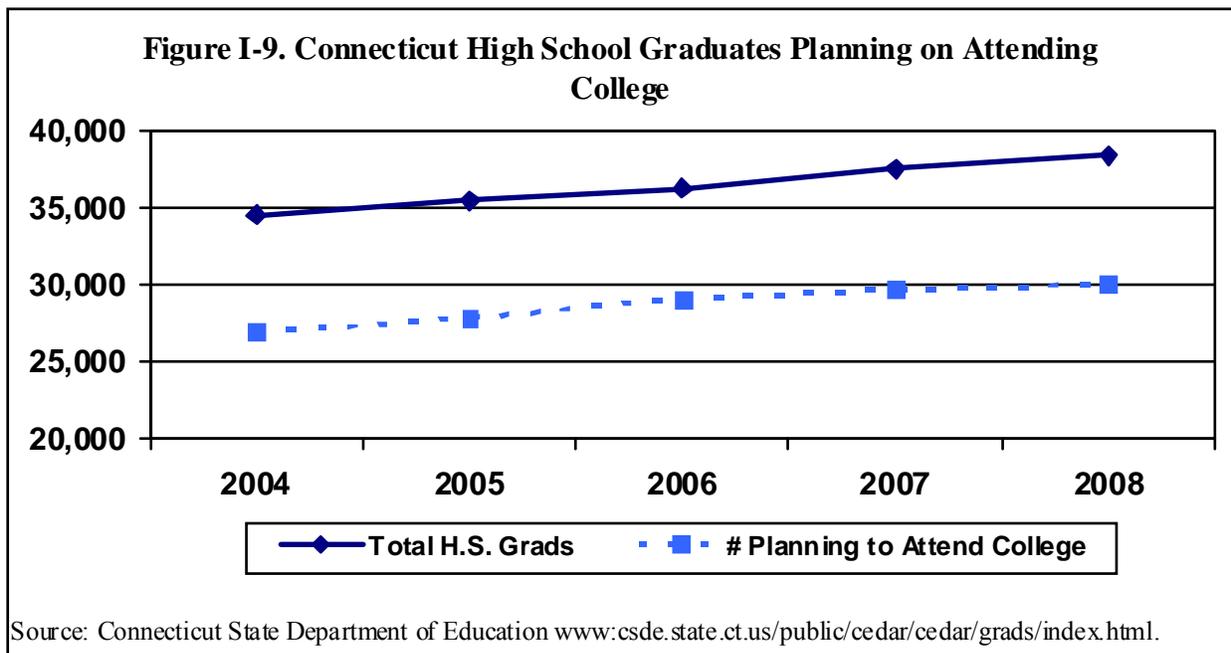
<sup>9</sup> Employing the Region’s Assets: Baby Boomers Meeting New England’s Skilled Workforce Needs. New England Public Policy Center of the Federal Reserve Bank of Boston, December 3, 2008, Conference Report 08-1.

Another way to predict near future workforce supply is to look at the actual number of *degrees or certificates conferred by Connecticut institutions of higher education*. This information is fairly readily available for students who receive their postsecondary education in-state, particularly at a public institution, but more difficult to discern for students who receive their education outside of Connecticut.

In addition to looking at the actual number of graduates, state of residence plays a role in determining if they will remain in Connecticut and join the workforce. As will be described, Connecticut high school graduates who attend college in Connecticut are more likely to remain in the state upon degree or certificate completion than are non-Connecticut residents. Given these cautions in interpreting the data, information on near future workforce supply is now provided.

**Number of recent high school graduates with plans to attend college.** The previously-mentioned talent pipeline stretches from preschool through postsecondary graduate school education. As discussed earlier, Connecticut’s highly skilled jobs require workers with postsecondary degrees or certificates. Entry into postsecondary education necessitates a high school diploma (or GED) and a plan to attend college.

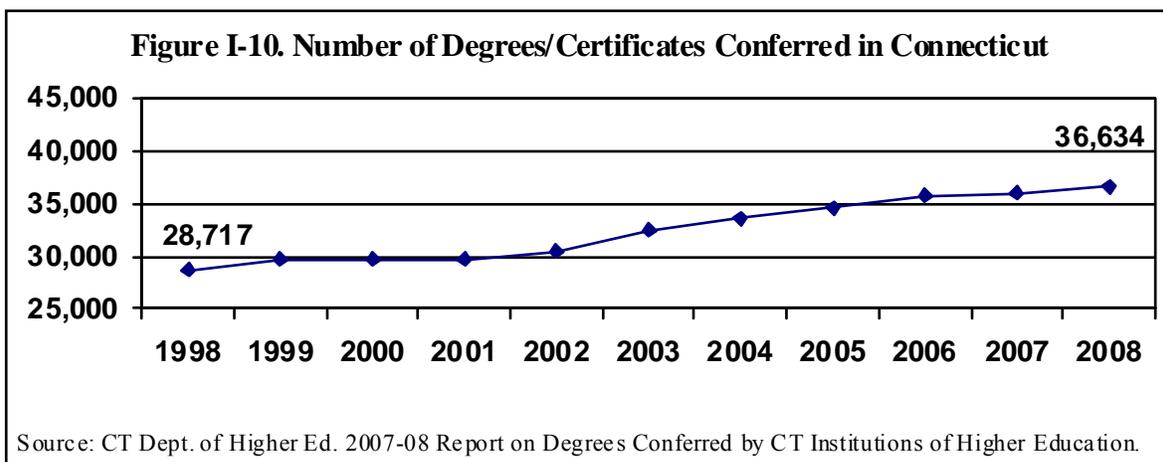
The Connecticut State Department of Education gathers statistics on the number of high school graduates and the percent planning on attending college. While the numbers of high school graduates and those planning to attend college have both increased approximately 11 percent from 2004 to 2008 (11.1 percent and 11.6 percent, respectively), the percent planning on attending college has remained relatively stable, fluctuating narrowly between 78-80 percent of high school graduates (Figure I-9). Thus, there are more recent high school graduates planning on attending college due to the *higher number* of high school graduates rather than due to *proportionately more* high school seniors planning on attending college.



As noted earlier, one caution in interpreting this data is that while the percents reflect students with *plans* to attend college, it does not confirm that the students followed through and actually enrolled in college that fall. Connecticut currently does not have a longitudinal data system to chart student advancement through postsecondary entry. There are 28 states with the ability to match student records between P-12 and postsecondary systems, and with recent funding from the U.S. Department of Education, the Connecticut State Department of Education and Department of Higher Education will soon be able to develop such a data system.

Another measure of future workforce supply is *actual* number of degrees or certificates conferred by Connecticut postsecondary education institutions.

**Number of certificates/degrees conferred by Connecticut colleges.** The students completing degrees or certificates from postsecondary institutions are poised to enter occupations for which they have been trained. Not all of these graduates are new to the workforce. A sizable number of community college students, for example, are employed while obtaining their educations. Figure I-10 shows a 28 percent increase in the past decade in the number of degrees and certificates conferred by Connecticut colleges.



The supply of near future workers is influenced not only by the number of postsecondary degrees or certificates awarded, but also by decisions to remain or leave Connecticut following graduation. Residency status is a key predictor of whether the graduate stays or leaves the state, which in turn is associated with the institution’s public/independent status type.

**Types of institutions producing the near future workforce supply.** Table I-4 shows the number of students who graduated in 2008 from Connecticut public and independent colleges and universities and the proportion who were Connecticut residents. This latter information is useful in projecting the near future workforce supply because while it is estimated that just 20 percent of those who had migrated into the New England region to attend college were still living there one year after graduation, more than 90 percent of native graduates had remained.<sup>10</sup>

<sup>10</sup> New England Public Policy Center at the Federal Reserve Bank of Boston, March 2009 Policy Brief.

The state's four national independent colleges (Connecticut College, Trinity College, Wesleyan University, and Yale University) draw students from around the country, and have a relatively small percentage of Connecticut residents enrolled. In contrast, almost half of the students enrolled in the state's 18 more regionally oriented independent colleges (e.g., Quinnipiac University, University of Hartford, University of New Haven, and Sacred Heart University) are Connecticut residents.

<b>Table I-4. Statistics on 2008 Graduates from Connecticut Colleges</b>			
<b>Type of Institution</b>	<b>Number of 2008 Graduates</b>	<b>Percent Estimated to be CT Residents<sup>b</sup></b>	<b>Number of Graduates Estimated to be CT Residents</b>
<b>Public Postsecondary Education Systems<sup>a</sup>:</b>	<b>19,030</b>	<b>86%</b>	<b>16,377</b>
CT Community College System (12 community colleges)	4,804	99%	4,756
CT State University System (4 state universities)	6,870	91%	6,277
University of Connecticut	6,875	75%	5,156
Charter Oak State College	481	39%	188
<b>Independent Postsecondary Education Institutions</b>	<b>17,381</b>	<b>45%</b>	<b>7,859</b>
National Independent Colleges (4 institutions)	5,808	12%	697
Regional Independent Colleges (18 institutions)	10,982	47%	5,162
Two-Year Independent Colleges (5 institutions)	591	94%	556
Sources: State of Connecticut Department of Higher Education, "2007-08 Report on Degrees Conferred by Connecticut Institutions of Higher Education."			
<sup>a</sup> Higher Education, "Building Connecticut's Workforce Report on 2006-07 graduates, April 2009."			
<sup>b</sup> State of Connecticut Department of Higher Education, "2009 Report, Higher Education Counts: Achieving Results."			

**Number of graduates by major/occupation areas.** Until this point, attainment of a postsecondary degree or certificate has been discussed in general terms, regardless of the field of study. As will be seen in Section III, many employers require positions to be filled by candidates who majored in particular areas. Table I-5 shows the most common majors across Connecticut higher education institutions for 2008 by certificate/degree level. Certificate and degree areas at the undergraduate level are most often awarded in business, management, marketing, and related support services as well as health professions and liberal arts. Business and education areas are popular among master's level degrees, and doctorates and professional degrees were commonly awarded in the legal and health areas.

<b>Certificate/Degree Level</b>	<b>Most Popular Certificate/Degree Areas at Connecticut Public and Independent Postsecondary Institutions</b>
Certificate (N=1,099)	<ul style="list-style-type: none"> <li>• Business, Management, Marketing, and Related Support Service (253)</li> <li>• Health Professionals and Related Clinical Sciences (229)</li> <li>• Engineering Technologies/Technicians (154)</li> </ul>
Associate's Degree (N=5,085)	<ul style="list-style-type: none"> <li>• Liberal Arts and Sciences, General Studies, and Humanities (1,750)</li> <li>• Health Professions and Related Clinical Sciences (1,105)</li> <li>• Business, Management, Marketing, and Related Support Service (1,016)</li> </ul>
Bachelor's Degree (N=18,930)	<ul style="list-style-type: none"> <li>• Business, Management, Marketing, and Related Support Service (3,221)</li> <li>• Social Sciences (2,390)</li> <li>• Psychology (1,488)</li> <li>• Health Professionals and Related Clinical Sciences (1,388)</li> </ul>
Master's Degree (N=9,613)	<ul style="list-style-type: none"> <li>• Education (2,776)</li> <li>• Business, Management, Marketing, and Related Support Service (1,898)</li> <li>• Health Professionals and Related Clinical Sciences (1,012)</li> </ul>
Doctoral/Professional Degree (N=1,716)	<ul style="list-style-type: none"> <li>• Legal Professions and Studies (513)</li> <li>• Health Professionals and Related Clinical Sciences (352)</li> <li>• Biological and Biomedical Sciences (133)</li> </ul>

Source: CT Dept. of Higher Ed. 2007-08 Report on Degrees Conferred by CT Institutions of Higher Education.

**Placement rates of Connecticut graduates in Connecticut jobs.** Placement rates of 2007 graduates from Connecticut public postsecondary institutions were used as a general indicator of new entries into the Connecticut workforce. Table I-6 shows that approximately seven in ten graduates from such institutions were employed in Connecticut within nine months of graduation. Similar aggregate information was unavailable for the 27 independent colleges.

<b>Postsecondary Institution Category</b>	<b>Number of Graduates</b>	<b>Employed in CT within 9 Months of Graduation</b>	
		<b>Number Employed</b>	<b>Percent of Graduates</b>
Community College System	4,691	3,611	77%
CT State University System	6,363	4,947	78%
University of Connecticut	6,282	3,739	60%
Charter Oak State College	592	181	31%
Total	17,928	12,478	70%

Source: Higher Education: Building Connecticut's Workforce; Report on 2006-07 Graduates, April 2009.

### **What is the Employer Demand?**

Employers must have well-educated, technologically advanced workers in order to compete in today's knowledge-based economy. Unmet employer need may result in companies moving jobs out of Connecticut or failing to compete effectively, thereby creating a serious barrier to the prosperity of Connecticut's economy.

Meeting employer demand is beneficial not only to employers and the state's economy, but also to the current and future workforce as the resulting jobs allow people to be self-sufficient citizens. The alignment of postsecondary education and employment is especially important in meeting employer demand as educational institutions are a valuable resource for producing new workers in shortage areas.

To assess whether postsecondary education and employment are aligned, it is necessary to understand employer demand now and in the near future. As is the case with workforce supply, there is more than one way to define employer demand for various occupations including the *rate of job growth, amount of job growth, and number of job openings*. Employee demand information is regularly gathered and available on the Connecticut DOL website.<sup>11</sup>

This section begins with a discussion of how employer demand is determined by the Connecticut DOL and reviews the jobs in greatest demand. There are also emerging fields that are anticipated to require a trained workforce in the not-too-distant future, and will need postsecondary institutions to respond by creating tailored programs to meet this new employer demand. Appendix A provides some information on a few of these occupations, such as nanotechnology and green collar jobs.

*Job vacancy* information is another way to assess employer demand. General and targeted studies of job vacancies were conducted within the past five years by the: Connecticut Department of Labor (representative survey of most occupations in Connecticut); Connecticut State Department of Education (annual report on the number of applicants and remaining vacancies for particular teacher job openings); and Connecticut Hospital Association (vacancy rates for nurses and allied health professions in 29 acute care hospitals). Jobs with the highest and lowest vacancy rates are also identified in this section.

### **How is Employer Demand Determined?**

In order for postsecondary education institutions to align degree and certificate programs with employer needs, the institutions need to know where the job demand is now and in the near future. The Connecticut DOL updates 10-year projections every two years on the jobs that will be in demand in the coming decade. Projections are based on information obtained from the Occupational Employment Statistics (OES) Survey, a twice-yearly mailed questionnaire to business establishments on occupational employment and wage rates.

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<sup>11</sup> <http://www.ctdol.state.ct.us/lmi/misc/occsindemand.htm>

There are 280 industry-specific versions of the OES survey, and depending on the particular business establishment, the form contains a grid of anywhere from 50 to 225 relevant occupational titles, grouped by occupational division, with twelve wage ranges and a total column. Employers are voluntarily asked to record the number of workers (by wage range) *currently employed* in each of the occupations (vacancies are excluded). All states use this surveying methodology and forward their results to the US DOL, where the individual state data is then compiled into national projections of workforce needs.

Out of the approximately 101,000 employers in Connecticut, a total of 3,500 representative employers are sampled in May and November of each year. The OES response rate for the May 2007 survey, for example, was 77 percent, above the 75 percent survey return rate required of states by the U.S. Bureau of Labor Statistics. (See Appendix B for more details on the sampling methodology).

Based on the OES results, high demand occupations are identified in one of three ways by Connecticut DOL:

- fastest growing: the *percent increase* in the number working in the occupation now and within 10 years;
- largest job growth: the *increase in the number employed* in the occupation 10 years from now; and
- most openings: *greatest number of annual openings* projected, taking into consideration such factors as retirements and creation of new jobs.

The Connecticut state labor economist reported using “most openings” OES data as the basis for developing the employer demand projections published in the DOL biennial report, “Soaring to New Heights,” and is the definition used in this PRI study. Other factors taken into consideration by the state labor economist in developing the employer demand projections include: overall demographics and population changes/growth; and information from other state agencies, such as the State Department of Education (SDE), that impact employment projections.

The Connecticut DOL staff interviewed reported that employer demand projections are more an art than a science, noting how difficult it is to accurately project job openings 10 years into the future. At any point during the 10-year period, major economic upheavals or introductions of new technologies could produce substantial deviations from the projections.

The “Soaring to New Heights” report is expected to provide a snapshot of jobs in greatest demand by training level and is not intended to comprehensively describe the job outlook for all 800+ occupations included in the OES survey. However, the publication was recently reduced from six to four pages to save paper, and therefore, money; in doing so, information on teacher occupations in demand was eliminated.

Table II-1 shows that, when all occupations requiring postsecondary education are considered, teachers are among the occupations with the greatest projected number of annual job openings for the years 2006-2016. As will be seen in Section III, while the projected number of job openings is an important factor in determining demand, it must be balanced with available supply. Elementary school teachers, for example, are among the occupations with the greatest

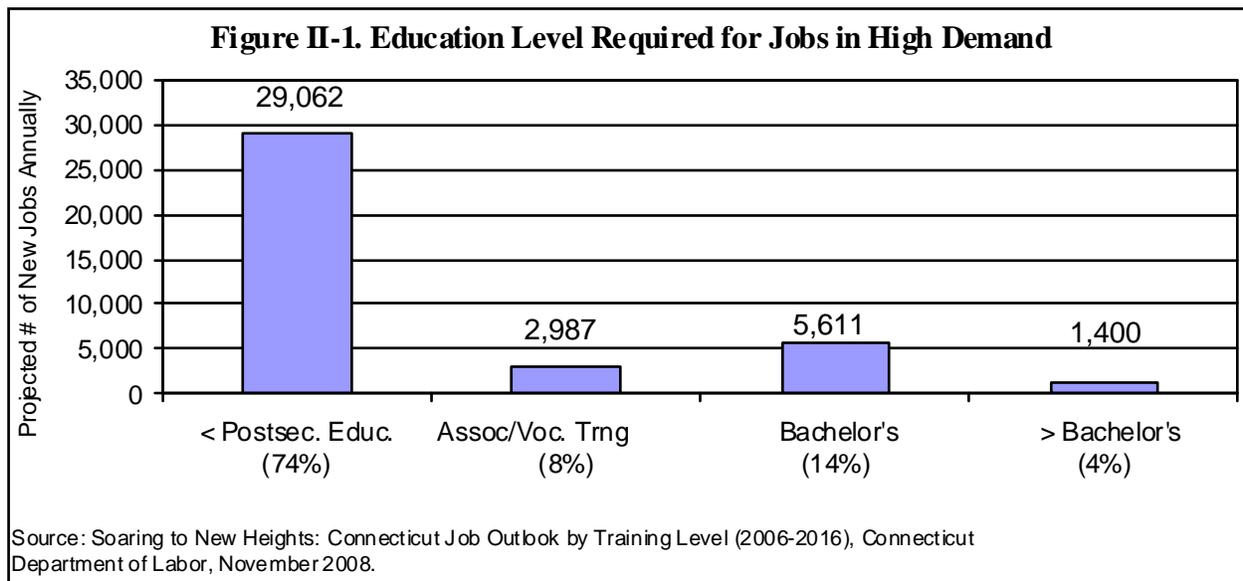
projected number of job openings in Connecticut; however, they are not considered a shortage area by the State Department of Education because of the large number of graduating students in Connecticut becoming certified in elementary education.

<b>Occupation</b>	<b>Annual Openings Projected</b>
Registered Nurses	1,114
Accountants and Auditors	683
Elementary School Teachers, Except Special Education	608
General and Operations Managers	479
Computer Systems Analysts	450
Secondary School Teachers, Except Special and Voc. Ed.	432
Computer Software Engineers, Applications	356
Licensed Practical and Licensed Vocational Nurses	324
Middle School Teachers, Except Special and Voc. Ed	319
Computer Support Specialists	307
Management Analysts	300

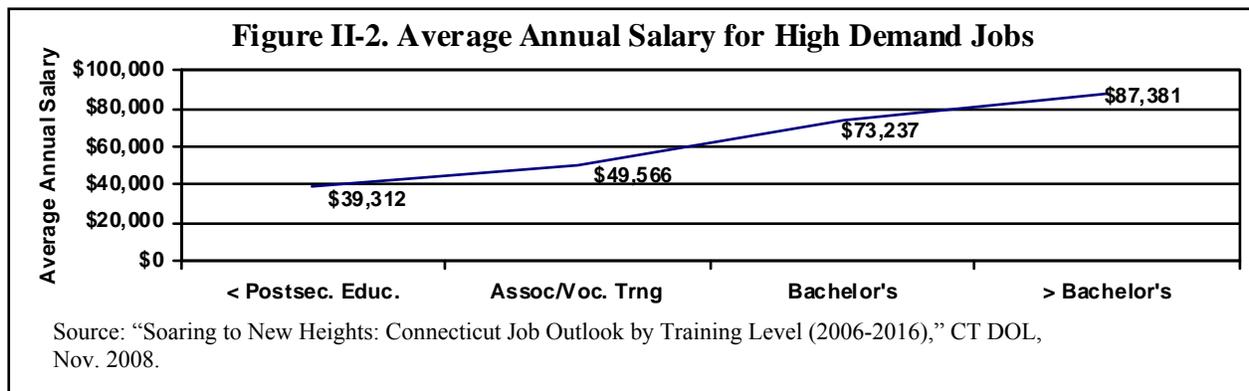
Source: CT DOL Office of Research Labor Market Information.  
[www.ctdol.state.ct.us/lmi/misc/mostopen.htm](http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm)

### What Education will be Needed for Jobs in Greatest Demand?

While many of the technologically advanced jobs in today’s economy require a college degree or certificate — the focus of this study — most jobs in demand do not require any postsecondary education. Almost three-quarters (74 percent) of the 39,060 projected annual openings in the “Soaring to New Heights” high demand areas (i.e., occupations with the greatest projected number of job openings in Connecticut) do not require any postsecondary education (e.g., cashiers, retail salespersons, waiters/waitresses, and customer service representatives) (Figure II-1).



While there are many openings for jobs requiring less than postsecondary education, Figure II-2 shows their relatively low salaries, which may be inadequate to meet basic needs in Connecticut.



**Jobs in greatest demand as they relate to income needed to meet basic needs in Connecticut.** To better understand what income is required to meet basic needs in Connecticut, average annual salaries can be compared the state's "self-sufficiency standard." Connecticut is statutorily required to calculate the "...income an employed adult may need to meet his family's needs, including, but not limited to, housing, food, day care, transportation and medical costs."

Table II-2 shows the minimum income required for a family in Connecticut of a given composition to adequately meet its basic needs without public or private assistance. The average annual salary for jobs in high demand that do not require any postsecondary education are insufficient to adequately support many of the families with one or more children.

**Table II-2. Self-Sufficiency Standards for Selected Family Types in Selected Connecticut Cities, Metro Areas and Regions, 2008**

Jurisdiction	Adult	Adult + Infant	Adult + Preschooler + School age	2 Adults + Preschooler + School age
Greater Waterbury	\$26,099	\$48,122	\$62,900	\$69,526
Greater Danbury	\$26,383	\$48,672	\$63,530	\$69,994
Northwest Corner	\$20,485	\$40,659	\$55,312	\$61,958
Bridgeport	\$17,362	\$38,234	\$54,610	\$57,899
Upper Fairfield (high, Adult)	\$29,536	\$53,152	\$70,257	\$76,415
Hartford (low, Adult)	\$16,146	\$34,873	\$48,713	\$51,847
Hartford Suburbs	\$23,472	\$43,678	\$58,012	\$64,915
North Central	\$22,576	\$42,330	\$56,785	\$63,814
New Haven	\$17,357	\$36,271	\$50,128	\$52,943
Upper Connecticut River (median, Adult)	\$22,238	\$42,105	\$56,372	\$62,971
Greater New Haven	\$23,757	\$43,562	\$57,859	\$64,837
Greater New London	\$21,073	\$36,995	\$48,432	\$54,754
Northeast Corner	\$18,928	\$35,309	\$46,496	\$52,908
<b>Median</b>	<b>\$22,238</b>	<b>\$42,105</b>	<b>\$55,312</b>	<b>\$62,971</b>

Sources: "The Real Cost of Living in 2005: The Self-Sufficiency Standard for Connecticut" (<http://www.wowonline.org/ourprograms/fess/state-resources/Connecticut.asp>). Permanent Commission on the Status of Women, "Wider Opportunities for Women: The Self-Sufficiency Standard for Connecticut." (Values inflated to 2008 using Department of Labor Consumer Price Index).

In addition, there are some high demand jobs *requiring postsecondary education* that have salaries insufficient to meet basic needs. Table II-3, for example, shows occupations such as preschool teachers and library technicians that require postsecondary education and are considered in high demand, but have relatively low salaries that are insufficient to meet the median basic needs in Connecticut for even a single adult.

<b>Occupations with Highest Salaries</b>		<b>Occupations with Lowest Salaries</b>	
Occupation	Salary	Occupation	Salary
Family and General Practitioners	\$80,766	Fitness Trainers and Aerobic Instructors	\$19,115
Pharmacists	\$79,061	Preschool Teachers, except Special Education	\$19,261
Veterinarians	\$73,237	Library Technicians	\$19,843
Computer and Information Systems Managers	\$69,701	Veterinary Technologists and Technicians	\$23,254
Lawyers	\$58,864	Automotive Service Technicians/Mechanics	\$24,710
Computer Software Engineers, Applications	\$58,323	Rehabilitation Counselors	\$25,834
Medical and Health Services Managers	\$57,782	Medical Records and Health Info. Technicians	\$26,042
Computer Software Engineers, System Software	\$57,616	Emergency Medical Technicians and Paramedics	\$26,125
Financial Managers	\$56,846	Real Estate Sales Agents	\$26,395
Computer Systems Analysts	\$56,014	Business Operations Specialists	\$26,437
		Mental Health Counselors	\$26,645

Source: Soaring to New Heights: Connecticut Job Outlook by Training Level (2006-2016), Connecticut Department of Labor, November 2008. (Annual wage calculated using minimum hourly wage x 40 hrs per week x 52 weeks)

The focus of this study is on occupations requiring postsecondary education *and* paying salaries that are sufficient to meet basic needs in Connecticut, and occupations that do not meet these criteria are excluded from further analysis. Additionally, there are other high demand occupations requiring postsecondary education (such as veterinary technologists and technicians, medical records and health information technicians, and emergency medical technicians and paramedics) with average entry level salaries below the self-sufficiency standard needed for single parents,<sup>12</sup> a factor for parents to consider when selecting postsecondary education and training programs.

## **Snapshot of Jobs in Greatest Demand**

Figure II-3 summarizes the high demand jobs in Connecticut by major occupation group. The healthcare field shows the greatest demand, fueled by the need for nurses. Some of the other occupations such as those in the computer, math and science field have had recent name changes and are not readily associated with a single major or degree, as is the case with nursing professions.

Figure II-4 shows some of the high demand occupations in Connecticut organized by postsecondary education requirement. For example, there are projected to be many annual openings during 2006-2016 for those with postsecondary vocational training as licensed practical/vocational nurses or automotive service technicians/mechanics.

Beyond projecting the number of annual openings, job vacancy surveys are another way to assess employer demand for various occupations.

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<sup>12</sup> Considering the smallest size family of one adult plus one infant.

Figure II-3. High Demand Occupations in CT Within the Major Occupational Groups

**Healthcare (2,445)**  
RN • LP/ Vocational Nurses • Radiologic Tech • Dental Hygienists • Pharmacists

**Computer/Math/Science (1,779)**  
Systems Analysts • Software Engineers/Applications • Computer Support Specialists  
Network Systems/Data Communications Analysts • Network/Computer Systems Administrators

**Business/Financial (1,763)**  
Accountants/Auditors • Mgmt Analysts • Bus. Operations Specialists • Financial Analysts

**Management (1,293)**  
General and Operations Managers • Financial Managers • Sales Managers  
Computer/Information Systems Managers • Social/Community Service Managers

**Community/Social Services (648)**  
Rehabilitation Counselors • Child/Family/School Social Workers • Mental Health/Subs. Ab. Social Workers  
Educational/Vocational/School Counselors • Mental Health Counselors

Source: U.S. Bureau of Labor Statistics.

Figure II-4. Examples of High Demand Occupations in CT Organized by Education Requirement

**H.S. Plus Postsecondary Vocational Training**

Licensed Practical and Vocational Nurses (324)<sup>a</sup>  
 Automotive Service Technicians/Mechanics (290)  
 Real Estate Sales Agents (69)  
 Emergency Medical Technicians/Paramedics (67)  
 Surgical Technologists (50)

**Associate's Degree**

Registered Nurses (1,114)  
 Computer Support Specialists (307)  
 Paralegals/Legal Assistants (129)  
 Radiologic Tech. (129)  
 Dental Hygienists (123)

**Bachelor's Degree**

Accountants and Auditors (683)  
 General and Operations Managers (479)  
 Computer Systems Analysts (450)  
 Computer Software Engineers, Applications (356)  
 Management Analysts (300)

**Post-Bachelor's Degree**

Lawyers (271)  
 Rehabilitation Counselors (172)  
 Mental Health and Substance Abuse Social Workers (120)  
 Pharmacists (100)  
 Educational, Vocational, and School Counselors (98)

<sup>a</sup> Numbers in parentheses are CT DOL projections of annual number of openings.

## Where Do Employers Have the Most Job Vacancies?

In spring 2005, the Connecticut DOL published the results of its first — and to date only — job vacancy survey conducted in fall 2004. The survey asked 3,325 employers across all industries in Connecticut to identify where they currently had job vacancies. With a 42 percent response rate (1,398 employers), this survey information provides additional information on the level of difficulty in filling certain jobs.

Table II-4 shows several occupations (in bold) with job vacancies that are even greater than the projected annual openings, indicating greater difficulty in supply keeping up with demand. On the other hand, many of the occupations with vacancies had only a small percentage of jobs open. The only occupations with more than a 10 percent vacancy rate were: real estate sales agents; dental hygienists; and child, family, and school social workers.

<b>Occupation</b>	<b>Job Vacancies Fall 2004<sup>a</sup></b>	<b>Annual Openings Projected 2004<sup>b</sup></b>	<b>Estimated Number Employed in 2004<sup>c</sup></b>	<b>Estimated Percent Vacant</b>
<b>Registered Nurses</b>	<b>1,677</b>	<b>1,081</b>	<b>31,890</b>	<b>5%</b>
<b>Accountants and Auditors</b>	<b>809</b>	<b>672</b>	<b>20,520</b>	<b>4%</b>
<b>Child, Family, &amp; School Social Workers</b>	<b>598</b>	<b>141</b>	<b>5,000</b>	<b>12%</b>
<b>Dental Hygienists</b>	<b>387</b>	<b>100</b>	<b>3,120</b>	<b>12%</b>
<b>Real Estate Sales Agents</b>	<b>383</b>	<b>82</b>	<b>2,560</b>	<b>15%</b>
<b>Paralegals and Legal Assistants</b>	<b>207</b>	<b>104</b>	<b>4,620</b>	<b>4%</b>
<b>Civil Engineers</b>	<b>195</b>	<b>79</b>	<b>3,250</b>	<b>6%</b>
<b>Licensed Practical and Licensed Vocational Nurses</b>	<b>305</b>	<b>294</b>	<b>7,880</b>	<b>4%</b>
<b>Physical Therapists</b>	<b>114</b>	<b>111</b>	<b>3,120</b>	<b>4%</b>
Automotive Service Technicians & Mechanics	237	431	10,470	2%
Management Analysts	118	273	10,930	1%
Lawyers	75	193	10,780	<1%

Sources: <sup>a</sup>“Connecticut Department of Labor-Job Vacancy Survey, Spring 2005.”  
<sup>b</sup>CT DOL Office of Research Labor Market Information (projections for 2004-2014).  
[www.ctdol.state.ct.us/lmi/misc/mostopen.htm](http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm)  
<sup>c</sup>Connecticut’s Industries and Occupations, Forecast 2014 ([www.ctdol.state.ct.us/lmi/misc/forecast2014.pdf](http://www.ctdol.state.ct.us/lmi/misc/forecast2014.pdf))

**SDE and teacher vacancies.** Another state agency that assesses job vacancies and difficulty in filling openings is the Connecticut SDE. On an annual basis, SDE monitors recruitment efforts for the various types of teachers and administrators in the public primary and secondary schools in Connecticut. Also annually, teaching jobs that are the most difficult to fill are identified by SDE as “shortage areas” and incentives such as a teachers’ mortgage assistance

program are provided to encourage people to go into those fields. Specifically, the commissioner of Education is required by statute (C.G.S. Sec. 10-8b) to determine subject and geographic shortage areas in which a teacher shortage exists annually, by December 1. The commissioner is directed to consider the following in determining teacher shortages: 1) the number of teacher vacancies in a particular subject or geographic area; 2) the number of new certificates in such subject areas issued by the Department of Education during the preceding year; and 3) the number and types of classes being taught by persons whose training is not specific to the field in which they are teaching. The Alternative Route to Certification program, available only for prospective teachers in shortage areas, provides another pool of applicants for these hard to fill positions. Table II-5 shows a number of the same subject certification areas identified as having shortages for each of the past six years.

<b>Table II-5. Annual Teacher Shortage Areas</b>						
<b>Subject Certification Area<sup>a</sup></b>	<b>Shortage-Area Year</b>					
	<b>04-05</b>	<b>05-06</b>	<b>06-07</b>	<b>07-08</b>	<b>08-09</b>	<b>09-10</b>
Bilingual Education, Pre-K-12	✓	✓	✓	✓	✓	✓
Comprehensive Special Education, 1-12	✓	✓	✓	✓	✓	✓
English, 7-12	✓	✓	✓	✓	✓	✓
Mathematics, 7-12	✓	✓	✓	✓	✓	✓
Science, 7-12	✓	✓	✓	✓	✓	✓
Speech and Language Pathology	✓	✓	✓	✓	✓	✓
World Languages, 7-12	✓	✓	✓	✓	✓	✓
Intermediate Administrator		✓	✓	✓	✓	✓
Music, PK-12	✓		✓	✓		✓
Library Media Specialist				✓	✓	✓
Technology Education, PK-12	✓			✓	✓	
Remedial Reading, PK-12		✓	✓			
TESOL, PK-12		✓				

<sup>a</sup>Although not included in this table, geographic shortage areas are also identified by SDE.  
Source: Annual Teacher Shortage Letter to Superintendents of Schools from Commissioner of Education (for Years 2004-2005 through 2009-2010).

Hiring statistics on the 2008-2009 shortage areas are shown in Table II-6. For each of the 265 open world languages positions, for example, there was an average of seven applicants per position. When rated on a five-point scale, however (with 1=few or no minimally qualified applicants and 5=many highly qualified applicants), school districts assessed the quality of applicant pools as only a “1” or “2” half the time, and no qualified candidates were found for 25 of the positions.

**Table II-6. Primary and Secondary Education Shortage Areas Identified by the State Department of Education for 2008-2009**

Certification Area (shortage rank)	Total Positions to Fill	Median # of Applications Per Opening	Median Applicant Quality Rating	# of Vacancies (No qualified candidates)
World Languages, 7-12 (1)	265	7	2	25
Speech and Language Pathologist (2)	131	4	1	23
Special Education, 1-12 (3)	566	20	2	34
Mathematics, 7-12 (4)	314	18	2	16
School Library Media Specialist (5)	68	8	2	10
Bilingual Education, PK-12 (6)	34	9	1	6
Intermediate Administrator (7)	253	20	4	12
Science, 7-12 (8)	322	11	2	7
English, 7-12 (9)	364	30	3	10
Music, PK-12 (10)	160	14	3	10
Technology Education, PK-12 (17)	35	6	1	2

Source: Connecticut State Department of Education Division of Assessment and Accountability March 2009 Data Bulletin.

**Nurses and allied health professionals and vacancies.** The Connecticut Hospital Association, representing more than 140 hospitals and health-related organizations in the state, published 2007 vacancy rates for nurses and allied health professions in 29 acute care hospitals. Table II-7 shows the higher vacancy rate in hospitals for registered nurses in comparison to licensed practical nurses. The broader 2004 Connecticut DOL job vacancy survey found a four percent vacancy rate overall for licensed practical nurses, which may indicate the shortage is more likely in non-hospital settings, or that the demand for employees in this occupation has declined between 2004 to 2007.

**Table II-7. 2007 Vacancy Rates for Hospital-Based Nurses and Allied Health Professions**

Profession	Vacancy Rate
Physical Therapist	9.5%
Pharmacist	7.3%
Occupational Therapist	6.9%
Staff Registered Nurse (RN)	6.6%
Surgical Procedures/OR Technician	5.9%
Pharmacy Technician	3.5%
Radiation Therapy Technologist	2.8%
LPN	1.1%

Source: Connecticut Hospital Association 2007 Vacancy Rates for Nurses and Allied Health Professionals in Connecticut Acute Care Hospitals.

## Where do Employers Have the Fewest Job Vacancies?

The Connecticut DOL job vacancy survey also provided information about occupations with the lowest number of openings, where employer needs were being met by the current workforce. Limiting this examination to occupations requiring postsecondary education, Table II-8 shows areas where there may be an oversupply of workers. There were just three vacancies for nutrition and dietetics, for example, and five vacancies for actuaries. The relatively small number of physical therapy assistants needed (23), however, represents a four percent vacancy rate given the 650 estimated to be employed in the field in 2004.

<b>Table II-8. Fewest Job Vacancies compared with Projected Number of Job Openings</b>				
<b>Occupation</b>	<b>Job Vacancies Fall 2004<sup>a</sup></b>	<b>Annual Openings Projected 2004<sup>b</sup></b>	<b>Estimated Number Employed in 2004<sup>c</sup></b>	<b>Estimated Percent Vacant</b>
Nutrition and Dietetics	3	20	570	<1%
Actuaries	5	48	960	<1%
Radiation Therapists	11	36	760	1%
Mechanical Engineers	14	172	6,200	<1%
Surgical Technologists	19	17	1,040	2%
Physical Therapy Assistants	23	30	650	4%
Industrial Engineers	25	108	3,420	<1%
Electrical Engineers	37	60	2,180	2%
Pharmacists	38	97	2,750	1%
Pharmacy Technicians	39	81	2,880	1%
Librarians	28	93	2,350	1%
Sources: <sup>a</sup> Connecticut Department of Labor-Job Vacancy Survey, Spring 2005 <sup>b</sup> CT DOL Office of Research Labor Market Information (projections for 2004-2014). <a href="http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm">www.ctdol.state.ct.us/lmi/misc/mostopen.htm</a> <sup>c</sup> Connecticut's Industries and Occupations, Forecast 2014 ( <a href="http://www.ctdol.state.ct.us/lmi/misc/forecast2014.pdf">www.ctdol.state.ct.us/lmi/misc/forecast2014.pdf</a> )				

The next section compares the employer demand data described in this section to the current and new workforce supply information described in Section I, to determine whether there currently is an alignment between postsecondary education and employment.

## Section III

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### **Are Supply and Demand Aligned?**

This section compares information on the balance or alignment between the supply of skilled workers and employer demand, focusing on occupations requiring specific postsecondary education. In general, there are many college graduates with broad majors that may lead to employment in a multitude of occupations, and while not discussed in this section, they are expected to fare better financially than those without postsecondary degrees or certificates. Elsewhere, this PRI report has described both the connection between level of education and salaries sufficient to meet basic needs, and the overall need for Connecticut to have an educated workforce to succeed in the 21<sup>st</sup> century.

However, in order to assess the alignment of postsecondary education and employment, one needs to examine workforce demand for particular jobs and the number of graduates to fill that need. Although workforce information is often presented in terms of industries or sectors, there are many different types of jobs within a single sector. Rather than examine alignment with industries, the methodology used for this study focuses on distinct occupations and the number of graduates with the required skills and knowledge for each of those occupations, regardless of the industry in which they are employed.

The section begins with a review of the caveats to consider when examining the supply and demand information. Tables III-1 through III-3 then examine whether there will be projected shortfalls for selected occupations. The section concludes with an assessment of the degree of current alignment between postsecondary education and employment.

### **Caveats Regarding Data on the Match-Up Between Education/Training and Employer Needs**

The relationship between educational programs and occupations is not always straightforward. Assessing the degree to which postsecondary education and employment are aligned is challenging given that:

- there may be more than one educational path to a single occupation;
- a single program may lead to a variety of different occupations;
- there are many bachelor's degree programs that are not directly related to a specific occupation; and
- one degree may be used to qualify for another, more advanced degree, such as an undergraduate bachelor's degree with a major in political science leading to a law degree, or a biology major going on to medical school.

Additionally, when analyzing occupational supply data, several factors affect the assumptions that can be drawn from this information, as noted by the Connecticut DOL Training and Education Planning System website:

- many students earning advanced degrees are already employed in that field;
- students from other states may return to their home states, especially at the graduate level. Similarly, foreign students often go back to their home country;
- some programs are not offered in Connecticut, such as veterinary medicine. Connecticut students desiring to major in these programs will have to go out of state and will not be counted in Connecticut supply data;
- those who already have a bachelor's degree may take programs at the certificate level in order to learn new or advanced skills;
- those with undergraduate degrees in various sciences may go on to medical or dental school rather than continue in biology, chemistry, or other sciences; and
- for some occupations, a graduate degree is generally needed for employment. However, students receiving degrees at lower levels, such as a bachelor's degree, may go into other occupations instead of continuing their education in their current field.

Also, the supply of postsecondary graduates and employer demand is not a closed system, limited to Connecticut employers and graduates of Connecticut colleges. For example, there are graduates who went to college in one state, but returned to their state of origin to then become employed. Similarly, there are Connecticut residents who have attended out-of-state schools, graduated, and then returned to Connecticut. There are also national and international companies that transfer workers from one state to another, regardless of where they attended college.

Additionally, there are occupations, such as pharmacy technicians, where training may be received directly from the employer (e.g., a major drug store chain). Other considerations such as a required licensing or exam to practice the occupation may mean that not all graduates are available to practice the occupation.

Finally, as is seen in the migration statistics in Section VI, Connecticut also attracts students and workers internationally who may become a resource for meeting employer needs.

### **How Do Number of Graduates Match Up with Projected Openings?**

PRI considered an alignment to exist if there was *no more than a 10 percent difference* between the supply and demand figures. Tables III-1 through III-3 provide supply and demand information for occupations that are often associated with a specific postsecondary education major or that require a distinct license or certificate. (Information on the number of 2008 graduates from specific Connecticut postsecondary institutions for each occupation is found in Appendix C). As mentioned earlier, supply and demand information on occupations that are associated with more than one major, such as computer-related occupations and general managerial occupations, are excluded from the analyses, as are majors such as history and psychology that are not directly tied to a single occupation.

The jobs shown in Tables III-1 through III-3 are organized according to U.S. Bureau of Labor Statistics major occupational groups. Table III-1 contains "Healthcare Practitioners and

Technical Occupations” that require postsecondary education and have a clear relationship between the degree or certificate required to perform the occupation.

**Assessment of alignment between postsecondary education and healthcare occupations.** Although registered nurses are often considered an occupation with a workforce shortage, there currently appears to be a match between the number of graduates and projected need in this field (Table III-1). One independent college, for example, recently noted that 2009 was the first year in recent memory where placement of graduates was approximately 65 percent rather than the usual 100 percent placement rate.

Occupation	Projected Need for 2008 (Demand) <sup>a</sup>	Total Number Graduated in 2008 (Supply) <sup>b</sup>	Shortfall	Number Graduated	
				Public	vs. Independent
Emergency Medical Technicians and Paramedics	67	29	-38	24	5
Registered Nurses	1,114	1,109	-5	636	473
Licensed Practical and Licensed Vocational Nurses	324	658	+334	No info	No info
Surgical Technologists	50	12	-38	12	0
Radiation Therapists	38	120	+82	56	64
Occupational Therapy Assistants	12	32	+20	24	8
Occupational Therapists	47	47	0	0	47
Physical Therapists	98	47	-51	28	19
Physical Therapy Assistants	24	17	-7	17	0
Nutritionists and Dietitians	16	37	+21	18	19
Dental Hygienists	123	143	+20	32	111
Social Workers <sup>c</sup>	386	373	-13	335	38
Substance Abuse and Behavioral Disorder Counselors	67	61	-6	61	0
Pharmacists	100	103	+3	103	0
Pharmacy Technicians	171	0	-171	0	0
Veterinarians	54	0	-54	0	0
Veterinary Technologists and Technicians	75	11	-64	11	0

Source: <sup>a</sup>CT DOL Office of Research Labor Market Information. [www.ctdol.state.ct.us/lmi/misc/mostopen.htm](http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm)

<sup>b</sup>State of Connecticut Department of Higher Education Degree Completions [www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level](http://www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level)

<sup>c</sup>Combines four subtypes of social workers.

Note: PRI considered an alignment to exist if there was no more than a 10 percent difference between the supply and demand figures.

*Alignment: Balanced.* If it is assumed that all graduates remain in Connecticut, the number of social work graduates and demand in that occupation also appears to be evenly

balanced. There also seems to be alignment between demand and postsecondary education production of occupational therapists by independent institutions, notably Quinnipiac and Sacred Heart Universities. The number of pharmacy graduates and demand also appear in balance; however, because of its national student draw, one would not expect all the University of Connecticut pharmacy graduates to remain in Connecticut. This theory is supported, in part, by information obtained by the Connecticut Hospital Administration, showing a 7.3 percent vacancy rate for pharmacists at acute care hospitals.

*Misalignment: Undersupply.* There are several healthcare occupations that appear misaligned with the number of graduates produced in 2008. There seems to be an *undersupply* of emergency medical technicians and paramedics as well as surgical technologists. There also appears to be a shortage of graduates in physical therapy, physical therapy assistants, veterinary technologists/technicians, and to a lesser extent, substance abuse and behavioral disorder counselors. (Note that all veterinarians in Connecticut have been trained outside of Connecticut as the only veterinary school in New England is at Tufts University in neighboring Massachusetts.)

*Misalignment: Oversupply.* There are several healthcare occupations that seem to have an *oversupply* of graduates in relation to the occupation's demand. Although identified as an occupation in high demand, the current production of licensed practical and licensed vocational nurses has more than twice the number needed according to the Connecticut DOL projections. Radiation therapists, occupational therapy assistants, nutrition and dietetics, and dental hygienists, also seem to be in oversupply in relation to the projected number of openings in these fields.

*Caveats.* Because there are challenges in projecting the number of openings in particular fields, the demand statistics may be tempered by vacancy rate information gathered since the projections were made. Taking into consideration the vacancy rate information, there may be more openings for registered nurses, social workers, and dental hygienists than originally projected and, if so, then there continues to be shortages in these fields despite the seemingly adequate number of graduates.

**Assessment of alignment between postsecondary education and education, training and library occupations.** Every October, SDE surveys all the local school districts to determine areas of teacher and administrator shortages. Table III-2 shows the number of positions to be filled for the 2008-2009 school year and the number of recent graduates certified to teach in particular areas. Besides Connecticut graduates, the available workforce supply is expanded to include persons who obtained their Connecticut certificates outside of the state's postsecondary institutions including: Alternative Route to Certification; Teach for America; and those who attended out-of-state colleges and have new Connecticut certification.

*Misalignment: Undersupply.* As described in Section II, SDE annually identifies subject (and geographic) "shortage areas" for teaching jobs that are the most difficult to fill, and an asterisk is used to identify the 2008 subject shortage areas. In addition to the shortage areas, there also appears to be an undersupply of business teachers. The number of art teachers produced by Connecticut colleges is fairly close to the number of open positions; however, there are many

**Table III-2. 2008 SDE Projected Supply and Demand for Education, Training and Library Occupations**

Occupation	Total Positions to Fill for 2008-09 School Year (Demand) <sup>a</sup>	Total Number Graduated in 2008 (Supply) <sup>b, c</sup>	Shortfall (including ARC, TFA, etc.)	Number Graduated	
				Public vs. Indpndt	
Comprehensive Special Education, K-12*	566	200 (340)	-226	129	71
World Languages, 7-12*	265	46 (127)	-138	33	13
Mathematics, 7-12*	314	123 (224)	-90	71	52
Science, 7-12*	322	121 (259)	-63	61	60
Secondary School Teachers, Except Special and Voc. Ed.	1,260	742 (1,208)	-52	376	366
Speech and Language Pathology*	131	47 (80)	-51	47	0
English, 7-12*	364	218 (333)	-31	106	112
Bilingual Education, PK-12*	34	0 (3)	-31	0	0
Business, 7-12	43	20 (29)	-14	2	18
Music, PK-12*	160	88 (154)	-6	52	36
Technology Education, PK-12*	35	19 (29)	-6	19	0
Physical Education	149	117 (182)	+33	117	0
School Counselor	144	125 (182)	+38	76	49
Art Education	87	92 (159)	+72	90	2
Intermediate Administrator*	253	554 (589)	+336	305	249
History & Social Studies, 7-12	217	260 (363)	+146	136	124
Elementary School Teachers, Except Special Education	913	1,358 (1,927)	+1,014	536	822
Library Media Specialist*	68	13 (20)	-48	11	2
Librarians	66	119	+53	119	0

Source: <sup>a</sup>CT State Department of Education 2008-09 Hiring Statistics, from March 2009 Data Bulletin.

<sup>b</sup>Connecticut State Department Education Bureau of Educator Standards and Certification, Data on First Issuance of Temporary 90-Day or Initial Educator Certificates, January 1, 2008 to December 31, 2008.

<sup>c</sup>Numbers in parentheses also add in: certificates issued via the Alternative Route to Certification; participants in Teach for America; and those who attended non-Connecticut colleges.

\*Signifies 2008-09 school year teacher shortage area as identified by SDE.

Note: PRI considered an alignment to exist if there was no more than a 10 percent difference between the supply and demand figures.

more individuals obtaining Connecticut certification as art teachers who received their education outside of Connecticut.

*Misalignment: Oversupply.* The surplus of elementary education teachers is especially apparent when the 477 newly certified elementary education teachers who attended out-of-state colleges (plus 92 certified under the Teach for America program) are added to those who attended Connecticut colleges (1,358). More Connecticut certified elementary school teachers received their education from independent colleges in Connecticut (822) than from public state colleges (536) or out-of-state colleges (569). (Appendix C shows a sizable number of the

certified elementary school teachers graduated from Sacred Heart University and the University of Bridgeport.)

There also appears to be an oversupply of history and social studies teachers, as well as librarians. Almost twice the number of librarians (in school and non-school settings) graduated (all from Southern Connecticut State University) than there are openings.

**Assessment of alignment between postsecondary education and architecture, engineering, and other occupations.** Table III-3 shows engineering and architecture occupations as well as some additional occupations that fall into other various categories. Engineering is often cited as vital to competing in the global economy. None of the architecture and engineering occupations appear to be in alignment. There seems to be an *oversupply* of architects, mechanical engineers, and mechanical engineering technicians, but an *undersupply* of industrial engineers and civil engineers.

**Table III-3. 2008 CT DOL Projected Supply and Demand for Architecture, Engineering and Other Occupations**

Occupation	Projected Need for 2008 (Demand) <sup>a</sup>	Total Number Graduated in 2008 (Supply) <sup>b</sup>	Shortfall	Number Graduated	
				Public	vs. Independent
Civil Engineers	120	81	-39	56	25
Industrial Engineers	139	36	-103	12	24
Mechanical Engineers	138	290	+152	109	181
Mechanical Engineering Technicians	26	44	+18	31	13
Architects	54	102	+48	0	102
<b>Other Occupations</b>					
Airline Pilots, Copilots, and Flight Engineers	16	0	-16	0	0
Accountants and Auditors	683	732	+49	500	232
Actuaries	42	44	+2	44	0
Forensic Science	3	111	+108	0	111
Lawyers	271	513	+242	188	325
Paralegal and Legal Assistants	129	96	-33	60	36
Real Estate Sales Agents	69	1,148	+1,079	mostly	
Automotive Service Technicians/Mechanics	290	415	+125	No info	No info

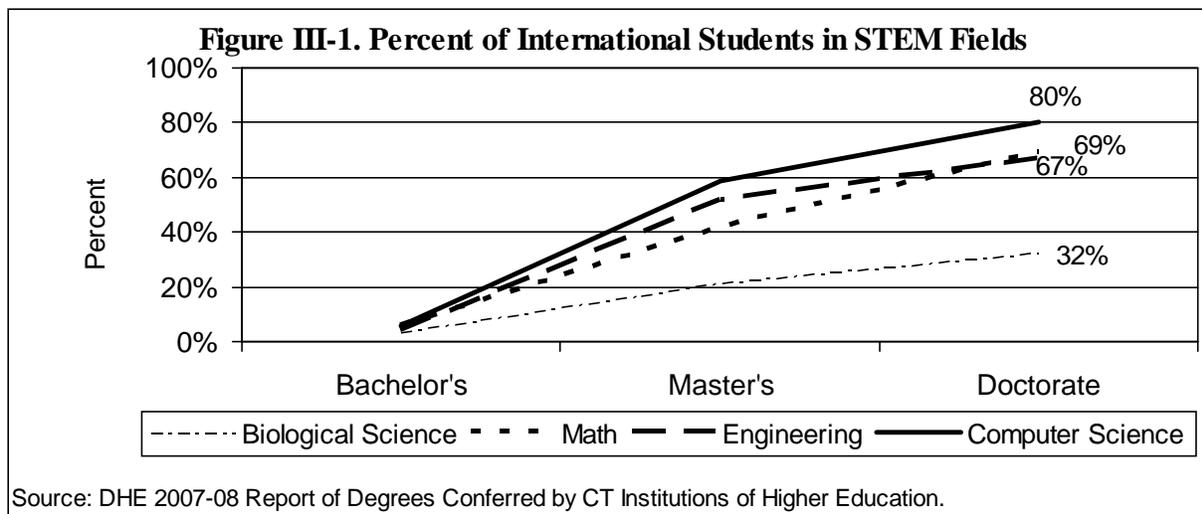
Source: <sup>a</sup>CT DOL Office of Research Labor Market Information. [www.ctdol.state.ct.us/lmi/misc/mostopen.htm](http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm)

<sup>b</sup>State of Connecticut Department of Higher Education Degree Completions

[www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level](http://www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level)

Note: PRI considered an alignment to exist if there was no more than a 10 percent difference between the supply and demand figures.

*International students.* However, another factor in the alignment of postsecondary education and the science, technology, engineering and math (or STEM) fields in particular, is the residency status of students. Figure III-1 shows that, as the degree level increases, there is an increasing proportion of international students, who may or may not remain in Connecticut following completion of their degrees. A report recently estimated that 50 percent of international students receiving their bachelor's degrees from New England colleges remained in New England following graduation, a proportion more than twice that of New England college graduates from other parts of the U.S. (at 21 percent).<sup>13</sup>



The growth in the proportion of international students, however, is reportedly slowing from a 10 percent annual increase in 2007 to only a three percent annual increase in 2008.<sup>14</sup> In analyzing first-time graduate-school enrollments by field, the report noted a sizeable increase of 11 percent in the number of U.S. students entering graduate programs in engineering.

*Additional information about engineering supply and demand.* In 2008, after hearing from companies that they were having difficulty finding engineering talent in Connecticut, and from in-state universities that their engineering graduates were unable to find jobs in Connecticut, the Office of Workforce Competitiveness (OWC) surveyed employers and graduating engineering students. With a caution that the response rate was very low (e.g., only six percent of surveyed companies responded), OWC found:

- six in 10 engineering students seeking employment did not have a job offer in the May before their graduation;
- surveyed companies reported an 8.2 percent vacancy rate for engineers and a 7.1 percent vacancy rate for engineering technicians;

<sup>13</sup> Sasser, Alicia. The Future of the Skilled Labor Force in New England: The Supply of Recent College Graduates. Federal Reserve Bank of Boston New England Public Policy Center Research Report 08-1, September 2008.

<sup>14</sup> Schmidt, Peter. Growth in International Enrollments Slows at U.S. Graduate Schools. September 16, 2009 Chronicle of Higher Education.

- surveyed companies said vacant engineering positions could only be filled by experienced engineers; however, many of the engineering technician vacancies could be filled with inexperienced applicants; and
- two-thirds of students who reported having accepted a job offer had prior experience with the firm while a student.

To help Connecticut companies find engineers, and engineering graduates find employment, the Connecticut Office of Small Business Innovation Research (SBIR) has launched a program called, “Careers for Engineers,” that is an electronic service with the intent of matching engineering job seekers with available jobs.

*Other occupations.* Of the remaining other occupations shown in Table III-3, actuaries, and accountants and auditors, appear to have a balanced number of graduates to fill the projected needs. An *undersupply* of graduates seems to occur in the occupations of pilots and paralegals/legal assistants, and an *oversupply* in the real estate sales agent, lawyer, and forensic science occupations. Further, the job vacancy survey conducted by Connecticut DOL found a vacancy rate higher than the number of openings projected in 2004 for real estate sales agents; thus, it is unclear whether supply has caught up with demand, or there is difficulty capturing data regarding the real estate sales agent occupation.

It is also unknown how many in the legal and forensic science occupations, for example, obtain jobs outside of Connecticut. Additionally, a recent article suggested that although some in higher education may be aware of the oversupply of lawyers, law schools may continue to be established because they add to a college’s prestige without adding significant expense — and may even provide additional income for the university.<sup>15</sup> On the other hand, the article further points out possible future employment opportunities for graduates to apply their legal skills outside of traditional law firm jobs, for example, in business or philanthropy.

### **Overall Assessment of Alignment Between Postsecondary Education and Employment**

Based strictly on the supply and demand figures obtained from the Connecticut Departments of Labor, Education, and Higher Education (and assuming graduates remain in Connecticut and immediately enter the workforce), the following occupations appear to be particularly well aligned: registered nurses, occupational therapists, social workers, pharmacists, and actuaries. When hospital vacancy rate data are added to the equation, however, it appears that as recently as 2007 (see Table II-7), hospitals experienced a shortage in registered nurses, occupational therapists, and pharmacists. The shortage of nurses was also found several years ago in 2004 in the Connecticut DOL job vacancy survey; however, the situation could have changed in the ensuing years.

There are additional occupations that appear to be fairly well aligned (e.g., substance abuse and behavioral disorder counselors, and accountants and auditors), although the Connecticut DOL job vacancy survey reported more job vacancies for accountants and auditors

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<sup>15</sup> Mangan, K. Law Schools Mull Whether They Are Churning Out Too Many Lawyers. Chronicle of Higher Education, July 9, 2009.

than annual projected openings. The understanding of the demand for accountants and auditors is further complicated by information on the accuracy of projections as assessed in Section VI, which suggest a 10 percent overestimate in the number of accountants and auditors needed in Connecticut.

There are other occupations, however, that stand out as having an *oversupply* or overproduction of graduates. These include: licensed practical and licensed vocational nurses, radiation therapists, elementary school teachers, mechanical engineers, architects, forensic science, real estate agents, and lawyers. (As will be seen in Section VI, projections for the number of lawyers needed in Connecticut were 44 percent higher than actually occurred.) Just as Connecticut's veterinarians have all been educated in other states, *Connecticut* may be training forensic scientists to meet employment demands in other states; however, there are clearly more graduates in this field than are needed to meet Connecticut employer demand.

Occupations that show an *undersupply* or underproduction to meet the demand are: emergency medical technicians and paramedics, surgical technologists, veterinary technologists and technicians, special education teachers, world language teachers, and industrial engineers. No postsecondary education institutions in Connecticut offer degrees in veterinary medicine and thus, all veterinarians employed in Connecticut were trained elsewhere. For-credit pharmacy technician programs are not currently offered at Connecticut colleges, and training may be occurring either in noncredit certificate programs (the overarching community college or higher education systems do not collect statistics on the number of students completing noncredit certificate programs) or by employers such as CVS and RiteAid pharmacies.

**Conclusions.** Given the numerous cautions detailed earlier in interpreting this data, Table III-4 summarizes this preliminary alignment analysis. The undersupply of EMTs and surgical technologists and the oversupply of LPNs and radiation therapists, shows a misalignment among some health care occupations. Other health care fields, however, such as registered nurses and occupational therapists, may have a fairly good match between supply and demand. These mixed results illustrate several points about the alignment of postsecondary education and employment:

- alignment needs to be assessed by occupation;
- for some occupations (e.g., actuaries and pharmacists), employer demand for an adequate supply of graduates appears to be met by Connecticut postsecondary institutions;
- some occupations, such as teachers, are able to closely monitor shortage areas and number of graduates produced based on their certification requirements;
- awareness of occupational shortages *may* lead to production of more postsecondary education programs and graduates in a given area, (e.g., nursing (RNs));
- awareness of occupational shortages *may not* lead to production of more postsecondary education programs and graduates if students do not choose to enter a field (e.g., world language teachers);
- all Connecticut employer needs do not have to be met by graduates from state postsecondary education institutions (e.g., veterinarians); and

- regardless of occupation, increasing the percent of students who complete their degrees and certificates — especially at the community college level — will better meet overall employer demand for a skilled and knowledgeable workforce.

**Table III-4. 2008 Alignment Status of Selected Occupations**

<b>Undersupply</b>	<b>Aligned</b>	<b>Oversupply</b>
EMTs	Registered Nurses?	LPNs
Surgical Technologists		Radiation Therapists
Physical Therapists	Occupational Therapists?	Occupational Therapy Assistants
Physical Therapy Assistants	Pharmacists?	Nutritionists and Dietitians
Veterinarian Technologists and Technicians	Social Workers	Real Estate Sales Agents?
Library Media Specialists	Actuaries	Librarians
Industrial Engineers	Accountants and Auditors?	Mechanical Engineers
High School Math Teachers		Mechanical Engineering Technicians
Special Education Teachers		Architects
High School Science Teachers		Lawyers
Bilingual Education Teachers		Forensic Science
World Language Teachers		Elementary School Teachers
		History & Social Studies Teachers

Source: PRI staff analysis.

### Connecticut's Higher Education System

Connecticut has a well-developed higher education system. There are 18 public degree-granting institutions and 29 independent colleges and universities (see Appendix D for a list of schools). The U.S. Coast Guard Academy, located in New London, operates under federal authority. In fall 2008, there were a total of 184,544 students enrolled in Connecticut's public and independent colleges and universities, of which 73 percent were Connecticut residents. Of the total students, 64 percent were enrolled at public institutions.<sup>16</sup> During the 2007-2008 school year, there were 36,634 degrees conferred by Connecticut colleges and universities, of which 51.2 percent were awarded from public institutions.<sup>17</sup>

Because of the critical role colleges play in a state's economic development, this study is examining how well academic institutions align themselves, particularly public colleges, with the employment needs of state businesses. Colleges and the students they graduate are vital to economic development for many reasons, and one key role is providing employers with a supply of graduates that are able to respond to a changing work environment and educated in new and emerging fields.

One of the ways states have promoted such alignment is to encourage state agencies involved in workforce development issues, education, and higher education, and private organizations, to meet and discuss how to coordinate state-led efforts that will promote these linkages so that educators can develop programs, in part, based on employer need. In Connecticut, multiple state agencies are required by law to chair various boards and committees in order to promote alignment across education, higher education, and workforce development, as discussed in the next section.

PRI committee staff also found numerous statutory references aimed at requiring the BGHE, DHE, and individual public higher education institutions to consider ways to promote the economic development of the state, as part of their overall responsibilities. State law has supported postsecondary and workforce alignment efforts by creating statutory incentives for student loan incentive and post-graduate loan forgiveness programs. Although many of these types of programs either exist in statute or federal grants are used for funding, they are usually considered pilot programs and continued funding of them has not always occurred.

This section focuses on the role of the Board of Governors for Higher Education, its administrative arm, DHE, and each of the constituent units as they relate specifically to the linkages mandated by Connecticut law. During the next phase of the study, committee staff will select two areas to "drill down" so that detailed information can be provided on whether certain state policies and programs, such as loan incentive and forgiveness programs, have increased graduates in workforce shortage areas.

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<sup>16</sup> Department of Higher Education, *Report: Fall 2008 College and University Enrollment in Connecticut – Comprehensive Report, June 2009*, p. 1.

<sup>17</sup> *Ibid.*, pgs. 1&9.

## Connecticut's Public Higher Education System

Figure IV-1 outlines the basic organizational structure of Connecticut's public higher education system and Figure IV-2 shows the geographic locations of public colleges and universities in the state. In addition to BGHE and DHE, the public system of higher education is organized into four constituent units, each with its own Boards of Trustees including the:

- Board of Trustees of the University of Connecticut, which is responsible for the university and five branch campuses, the medical school, and the law school;
- Board of Trustees of the Connecticut State University System, which is responsible for the four state universities;
- Board of Trustees of the Connecticut Community College System, which is responsible for 12 two-year colleges; and
- Board for State Academic Awards, which is responsible for Charter Oak State College (the state's external degree-granting institution), and on-line learning and distance education.

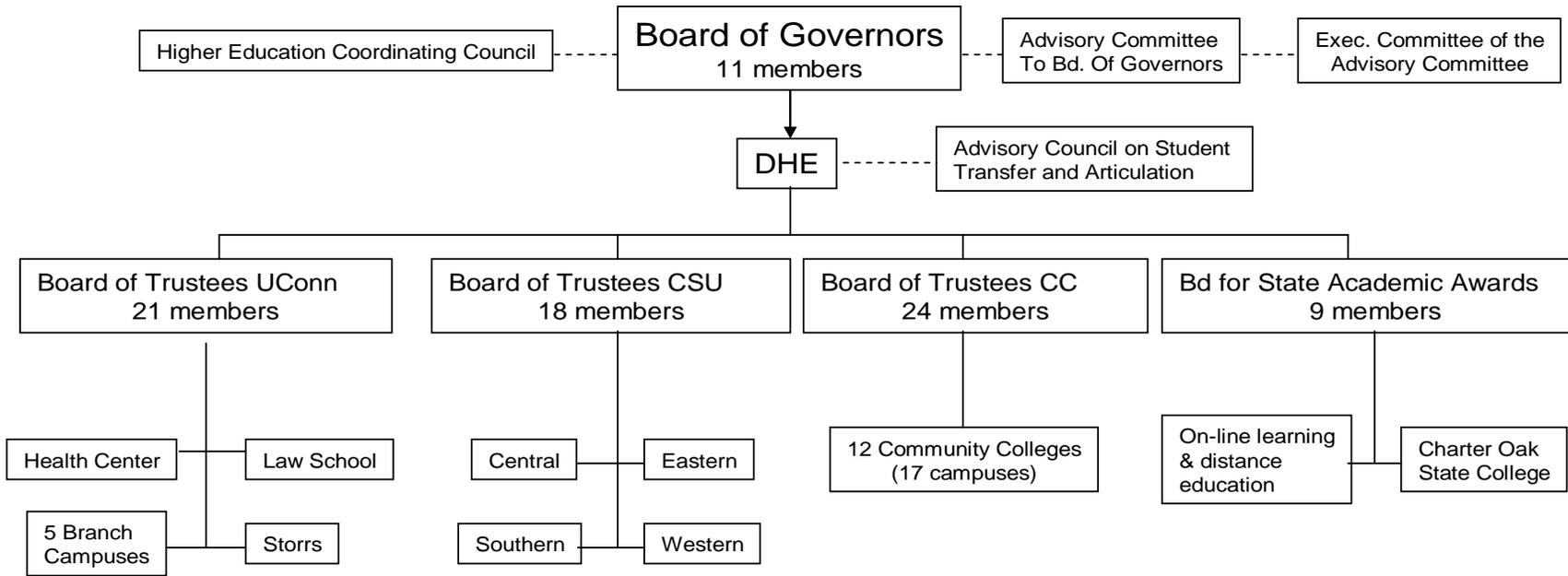
**Board of Governors.** The Board of Governors for Higher Education was created in 1982 as a successor to the Board of Higher Education. It is the central policy-making authority for public higher education in Connecticut and serves as a coordinating body for all of the public and independent colleges, universities, and post-secondary institutions of Connecticut.

The board comprises 11 members, seven appointed by the governor and the remainder by the leaders of the Connecticut General Assembly. Board members cannot be employed by or be a member of any of the boards of trustees for any public or independent Connecticut higher education institution.

The Department of Higher Education serves as the board's staff, and the board selects and hires the commissioner of higher education. In FY 08, DHE had 48 full-time employees and operating expenses of about \$75 million (the entire public higher education system's operating expenses were almost \$734 million). The board's responsibilities are laid out in C.G.S. Sec. 10a-6 and include to:

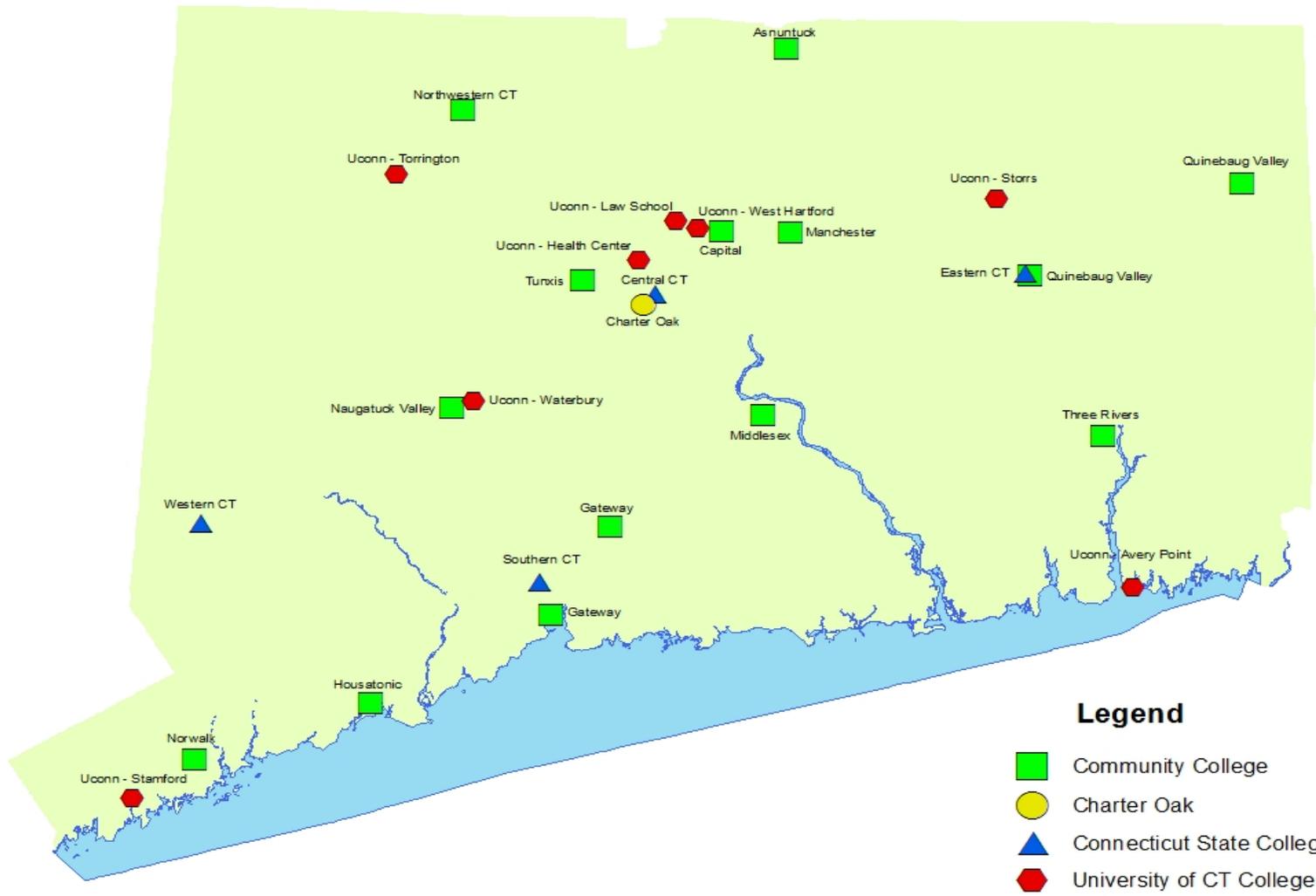
- establish state-wide policy for Connecticut's public higher education system;
- develop a higher education master plan;
- establish state-wide tuition and financial aid policies;
- evaluate institutional effectiveness;

Figure IV-1. CT's Public Higher Education System Structure



Source: DHE

Figure IV-2. Public Colleges and Universities in Connecticut.



Source: DHE & Legislative ITS

- merge and close institutions;
- review and approve the mission statements of the constituent units and the role and scope statements of the individual public institutions;
- approve recommendations by constituent units to establish new academic programs or eliminate existing programs;
- prepare and present to the governor and the General Assembly a consolidated operating and capital budget for all constituent units of higher education;
- review and make recommendations on plans received from each constituent unit' for development and maximum utilization of resources;
- appoint advisory committees to assist in defining and suggesting solutions for the problems and needs of higher education;
- establish an advisory council for higher education with representation from public and independent colleges to study ways to coordinate efforts of all the state's colleges in providing an enriched educational environment for the state's citizens;
- coordinate programs and services throughout higher education, including procedures to evaluate the impact on independent institutions of higher education of proposals affecting public higher education institutions;
- enter into contracts, leases, or other agreements;
- maintain a central higher education information system; and
- undertake studies and activities as will best serve the higher education interests of the state.

The Board of Governors is primarily viewed as a coordinating body for all of Connecticut's higher education system but it has limited authority over both the public and independent colleges and universities in the state. For the public colleges and universities, the system of governance is primarily concentrated at the constituent unit level, with BGHE not proactively setting strong program agendas or mandates for them. One reason for this is that although BGHE presents a single consolidated budget compiled from those submitted by the constituent units, it has only review and comment authority. In addition, legislative appropriations are made directly to the constituent unit's boards of trustees.

Because of the decentralized nature of the public higher education system in Connecticut, PRI staff were unable to locate a compendium or identify the extensive array of successful alignment initiatives being achieved at the constituent unit, individual college, and even academic department level through the use of federal, state, and private grant funds, which are used for a wide range of activities. For example, several community colleges receive federal grants that allow them to link to low performing high schools that are "feeder schools" into their local community college. To address the remedial needs of high school students prior to them graduating and ensuring greater success when enrolled, these colleges partner with high school faculty to devise remedial strategies to be taught to students while they are still in high school. Other programs, such as *Achieving the Dream*, are aimed at

providing more intensive supports once a high school graduate enrolls in college and helps them overcome obstacles to graduation.

One area that committee staff will continue to explore is the statutory programs that were created to provide a variety of loan incentives to encourage students to enter certain critical shortage areas, such as nursing, or provide forgiveness of a portion of a student loan if the graduate stays in Connecticut and becomes employed by a Connecticut business in that field. At least three state agencies offer these forgiveness programs.

*Standing Advisory Committee.* There is a 22-member Standing Advisory Committee to the board, which has representation from independent and public college trustees, administrators, faculty members, and students. The committee is statutorily required to meet at least twice yearly with the board. The role of the advisory committee is to assist the board in performing its statutory duties.

*Higher Education Coordinating Council.* The Higher Education Coordinating Council, established under P.A. 92-126, is made up of the chairperson of the boards of trustees and the executive officers of each constituent unit, the OPM secretary, and the commissioners of DHE and SDE. Under current state law, the council is responsible for identifying, examining and implementing savings in administrative functions and, since 1999, developing accountability measures for each constituent unit and each public institution of higher education. The Board of Governors was required to approve these measures, which are now used by DHE and each constituent unit to report to the committees of cognizance of the legislature to assess progress towards meeting the statutory goals of:

- enhancing student learning and promoting academic excellence;
- joining with K-12 to improve teaching at all levels;
- ensuring access to and affordability of higher education;
- *promoting the economic development of the state to help business and industry sustain strong economic growth;*
- respond to the needs of society; and
- ensuring the efficient use of resources.

The accountability measures, along with progress made towards achieving them, are continued in an annual publication entitled *Higher Education Counts: Achieving Results*.

*Statutory boards/commissions.* Table IV-I shows statutorily mandated boards, councils, and commissions within the Connecticut statutes governing higher education, and their intended purposes. Department staff indicated, as the table shows, three of the four required entities are either no longer active or have never been active for various reasons. In addition to these, DHE sits on four OWC statutory boards, of which two are active and two are inactive (see Section V for the names of these boards). DHE also is co-chair of the P-20 Commission, which was created by executive order, and is a member of the Connecticut Education and Training Commission, described in detail in Section V.

**Table IV-1. Statutory Boards and Commissions Chaired by BGHE or DHE**

<i>Name/Purpose</i>	<i>Lead Agency (In Bold)</i>	<i>Status</i>	<i>Established</i>
<b>Higher Education Coordinating Council</b> - identify, examine and implement administrative savings and develop accountability measures for each constituent unit and each public institution of higher education	Chairmen of the boards of trustees, chief executive officer of each constituent unit, OPM secretary, and commissioners of DHE and SDE (no lead designated)	Changed to more informal CEO meeting before the inclusion of OPM. Meets at the behest of DHE several times a year when issues arise	1992 1999 (revised to include OPM)
<b>Task Force to Develop Higher Education Management Information and Student Information System</b> – assist DHE and the constituent units in developing an integrated, commonly-linked higher education management and student information system.	CEO of each constituent unit, chief data processing officers of DHE, UConn, CSU, community college system, and each institution in the CSU system, and the OPM secretary (no lead designated)	Never active because of funding	1992
<b>Blue Ribbon Task Force</b> - develop strategic plan for Higher Education	<b>BGHE</b> , DHE, SDE, DECD, DOL, Chairs and presidents of each public college, OWC, OPM secretary. Also representation from: <ul style="list-style-type: none"> <li>• public and independent colleges</li> <li>• arts and culture field,</li> <li>• science and technology</li> <li>• state-wide business organization</li> <li>• nonprofit education foundation</li> <li>• university research and its commercial application</li> <li>• PK – 12 education</li> <li>• One additional person</li> </ul>	Never active – funding lapsed in FY 07 and was rescinded in FY 08	2007
<b>Technical Education Coordinating Council</b> - review and evaluate the coordinated delivery of technical and technological education to meet the employment needs of business and industry	<b>DHE</b> , DECD, DOL, CEOs of each constituent unit, president of the Connecticut Conference of Independent Colleges, superintendent, teachers, and parents of the Technical Schools, various business members, chairs and ranks of education and commerce committees	No longer active	1989
<b>Advisory Council on Student Transfer and Articulation</b> - develop a plan that maximizes the transferability of credits.	<b>DHE</b> , chief academic officer of each constituent unit, teaching faculty, students, and other representatives of public colleges and universities, and representatives from independent colleges	No longer active in this form but through the Standing Advisory Committee to the Board	1991 (revised 1995)

Source: CT General Statutes, DHE, staff, and PRI staff

As shown in the table, the legislature created a Blue Ribbon Task Force in 2007, primarily charged with developing a master strategic plan for higher education. Section V gives more details about its legislative charge and discusses why the task force was never constituted. To date, BGHE does not have a master strategic plan.

**Targeted incentive and loan forgiveness programs.** The Board of Governors is responsible for the administration of several incentive and loan forgiveness programs that are targeted at getting students to major in specific fields of study that are experiencing critical worker shortages, or have graduates of such programs remain in Connecticut and be employed in the critical shortage field. Table IV-2 shows the name of each program, its statutory reference, and the amount of funding received by each, if any.

During the next phase of this study, information on expenditures, number of awards, and outcomes will be presented, particularly for loans related to the drill-down areas for critical shortage areas.

### **Constituent Units**

As noted above and shown in Figure IV-1, there are four constituent units under BGHE. Although BGHE is the central coordinating and policy-making power, in practice the public higher education system is decentralized with decisions made at the constituent unit level. Each of the boards of trustees at the constituent unit level are granted similar authority under the law. The boards have fairly broad authority in terms of governing their individual units and are responsible for establishing and administering academic, financial, and administrative policies. Each board has jurisdiction over its respective college or university system and make policy and budgetary decisions regarding its system. Each board also develops mission statements for the colleges, identifying the role and scope of each college within the system, along with its institution's strengths and specialties, although the statements must be reviewed and approved by BGHE.

**Connecticut Community College System.** Connecticut's regional two-year public college system is part of the state's higher education system and was created in 1965 to promote access to higher education opportunities and help meet the state's demand for a skilled workforce. At present, the system includes 12 community colleges governed by a 24-member board of trustees, 22 of whom are appointed by the governor and two students are elected by their peers. At least six members must have expertise and experience in business, labor, or industry, and alumni are represented. Its administrative staff, headed by a system chancellor, oversees day-to-day operations and coordinates activities among the individual colleges.

*Types of programs offered.* Community colleges provide two types of educational programs: credit and non-credit. The colleges' credit programs lead to associate degrees or certificates and require a high school diploma or its equivalent for admission. It offers career programs (such as nursing, information technology, and early childhood education), as well as general study and transfer programs. Not all programs are offered at all colleges. In FY 08,

**Table IV-2. Statutory Loan Incentive or Forgiveness Programs Administered by DHE**

<i>Name of Program or Pilot and Purpose</i>	<i>Statutory Cite</i>	<i>Legislation Adopted</i>	<i>Funding</i>
<i>Connecticut Nursing Incentive Program</i> – provides funding for up to four community colleges that partner with hospitals and secure non-state funding to increase faculty members that are qualified to teach students to become registered nurses	10a-19c	2004	\$200,000 appropriated for 2005 and 2006. Additional Education and Health Initiatives funding was used to fund programs at Capital, Norwalk, Naugatuck, and Three Rivers at \$75,000 each for both years; \$600,000 total expended.
<i>Training for Early Childhood Education Teachers</i> – within available appropriation expand capacity of programs through development of accelerated alternative route program	10a-19d	2006	Funded at \$50,000 from Early Childhood appropriation in 2008
<i>“Engineering Connecticut” Loan Reimbursement Grant</i> - within available appropriation, up to \$5,000 in student loan reimbursements for candidates who are CT residents, have outstanding student loans in their names, earned an engineering undergraduate or graduate degree in the U.S. and have been hired as a full-time engineer in CT after 12/31/05	10a-19e	2006	\$250,000 appropriated in 2007
<i>“You Belong” Loan Reimbursement Grant</i> – within available appropriation, up to \$10,000 in student loan reimbursements for candidates who are CT residents, have outstanding student loans in their names, hold a doctorate in any field from any college or university, and are newly employed full-time in the state after 12/31/05 in an economically valuable field as determined by DECD, and the company or institution has been qualified by DECD	10a-19f	2006	\$250,000 appropriated in 2007
<i>High Technology Doctoral Fellowship Program</i> - within available appropriation, a fellowship program to attract students to state doctoral programs in high technology and encourage them to teach in a college or university in the state	10a-25n	1987	Last funded at \$50,000 in 1994

**Table IV-2. Statutory Loan Incentive or Forgiveness Programs Administered by DHE**

<i>Name of Program or Pilot and Purpose</i>	<i>Statutory Cite</i>	<i>Legislation Adopted</i>	<i>Funding</i>
<b>State Scholarship Program for Nursing Education and Program for the Forgiveness of Loans provided by the state for Nursing Education</b> – provided state loans for state residents entering into or advancing in the nursing profession; forgive loans for candidates who worked as nurses in the state for 5 years	10a-162a	1988	Last funded at \$75,000 in 1992
<b>Teacher Incentive Loan Program for Training in Areas of Teacher Shortages</b> – provided loans of up to \$5,000 per year for 2 years to students entering approved teacher education programs; each year 20% of loan is forgiven for every year the student taught in a CT public school in a field suffering a teacher shortage	10a-163	1977	Not funded since the 1980’s
<b>Scholarship Aid for Teachers of Children Requiring Special Education</b> – applicant must agree to teach children requiring special education in Connecticut for at least three years	10a-168	1977	Not Funded
<b>Minority Teacher Incentive</b> – within available appropriation, provides up to \$5,000 in grants for individuals who are enrolled in CT teaching training programs and full-time junior and senior minority students, graduate students that received grant for one year at undergraduate level, or enrolled in alternative route to certification and eligible for up to \$2,500 a year, for up to 4 years in loan reimbursements in return for students teaching in a CT public elementary or high school. Ten percent of grant recipient awards must be to minority students who transfer from a community college	10a-168a	1998	\$481,374 appropriated in FY 08 and FY 09 each
<b>Information Technology Scholarship Pilot Program</b> – within available appropriation, provide grants of up to \$3,000 per year and for students enrolling in an information technology related degree or certificate program at any public or independent	10a-169a	2000	One-time funding of \$2.5 million in FY 2001

**Table IV-2. Statutory Loan Incentive or Forgiveness Programs Administered by DHE**

<i>Name of Program or Pilot and Purpose</i>	<i>Statutory Cite</i>	<i>Legislation Adopted</i>	<i>Funding</i>
college or university.			
<b>Information Technology Loan Reimbursement Pilot Program</b> - within available appropriation, provides up to \$2,500 a year, for up to 2 years, in loan reimbursements to individuals who attended a CT college, majored in an information technology related field, and were employed in an information technology position for a CT company on or after Jan. 1, 2001	10a-169b	2000	Not Funded
<b>High Technology Graduate Assistantship Program</b> – within available appropriation, \$10,000 annually for students enrolled in graduate programs in CT in high technology fields which meet state-wide economic needs and are approved by BGHE and designated, in consultation with DECD; must be employed by institution in a teaching or research capacity for not less than 50 percent of full-time	10a-170a - 10a-170d	1983	Last funded at \$193,000 in FY 1989
<b>Academic Scholarship Loan Program (encourage people to teach in state’s public schools)</b> – provides loans to academically talented graduating high school students and new college students who became certified and taught in public or approved private schools in the state. Recipients attending public colleges could receive up to \$3,000 a year for four years, those attending independent colleges, up to \$5,000. Loans were forgiven on a graduated scale depending on the number of years teaching in a CT with 100% forgiven after 5 years of teaching	10a-170e, f	1984	Last funded at \$135,000 in FY 1990. Last loan repaid in September 2009
<b>Academic Scholarship Graduate Student Loan Program (graduate teacher program)</b> – scholarships for students accepted or currently enrolled in graduate teacher preparation programs; students must be CT residents and have an undergraduate degree	10a-170r - 10a-170t	1986	Not Funded

Source: DHE staff, PRI staff, and Connecticut General Statutes.

there were 51,105 credit students and 40,372 non-credit students (full-time and part-time). Only for-credit course tuition and expenses are eligible for PELL grant financial support.<sup>18</sup>

Admission to continuing education non-credit courses at community colleges does not require a secondary school credential but there may be other prerequisites for some classes. The non-credit courses offered encompass a variety of instruction, from professional continuing education classes and computer skills training to recreational, cultural, and personal enrichment classes. The community colleges also develop and provide customized workforce development courses for local employers through their Business and Industry Services Network. However, all non-credit courses can be generally classified as either workforce or personal development.

*Regional Advisory Boards.* Mandated since 1989, C.G.S. Sec. 10a-73 requires each of the 12 community colleges have a regional advisory board. The president of each college recommends individuals to the board, which must be representative of the geographic area served. Related to the alignment of postsecondary education and employment, the purpose of each council is to advise the board of trustees and the college president about appropriate educational programs to meet the needs of the communities represented by each college.

*Program Advisory Councils.* Another way the community colleges align with employer needs is through their Program Advisory Councils. Each community college professional program has a Program Advisory Council. Advisory councils are composed of employers and industry leaders who help the college stay aware of the needs of its regional business needs in a particular program area. The councils offer input to program curriculum and are concentrated in the professions, business, and financial areas (Table IV-3).

Although there are numerous examples of successful programs that align students and graduates of the state's community colleges with skills needed by Connecticut employers, one example is at Asnuntuck Community College in Enfield. In interviews conducted by PRI staff, college officials explained that the Enfield Chamber of Commerce contacted school administrators and asked why no type of manufacturing program was offered since the region had a need for skilled workers in this area. Consequently, college officials met with the Enfield Economic Development Director and developed a non-credit manufacturing program, which took about six months to begin to train people.

The college decided to offer the program for credit once it was up and running in order to provide a career pathway for individuals who wanted to go on to a higher degree as well as make students eligible to cover expenses through Pell grants. College officials believe that one reason the manufacturing program is so successful in placing students is because a six-month internship is offered and students are placed with employers that will likely hire them upon completion of the program. There are two program advisory boards – the Electronics Advisory Board and the Precision Machining Advisory Board – both comprised of manufacturing employers in the region.

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<sup>18</sup> The Federal Pell Grant Program provides need-based grants to low-income undergraduate and certain postbaccalaureate students to promote access to postsecondary education.

<b>Table IV-3. Program Advisory Council Affiliations (Total Statewide).</b>		
<i>Affiliation</i>	<i>Number</i>	<i>Percent</i>
Business	34	13%
Financial	31	12%
Labor	2	<1%
Industry	8	3%
Technical Occupations	4	2%
Other	1	<1%
Management	8	3%
Professional (architect, education, engineer, health tech, legal, computer, entertainment, media, social services, scientist, other)	101	40%
Service Occupations	17	7%
Sales	10	4%
Office/Admin Support	6	2%
Installation/Maintenance/Repair	2	<1%
Production	2	<1%
Transportation	0	-
Public Service	24	9%
Community Service	5	2%
Total Members Statewide	255	100%
Source: Board of Trustees of the Community Colleges		

*Articulation/Transfer agreements.* If producing workers with more education and critical thinking skills is important for employers, then state policies that make it easier for students to pursue higher education are also important. Articulation and transfer agreements are formal agreements between postsecondary institutions that maximize the number of credits the student may transfer. Specifically, the agreements allow a student to apply credits earned at one institution toward advanced standing, equal transfer, or direct entry into specific programs at another institution. They provide incentives to students for advancing from a lower degree level to a higher level, by automatically accepting coursework completed at the lower level at the time of transfer, and provide guaranteed pathways to a bachelor's degree at another.

The Connecticut Community College System and the Connecticut State University System (CSUS) developed a Transfer Compact that offers, beginning in fall 2009, Dual Admission (a specific type of transfer agreement) to students who are planning to enroll at a CSUS university after completing an associate's degree. The Dual Admission program is designed for students who:

- plan to earn an associate's degree from one of the 12 Connecticut Community Colleges (in five years or less);
- plan to pursue a bachelor's degree at one of the four Connecticut State University System institutions, beginning within two years of completing an associate's degree; or

- have earned 15 or fewer transferable college credits at the community college at the time of application.

Since 2007, the University of Connecticut also has guaranteed admission for persons graduating from Connecticut's community colleges who fulfill certain requirements. Called the Guaranteed Admissions Program (GAP), these students are admitted to any UConn campus – Storrs, Avery Point, Greater Hartford, Torrington, Waterbury, or Stamford – provided they complete an associate's degree and have at least a 3.0 (B) grade point average in a liberal arts or other approved major including horticulture, veterinary technician, and environmental engineering technology.

Several of the community colleges also have established separate articulation agreements with Connecticut and out-of-state independent colleges and universities, but these have been initiated at the individual college, rather than system, level.

Most of the community colleges also have articulation agreements with Connecticut's Technical Schools, at least in some areas. As part of this study, program review committee staff examined the pathways that exist for technical school graduates to gain admittance into the state's public colleges and universities. More information on these pathways is presented in Appendix E.

**Connecticut State University System.** As shown in Figure IV-1, the Connecticut State University System (CSUS) comprises four universities located in four different regions of the state (Danbury, New Britain, New Haven, and Willimantic). All of the universities in the system began as "normal" colleges for teacher training.

In fall 2008, there were 35,891 undergraduate and graduate students enrolled in the system, and 93 percent of the students are from Connecticut. Undergraduates accounted for 82 percent of the total enrolled. There are over 160 programs of study offered by the system. CSUS offers students baccalaureate and selected masters' and sixth year degree and certificate programs.

The system is governed by a board of trustees and a chancellor, and each college has a president. The board has 18 members, 14 of whom are appointed to six-year terms by the governor and four elected by their peers, one from each of the universities. The board appoints the system's chancellor and the university presidents, and develops mission statements for each university, which require approval by BGHE. As noted above, it is responsible for establishing rules for governing the state system.

**University of Connecticut.** The University of Connecticut is the state's flagship institution of higher learning. The University was founded in 1881 as the Storrs Agricultural School and became the University of Connecticut in 1939. The University has ten schools and colleges at its main campus in Storrs, separate Schools of Law and Social Work in Hartford, five regional campuses throughout the state, and Schools of Medicine and Dental Medicine at the UConn Health Center in Farmington.

In fall 2008, there were 29,383 undergraduate and graduate students enrolled in the system. Undergraduates accounted for 73 percent of the student body. There are 14 schools and colleges, with 100 undergraduate majors, 91 graduate fields of study, and 5 professional degree programs.

The university is governed by a 21-member Board of Trustees, of which the governor appoints 12 members, and students and alumni elect two members each. There are five ex-officio members including the governor; the commissioners of agriculture, economic and community development, and education; and the chairman of the UConn Health Center Board of Trustees. Like the boards for the community college and CSU systems, the UConn Board is responsible for governing the university and developing a mission statement for it, including the role and scope of each branch campus. The board also coordinates branch and institutional services and programs.

**Charter Oak State College and Distance Learning.** In 1973, the Connecticut legislature established Charter Oak State College to provide an alternative way for adults to earn associate and bachelor's degrees. Charter Oak is a distance learning college offering video and online courses. Students that are enrolled at the college create a personalized degree. Degree requirements are satisfied in several ways. Students may earn college credits through:

- courses transferred from other regionally accredited colleges and universities;
- certain standardized tests;
- certain corporate & agency training programs;
- military service schools and occupational ratings evaluated by the American Council on Education (ACE);
- faculty-evaluated licensures/certifications;
- contract learning (independent study);
- experiential learning; and
- Connecticut Credit Assessment Program (CCAP).

There are about 2,000 students enrolled with the college, representing all 50 states and 9 countries.



### **Linking the Postsecondary Education System to Employer Need**

The current state organizational structure to facilitate the coordination of postsecondary education with workforce development issues involves a myriad of agencies, boards, higher education institutions, offices, councils, and commissions. Some have overlapping responsibilities, but there is no single entity with authority to implement across-the-board strategies, policies, or programs. Connecticut's postsecondary system, discussed in the previous section, creates the supply of future educated workers. State agencies concerned with examining workforce demand and/or sustaining Connecticut's economic viability include the Departments of Labor and Economic and Community Development, and the Office of Workforce Competitiveness. In addition to these entities, there are numerous formal and informal public/private partnerships that explore ways to better develop Connecticut's workforce at the local, regional, and state levels.

This section describes the roles and responsibilities of the:

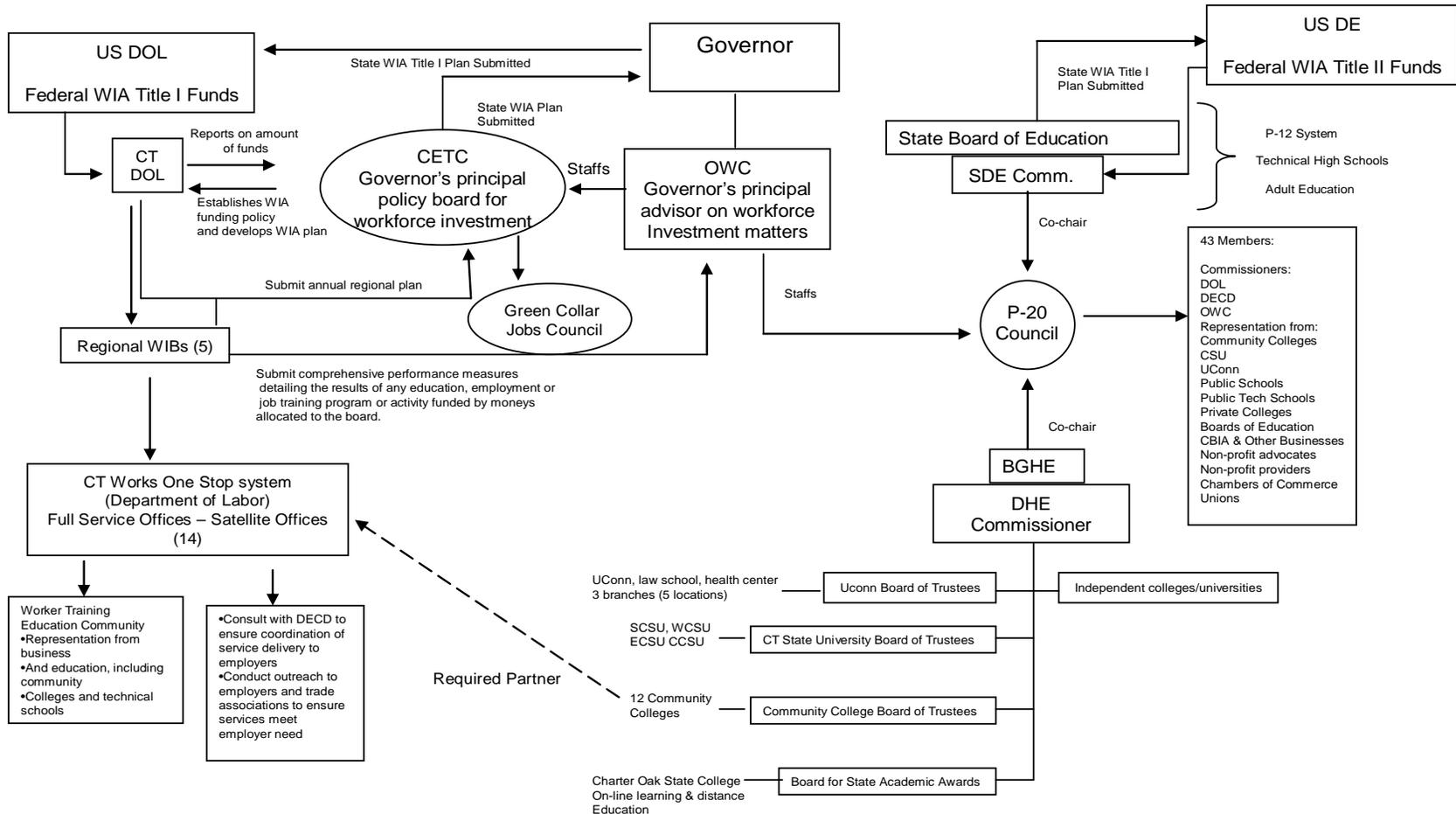
- state agencies responsible for workforce development;
- involvement of the public higher education system in considering workforce needs; and
- coordinating entities that have been established to better link the postsecondary education system with Connecticut's workforce development needs.

It also describes the numerous boards and commissions involved in identifying, establishing, or implementing strategies and/or programs created to foster alignment between postsecondary education and employer need.

Executive and legislative branch initiatives to better coordinate postsecondary education with workforce development can be traced back to the early 1980s. Thus, creating alignment between the types of graduates produced by Connecticut and the types of graduates needed by employers to keep Connecticut competitive has been a persistent concern of policymakers.

In addition to efforts by policymakers to require alignment through legislation, there are also numerous linkages that exist outside of the statutes between independent postsecondary institutions, business organizations, and individual employers. However, no compendium of all these efforts has ever been compiled nor an assessment made of the strategies that lead to better outcomes. One goal of this study is to determine whether a more systemic approach to promote the alignment of postsecondary education and the employment needs of Connecticut's businesses is required instead of the current decentralized system.

**Figure V-1. Current Organizational Structure for Alignment of Postsecondary Education and Workforce Development.**



Source: OWC & PRI committee staff

Figure V-1 identifies the key players in aligning postsecondary education with the needs of Connecticut's employers. The figure shows the relationship between the various agencies, offices, boards, and departments. The entire public system for workforce development in Connecticut is shown in the figure in order to convey its complexity. It is important to remember that many of these agencies/entities have multiple responsibilities and creating alignment between the higher education system and the needs of employers is only one of their roles. The Department of Economic and Community Development is not depicted in the figure because its role focuses on promoting innovative research and, new competitive industry niches to foster growth in Connecticut's economy. Each of the entities roles and responsibilities, as they are related to this study, is described below.

### **Role of the Department of Labor in the Workforce Development System**

**Connecticut Department of Labor.** The Connecticut Department of Labor (DOL) is the state's lead agency for producing information and statistics on the economy, workforce and occupation demand, and growth in industry sectors. It also is the state agency responsible for administering a variety of federal and state employment service programs, and regulating and enforcing working conditions, wage standards, and labor relations.

Its main roles in the workforce investment system include: statewide planning, funding, and monitoring duties required by state and federal law for a number of employment and training programs; managing, with the regional workforce boards, the state's one-stop center network; and administering the Jobs First Employment Services (JFES) program, the employment portion of the state's welfare-to-work program.

Most of the efforts by DOL are related to implementation of grant programs and/or training requirements around youth programs, welfare-to-work programs, and programs for disadvantaged/displaced workers, which was not the focus of this study. However, the flow of federal Workforce Investment Act funds is depicted in Figure V-1 because it is a part of Connecticut's overall workforce development system, and through its programs, produces a supply of workers that can be considered a resource for employers.

Particularly relevant to the PRI study, DOL is statutorily required to develop future workforce demand projections by surveying the state's employers and forecasting the number and types of openings that will be available for a wide range of occupations. (Section VI reviews the challenges of forecasting employer needs.) The occupational information developed by DOL is distributed through the Connecticut Career Resource Network (CCRN), which is the state's counterpart to the federal America's Career Resource Network. Information is distributed through CCRN to the education community, teachers, guidance counselors, students, parents, and other individuals interested in job outlook information. The goal of the network is to "improve career decision-making by students and other individuals, and to support life-long learning."

DOL undertakes career-related activities, including publishing documents, holding workshops and conferences, and maintaining web-based information systems. In interviews conducted by PRI staff, it was not clear how this information was specifically being used by high

schools, colleges, and universities, as part of their advising roles in student career services. Some of those interviewed cited the difficulties in using data that projected job shortage areas 10 years out but stated that it was used as a broad guide for areas that will need workers in the future. Other factors, such as the economy or new technologies, were also noted as impacting the reliability of these projections.

Finally, the commissioner of the Department of Labor (or designee) is a statutory member of four inter-agency commissions/councils and/or boards that seek to coordinate education and jobs, which are identified and described later in this section.

### **Coordinating Bodies for Aligning Postsecondary Education and Employer Need**

For almost 30 years, there have been proposals intended to create linkages between the higher education system and the development of the state's workforce to better meet the needs of the state's employers. As noted in the introduction, as early as 1982, the Governor's Commission on Higher Education and the Economy recommended the governor annually appoint a Committee on Technological Change representing business, labor, industry, and government that would report on technological change and its effect on employment opportunities in Connecticut.

More recently, governors through executive orders have created new state entities and public/private partnerships charged with fostering alignment. Under Executive Order No. 14, Governor Rowland established two new entities, partly in response to federal passage of the Workforce Investment Act, but also to better prepare Connecticut's workforce for the economy of the 21st Century. The order created the Office of Workforce Competitiveness (OWC) and the Governor's JOBS Cabinet.

The Office of Workforce Competitiveness is still in existence while the JOBS cabinet was rescinded by Governor Rell through Executive Order No. 2A and replaced with The Connecticut Commission for the Advancement of 21<sup>st</sup> Century Skills and Careers. Governor Rell has also created a new coordinating entity to prepare Connecticut to capitalize on green collar jobs. These bodies are described in this section and their relationships are also depicted in Figure V-1.

**Office of Workforce Competitiveness.** The Office of Workforce Competitiveness was established by Executive Order No. 14 on April 12, 1999. Recognizing a link between business needs and higher education, and that a skilled workforce is essential to the state's economic viability, the order created OWC (along with the Governor's JOBS Cabinet) to focus on the need to prepare the state's workforce for the new century.

OWC was made a statutory agency within the Office of Policy and Management for administrative purposes only under P.A. 00-192. The office is headed by a director who reports directly to the governor. The office serves as the governor's principal workforce development policy advisor. It is charged with providing advice to the governor on workforce investment matters, serving as liaison between the governor and various federal, state, and local entities, and coordinating the workforce development activities, including WIA, of all state agencies. In FY

08, the office had 4 FTE staff and expended almost \$6.5 million for pilot programs, other initiatives that promote workplace competitiveness, and staffing.

The office also provides staff support to the Connecticut Employment and Training Commission (CETC) and The Connecticut Commission for the Advancement of 21st Century Skills and Careers.

Statutorily, OWC is required to provide the governor and legislature, with the assistance of DOL, necessary reports, information, and assistance to any state agency. The office has completed 42 reports since 2001, many of them aimed at identifying strategies to build talent to address critical shortage areas or emerging fields. A list of reports completed by the office is contained in Appendix F.

The OWC staff also head up a number of other initiatives including administering targeted pilot programs and chairing a number interagency committees that are required by statute. Other statutory responsibilities particularly related to the alignment of postsecondary education and employment, include:

- serving as the lead agency for the development of employment and training strategies and initiatives required to support Connecticut's position in the knowledge economy; and
- annually submitting a report, with the assistance of DOL, to the Governor and the legislative committees of cognizance (education, economic development, labor, and higher education and employment advancement) based on a forecasted assessment by DOL of workforce shortages in occupations in this state for the succeeding two and five year periods. The report must include recommendations concerning:
  - methods to generate a sufficient number of workers to meet identified workforce needs, including scholarship, and school-to-career, and internship programs; and
  - methods secondary and higher education and private industry can use to address identified workforce needs.

*OWC statutory committees boards, and commissions.* Connecticut law requires that the OWC director serve as chair or member of a variety of committees, boards, and commissions relevant to the alignment of postsecondary education and workforce development. For the entities that the office chairs, committee membership is delineated in statute and typically includes several state agencies and public members with expertise in certain fields (see Table V-1).

*Pilot programs.* The office also administers several grant programs with the purpose of increasing skills in a specific occupational shortage area or providing incentives through student loan reimbursement programs to encourage individuals to enter certain shortage fields. These programs are shown in Table V-2.

Table V-1. Statutory Committees Chaired by OWC Director.

<i>Name</i>	<i>Membership</i>	<i>Alignment-Related Purposes and Objectives</i>	<i>Meeting Frequency</i>
<i>CT Career Ladder Advisory Committee</i>	13 members: <ul style="list-style-type: none"> <li>• OWC director</li> <li>• commissioners of SDE, DHE, DPH, DOL (or designees)</li> <li>• 9 public members with expertise in early childhood education, health care, labor market analysis, health care employees, early childhood education employment, and 3 members with workforce development expertise</li> </ul>	The committee's purpose is to: <ul style="list-style-type: none"> <li>• promote the creation of new career ladder programs and the enhancement of existing programs for occupations in this state with projected workforce shortages</li> </ul> OWC must consult with the Permanent Commission on the Status of Women.	Bimonthly
<i>CT Allied Health Workforce Policy Board</i>	13 members: <ul style="list-style-type: none"> <li>• OWC director</li> <li>• commissioners of DPH, SDE, DHE (or designees)</li> <li>• chairs and ranking members of Public Health, and Higher Education and Employment Advancement Committees (or designees)</li> <li>• a member of the State Board of Examiners for Nursing</li> <li>• Connecticut Conference of Independent Colleges</li> <li>• Various recognized experts in field of allied health, finance, economics or health facility management appointed by the leaders of the General Assembly</li> </ul>	The board is required to <ul style="list-style-type: none"> <li>• act in coordination with the Connecticut Career Ladder Advisory Committee</li> <li>• monitor data and trends in the allied health workforce including:               <ul style="list-style-type: none"> <li>○ current and future supply and demand</li> <li>○ capacity of the state's higher education system to educate and train students pursuing allied health professions; and recruitment and retention strategies for students and employers</li> </ul> </li> </ul>	Not stated but board is active and submitted annual 2009 report to committees of cognizance with findings and recommendations to address allied workforce shortages in CT
<i>Council of Advisors on Strategies for the Knowledge Economy</i>	11 Members: <ul style="list-style-type: none"> <li>• OWC director</li> <li>• commissioners of DECD, DHE, DOL</li> <li>• OPM secretary</li> <li>• executive directors of CT Innovations Inc., and the Connecticut Development Authority</li> <li>• 4 representatives of the technology industry appointed by leaders of General Assembly</li> </ul>	The council's purpose is to: <ul style="list-style-type: none"> <li>• promote formation of university-industry partnerships, identify benchmarks for technology-based workforce innovation and competitiveness and advise the award process for innovation challenge grants to public postsecondary schools and their business partners</li> <li>• administer grants to generate talent in institutions of higher education</li> </ul>	Never active: Grants never funded
<i>Industry Advisory Committees for Career Clusters within Technical Schools and the Community College System</i>	<ul style="list-style-type: none"> <li>• OWC, in consultation with Superintendent of Technical Schools must create an integrated system of state-wide industry advisory committees for each career cluster offered as part of Technical School and Community College System</li> <li>• Committee representation must include industry representatives of the specific career cluster</li> </ul>	<ul style="list-style-type: none"> <li>• Each committee, with support from OWC, the Technical School and Community College system, and SDE, is required to establish for each career cluster:               <ul style="list-style-type: none"> <li>○ specific skills standards;</li> <li>○ corresponding curriculum; and</li> <li>○ a career ladder which shall be implemented as part of the schools' core curriculum.</li> </ul> </li> </ul>	No statewide committees are active but Technical Schools have regional committees

Source: Connecticut General Statutes and OWC.

**Table V-2. Statutory Programs Administered by the Office of Workforce Competitiveness**

<i>Name of Program or Pilot</i>		<i>Statutory Citation</i>	<i>Public Act</i>	<i>Funded (y/n)</i>	<i>If Funded, State Appropriation by FY</i>	<i>No. Students Served</i>	<i>No. Students Completing Requirements</i>
Technology Assessment Examination Program – 2-year pilot program (FYs 02 and 03)	<b>Evolved into the CT Career Choices Program (CCC)</b>	4-124x	01-193	<b>Yes</b>	FY 08 - \$800,000 <b>FY 09 - \$760,000</b>	<b>Since its inception in FY 05:</b>  <b>50 high schools have offered one or more CCC courses involving nearly 6,000 students and 125 teachers</b>  <b>Almost 100 experiential learning activities reached over 400 students</b>	
Information Technology Credential or Degree Program		4-124y	01-193				
Information Technology Internship and Work-Study Program		4-124aa	01-193				
Career Ladder Programs – provide funding for career ladder programs to encourage students to enter occupations with projected workforce shortages for the next five years		4-124cc	03-142	<b>Yes</b>	FY 08 -\$500,000 <b>FY 09 - \$475,000</b>	no data available	no data available
Connecticut Nursing Faculty Incentive Program		4-124ee	04-196	<b>Yes</b>	FY 05 -- \$75,000 FY 06 -- \$50,000	<b>26 students were supported through this two-year program and received nursing education credits</b>	
Innovative Challenge Grant Program	<b>Same program</b>	4-124ff	04-212 05-198	<b>No</b>	not applicable		
Grant Program to Generate Talent in Higher Education Institutions		4-124hh	2005				
Program regarding Trained Workforce for the Film Industry		4-124uu	2007	<b>Yes</b>	FY 08 - \$1,000,000 <b>FY 09 – \$950,000</b>	<b>FY 08 – 149</b> <b>FY 09 – 121 (Training sites reduced from 3 to 2 in FY09)</b> <b>Aerial Lift Training - 49</b>	

Source: Office of Workforce Competitiveness, PRI Committee

**Connecticut Employment and Training Commission (Designated State-level Workforce Investment Board).** The Connecticut Employment and Training Commission (CETC) was created in 1989 by P.A. 89-292 with a mandate to plan, coordinate, and evaluate state sponsored job training programs. It was designated as the state-level Workforce Investment Board, required by federal law under the Workforce Investment Act of 1998 (WIA). Statutorily, CETC has 24 members with the majority of its membership from business and industry, and the remainder representing state and local government, organized labor, education, and community-based organizations. Originally located within DOL, the commission was transferred to OWC effective July 1, 2000 and since then OWC has been responsible for staffing the commission.

Although CETC is the governor's principal policy board for workforce investment - the education, training, and retraining of the current and future workforce - much of the commission's focus is on funding training and employment programs through grants provided under the Workforce Investment Act of 1998 (WIA). WIA provides federal grant funds that target employment and training programs around three populations – dislocated workers, unemployed adults, and disadvantaged youth – that is not the subject of this study. There are many different types of training programs available to individuals who are eligible for WIA grant funding, including programs offered through Connecticut's one-stop centers that have on-site training and job placement assistance, as well as programs available through the community college system. Under WIA, community colleges are required to partner with Connecticut's one-stop centers.

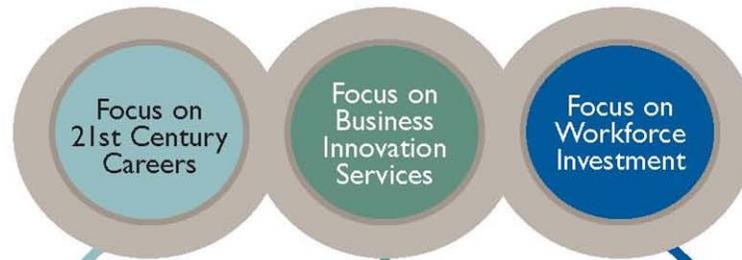
In recent years, the commission has approached its role more broadly in its examination of Connecticut's workforce investment system. The commission is required to annually report on the status of policies, programs, and investments intended to build and sustain a skilled state workforce to the governor and legislature and develop a federally-required education and job training report card that assesses the accomplishments of the state workforce investment system. Both of these requirements were blended into CETC's 2009 Annual Report to the legislature.

The 2009 CETC annual report cites several key indicators that raise concerns about the state's future workforce. These include demographic trends showing an aging workforce with a younger, less skilled working population available to replace it, poor student achievement in science and math, poor urban school performance, and too few college graduates in science and engineering. To address these challenges, the commission proposes a "talent-based strategy built on the foundation of a talent pipeline." This strategy, the official workforce development policy for Connecticut, is promoted by the Office of Workforce Competitiveness and was adopted by the governor in her submission of the State's Strategic Two-Year State Workforce Investment Plan (July 1, 2007 – June 30, 2009) to the U.S. DOL.

*Talent-Based Strategy to Keep Connecticut Competitive in the 21st Century.* The components of the strategy include fostering the "talent pipeline" so that an "integrated continuum of education and workforce training systems and strategies [are] coordinated to meet the objectives of a growing and competitive state economy." Figure V-2 conceptually outlines the talent-based strategy, which includes three parts:

Figure V-2. Strategic Approach to Building Connecticut's 21<sup>st</sup> Century **TALENT PIPELINE**

**NEW ORGANIZATIONAL FOCUS:**



**POLICY OBJECTIVES:**



**TALENT PIPELINE:**



Source: OWC

- **Growing Talent** – ensure future workers have the necessary skills to enter the 21st workforce. Responsibility for growing talent falls to the three education systems: early childhood, K-12, and postsecondary;
- **Using Talent** – using skills gained to increase research, product development, and new venture development; and
- **Enriching Talent** – retraining existing workers to obtain skills necessary to enter occupations in critical shortage areas.

CETC’s 2009 annual report emphasizes the importance of postsecondary education in recommending that:

*all Connecticut workers should have the equivalent of at least two years education or training beyond high school leading to an associates degree, a comparable vocational credential, or similar industry certification, including demonstrable competence in core academic, STEM, and 21st century skills to compete in the workplace, thrive financially and contribute productively as a taxpayer, citizen and consumer.*<sup>19</sup>

The commission also acknowledges that coordination is a key ingredient of an effective workforce development system. This includes coordination and collaboration across state agencies and universities, among employers, and within higher education institutions.

*Executive Order No. 23 regarding green collar jobs.* An example of a new collaborative effort that furthers alignment of postsecondary education graduates with emerging needs identified by employers is detailed in Executive Order No. 23. The order, which was issued on February 2, 2009 by Governor Rell, noted the need to design initiatives and programs to spur the growth of green collar jobs in Connecticut and directs such planning to begin in four ways.

First, the commissioners of DECD and DOL are to plan for the development and growth of green industries and green jobs, in coordination with the executive director of OWC, the commissioners of SDE, DHE, and DEP, and the chancellor of the community college system. Once developed, the plan is to be submitted to CETC.

Second, CETC is to create and chair the Green Collar Jobs Council, which is comprised of representatives from the Departments of Education, Higher Education, Environmental Protection, Labor, and Economic and Community Development, the newly created Energy Workforce Development Consortium, and representatives from business and industry.<sup>20</sup> The council is charged with developing green collar job opportunities, public-private partnerships, and job training programs.

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<sup>19</sup> A Talent-Based Strategy for Economic Competitiveness, CETC 2009 Annual Report/Card.

<sup>20</sup> The Connecticut Energy Workforce Development Consortium mission is to “define the industry’s needs as it relates to work force development, build awareness of the demand for energy personnel in the state, generate a sense of excitement around the industry, improve training programs to closely align classroom learning with workplace requirements, and create pathways to continuing education, certification and employment for high school and college graduates. “ Members include executives from traditional and alternative energy companies, manufacturers of energy-related products, workforce investment boards, and representatives from technical high schools, community colleges, and universities.

Third, the community college system is to expedite the creation of eight certificate credit programs and train 320 students within the next two years.

Fourth, OWC is to provide administrative support and coordinate efforts among the many state agencies, public and independent colleges and universities, and quasi-public agencies whose missions include green collar industries and jobs.

**The Connecticut Commission for the Advancement of 21st Century Skills and Careers.** The Connecticut Commission for the Advancement of 21st Century Skills and Careers was created under Executive Order No. 2A and is informally called the P-20 Commission. It is the successor to the voluntarily-formed PK-16 council that had existed since January 2007. The preamble to Executive Order No. 2A, which eliminated the Governor's JOBS Cabinet and replaced it with the P-20 Commission, emphasizes the need to create an effective education and career pipeline that maximizes the number of skilled people in Connecticut with a postsecondary degree or other credential. The commission is charged with:

- developing a public policy framework for state leaders that increases collaboration across the systems at their current and potential points of intersection;
- exploring how the systems can work more effectively together to deliver services; and
- realigning existing activities and operations in a way that makes the education pipeline more responsive to the diverse needs of students.

The order recognizes that growing talent is not the responsibility of a single agency, and states that multiple agencies must collaborate for this unified purpose. The order requires the commissioners of DHE and SDE to co-chair the commission and appoints the commissioners of DOL, DECD and OWC as members, with OWC as staff. The commissioners of SDE and DHE are given the authority to appoint any additional commission members. Currently, there are 43 members, including representatives from the fields of early childhood, K-12, and higher education; the workforce system, and other state agencies, businesses, and philanthropic and community-based organizations.

Since January 2009, the commission has held two meetings and has another scheduled in November. At the introductory meeting, issues that Connecticut needs to resolve in order for students to make successful transitions from middle school and high school into postsecondary education were discussed. Ultimately, commission members decided to focus on fostering collaboration among four systems:

- early childhood;
- K-12;
- higher education; and
- workforce training.

At the June 10, 2009 meeting, the commission decided to break into three workgroups. The focus of the first is on data systems and determining the types of information that should be

tracked from early childhood through the postsecondary system. (The legislature adopted P.A. 09-241 that allows for longitudinal tracking by assigning a unique student identifier to each student.) The second workgroup will focus on teacher effectiveness in the K-12 system and teacher preparation in the postsecondary system. The last group will focus on existing regional partnerships to identify success efforts at coordination between the four systems and whether there are best practices that should be applied on a statewide basis.

### **Recently Defunct or Never Active Coordinating Bodies**

Two coordinating bodies were created within the last ten years, one by executive order and one through legislation. Both were intended to align postsecondary education and employment. One of these coordinating bodies is defunct and was replaced by the P-20 Commission, while the other was never active. They are described below to show the attempts made by both the executive and legislative branches of government to address the decentralized nature of education, postsecondary education, and workforce development, through establishing entities that span the three areas.

**The Governor's JOBS Cabinet.** The Governor's JOBS Cabinet, created in the same executive order as OWC, was mandated to "*explore, identify and report on policies and actions necessary to ensure that Connecticut leads the nation in building a trained and employed workforce.*" The cabinet could be chaired by either the governor or the OWC Director and included: the commissioners of labor, economic and community development, education, and social services; the secretary of OPM; and the chancellor of Connecticut's community college system. Its membership was expanded under Executive Order No. 2 in November 2004 to include DHE, the chancellor of the Connecticut State University System, the presidents of UConn and UConn Health Center, the president of the Connecticut Conference of Independent Colleges, and the presidents of the Connecticut Development Authority and Connecticut Innovations, Inc., two quasi-public agencies.<sup>21</sup>

The OWC executive director indicated in PRI staff interviews that the council became less effective as it grew larger, so informal meetings occurred among some members on an ad hoc basis. No minutes of these meetings were kept. In January 2009, Governor Rell eliminated the cabinet under Executive Order No. 2A and replaced it with the Connecticut Commission for the Advancement of 21st Century Skills and Careers, otherwise known as the P-20 Commission, described above.

**Blue Ribbon Task Force.** In 2007, the legislature created a Blue Ribbon Task Force to develop and implement a strategic master plan for higher education in Connecticut by October 1, 2008. The law requires the plan to contain short-term and long-term state goals for higher education and include benchmarks for achieving those goals by 2010, 2015, and 2020. The law also requires the commission to biennially submit a report prepared by the Department of Higher

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<sup>21</sup> The Connecticut Development Authority provides debt financing and investment capital to help businesses grow in Connecticut. Connecticut Innovations Inc. provides strategic capital and operational insight to push the frontiers of high-tech industries such as energy, biotechnology, information technology, and photonics.

Education on the implementation of the plan and progress made in achieving the strategic plan's benchmarks to the governor and the General Assembly. The task force is scheduled to terminate on January 1, 2021.

In the FYs 08-09 Biennial Budget, \$100,000 was appropriated each year for developing the strategic master plan for higher education. To date, the commission has not been constituted and funds lapsed the first year and then were rescinded the following year.

Relevant to the PRI study, and as part of its charge, the task force is required to:

- examine the impact of demographics and workforce trends on higher education in the state;
- address the challenges related to increasing the number of students earning bachelor's degrees in the state, increasing the number of young people entering the state's workforce, and the disparity in the achievement gap between minority students and the general population;
- recommend ways in which the state's higher education institutions can, consistent with their respective missions, expand their role in advancing the state's economic growth; and
- review the higher education board of governors' master plan for higher education and strategic plan for racial and ethnic diversity, and the Nellie Mae Foundation report titled, "New England 2020: A Forecast of Educational Attainment and its Implications for the Workforce of New England States."

In developing the strategic plan, the task force is to consider several factors including partnering public higher education institutions with the business community to move students into workforce shortage areas, and developing strategies to promote and measure retention and graduation rates.

*Commission Membership.* The 36-member commission is to consist of 16 voting members and 18 ex-officio nonvoting members. Representation is to be selected from a wide variety of education, business, and cultural interests. Membership includes key state agency commissioners, the executive director of OWC, Board of Trustee chairpersons and presidents of public colleges and representation from the Connecticut Conference of Independent colleges. A unique feature of the task force, different from the other coordinating bodies described above, is that it includes the chairs and ranking members of the legislative Committee on Higher Education and Employment Advancement as ex-officio members of the task force. Table V-3 shows the appointed voting members and their appointing authorities.

*Reporting.* The act requires the commission to complete and submit its strategic master plan for appropriate legislation and funding by October 1, 2008. The act also requires the commission biennially to submit, between January 1, 2009 and January 1, 2021, a report prepared by DHE on the implementation of the plan and progress made in achieving the strategic

**Table V-3. Appointed Voting Members and Appointing Authority and Ex-Officio Members.**

<i>No.</i>	<i>Appointing Authority</i>	<i>Appointees</i>
2	House speaker	<ul style="list-style-type: none"> <li>Former administrators or faculty members of independent higher education institutions</li> </ul>
2	Senate president pro tempore	<ul style="list-style-type: none"> <li>Former UConn administrator or faculty member</li> <li>Former community-technical college administrator or faculty member</li> </ul>
2	House majority leader	<ul style="list-style-type: none"> <li>Former state university administrator or faculty member</li> <li>Former Charter Oak State College administrator or faculty member</li> </ul>
2	Senate majority leader	<ul style="list-style-type: none"> <li>Representative from the arts and culture field</li> </ul>
2	House minority leader	<ul style="list-style-type: none"> <li>Persons knowledgeable about science and technology</li> </ul>
2	Senate minority leader	<ul style="list-style-type: none"> <li>Representatives of state-wide business organizations</li> </ul>
4	Governor	<ul style="list-style-type: none"> <li>Representative from a nonprofit education foundation</li> <li>Person experienced in university research and its commercial application</li> <li>Person experienced in preK-12 education</li> <li>One additional person</li> </ul>
<b><i>Ex-Officio Non Voting Members</i></b>		
Chairpersons and Ranking Members		Committee on Higher Education and Employment Advancement
Commissioners		DHE, SDE, DECD, DOL
Chairpersons and CEOs of each public higher education institution		UConn, CSU, Community Colleges, Board for State Academic Awards
Chairperson and President		Connecticut Conference of Independent Colleges
Director		OWC
Secretary		OPM
Source: P.A. 07-3, JSS.		

plan's benchmarks. Both are to be submitted to the governor, and the Higher Education and Employment Advancement, Education, Commerce, Labor, and Appropriations Committees. As noted previous, BGHE does not currently have a strategic master plan.

### **Newly Proposed Coordinating Body**

In September 2009, Governor Rell released the state's first-ever *Economic Strategic Plan* developed by the Department of Economic and Community Development. A section of the plan states that the way for the state to remain competitive is by growing talent and being prepared for the technological jobs of the future. To accomplish this, there are several strategies identified in the plan. To provide oversight and ensure implementation, the governor proposed a new Workforce and Education Cabinet be established.

The cabinet would consist of the following members: the commissioners of SDE, DHE, DOL, and DECD (or designees); the secretary of OPM (or designees); the heads of OWC, the Connecticut Development Authority, and Connecticut Innovations, Inc.; and the chairs of the State Board of Education, the Board of Governors for Higher Education; and the boards of trustees of UConn, UConn Health Center, Connecticut State University System and the state community college system.

Among the strategies the cabinet would provide oversight for and are related to this study include: 1) building the capacity for economic and workforce analysis, including examining occupational supply and demand information, and 2) increasing the number of postsecondary students seeking degrees in STEM areas, by creating a \$100 million, public-private student loan partnership, offering loan forgiveness in critical shortage occupations such as science and engineering.



### What are Some Possible Barriers to Alignment?

This section focuses on some of the possible barriers to aligning postsecondary education and employment. The barriers may be grouped into five general areas related to: 1) elementary and secondary school students in the knowledge/talent pipeline; 2) postsecondary education institutions; 3) difficulty in making accurate demand projections; 4) current economic challenges; and 5) state agency organization, programs and policies. The section concludes with a review of migratory patterns of college-educated residents and the degree to which this is contributing to a “brain-drain” in Connecticut.

#### 1) Barriers Related to Elementary and Secondary School Students

Prior to any postsecondary education, elementary and secondary school students must be well-prepared for the upcoming work they will face in college. There are signs, for example, that U.S. students are not as strong in science as many other countries. Within Connecticut, fourth and eighth graders do not score as well as students in other New England states. This is contributed to in part, by the widening performance gaps across economic, gender, and racial/ethnic groups. This lack of preparedness is borne out in the substantial proportion of college freshmen required to take remedial courses.

The knowledge gained and the preparedness of U.S. high school graduates for college level coursework has been assessed in a variety of ways, from remedial coursework required when entering college to international, national, and state comparisons of science, math and reading literacy, necessary ingredients for STEM occupations.

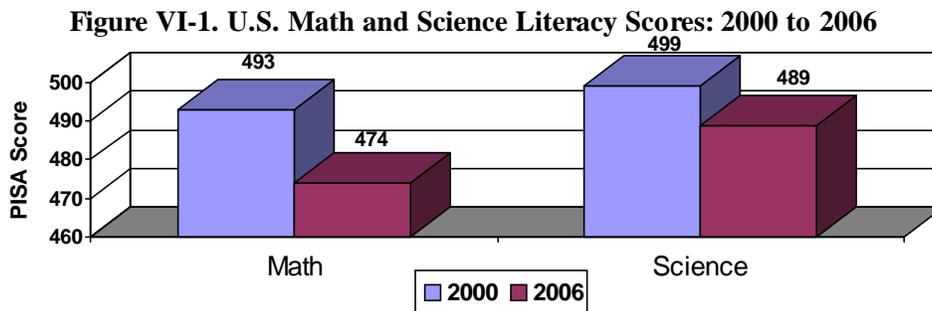
**Science literacy performance of the United States.** One of the indicators the U.S. Department of Education reported on in its report, “2008 Condition of Education in the United States,” is the science literacy level of 15-year-olds around the world as measured by the Program for International Student Assessment (PISA). With average performance scaled to a score of 500, Table VI-1 shows how U.S. students compare to their peers in the 30 industrialized countries belonging to the intergovernmental Organization for Economic Cooperation and Development (OECD) and 27 non-OECD countries. More than half (16) of the OECD-member countries and 6 non-OECD-member countries or jurisdictions had significantly higher science literacy scores than U.S. students.

Math and science literacy scores for the United States have also decreased from six years ago. Figure VI-1 compares the average math and science literacy scores in 2000 and 2006 for 15-year-olds.

**Table VI-1. International Science Literacy Performance: Average Combined Science Literacy Scale Scores of 15-Year-Olds by Country or Jurisdiction: 2006**

Average score relative to U.S. average score	OECD-member country and average score					
Significantly higher	Finland	563	Netherlands	525	Switzerland	512
	Canada	534	Korea, Republic of	522	Austria	511
	Japan	531	Germany	516	Belgium	510
	New Zealand	530	United Kingdom	515	Ireland	508
	Australia	527	Czech Republic	513	Hungary	504
					Sweden	503
					<b>OECD avg.</b>	<b>500</b>
Not significantly different	Poland	498	Iceland	491	Spain	488
	Denmark	496	<b>United States</b>	<b>489</b>	Norway	487
	France	495	Slovak Republic	488	Luxembourg	486
Significantly lower	Italy	475	Greece	473	Mexico	410
	Portugal	474	Turkey	424		
Non-OECD-member jurisdiction and average score						
Significantly higher	Hong Kong-China	542	Estonia	531	Slovenia	519
	Chinese Taipei	532	Liechtenstein	522	Macao-China	511
Not significantly different	Croatia	493	Lithuania	488		
	Latvia	490	Russian Federation	479		
Significantly lower	Israel	454	Thailand	421	Brazil	390
	Chile	438	Romania	418	Columbia	388
	Serbia, Republic of	436	Montenegro,		Tunisia	386
	Bulgaria	434	Republic of	412	Azerbaijan	382
	Uruguay	428	Indonesia	393	Qatar	349
	Jordan	422	Argentina	391	Kyrgyz Republic	322

Source: Highlights From PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context, U.S. Department of Education National Center for Education and Statistics.



Source: Organization for Economic Cooperation and Development, Program for International Student Assessment (PISA) 2000, 2006.

**Math and reading performance of Connecticut fourth and eighth grade students.**

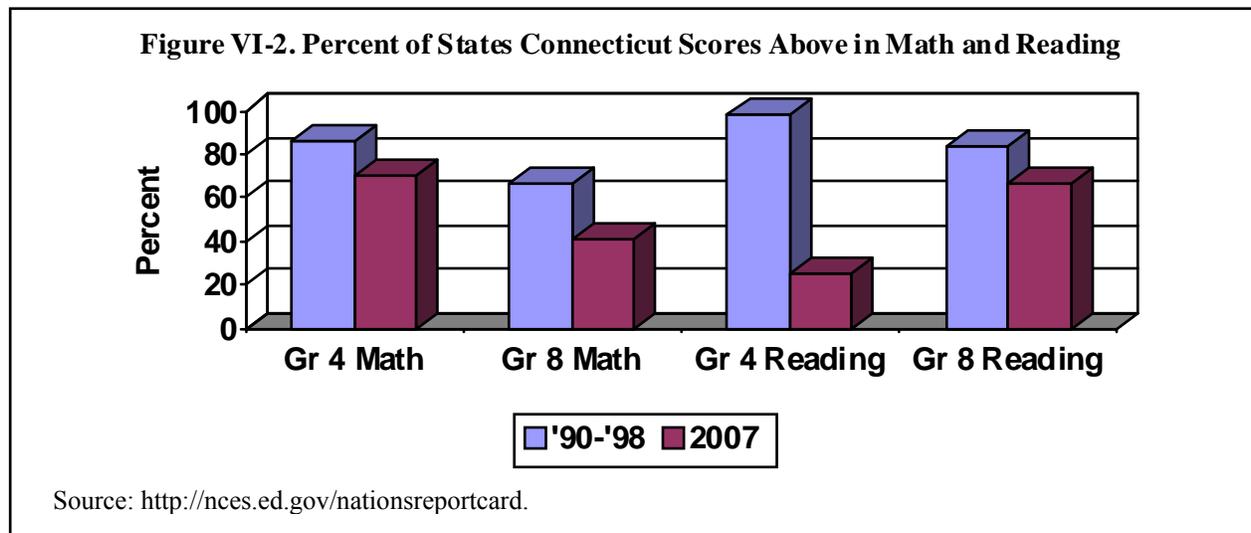
Leading up to student performance in secondary school, is student performance in primary school. The National Center for Education Statistics (NCES) is the primary federal entity that collects and analyzes data related to education. The Nation’s Report Card provides a common measure for assessing educational progress across various subjects (e.g., reading and math) over time. The most recent scores are from 2007, with Connecticut ranked as high as fifth nationally on fourth grade reading scores, to as low as 28th on eighth grade math scores. Massachusetts, Vermont, and New Hampshire consistently rank above Connecticut on the four reading and math indicators (Table VI-2).

**Table VI-2. State Ranking on Math and Reading Student Performance in 2007**

State	Fourth Grade		Eighth Grade	
	Reading	Math	Reading	Math
<b>Connecticut</b>	<b>5</b>	<b>16</b>	<b>14</b>	<b>28</b>
Massachusetts	1	1	1	1
Rhode Island	34	39	39	38
Vermont	4	6	2	4
New Hampshire	3	3	6	9
Maine	11	19	5	12

Source: 2007 National Assessment of Educational Progress (<http://nces.ed.gov/nationsreportcard/>)

Additionally, the performance of Connecticut’s students declined from the 1990s to 2007 compared to that of children in other states (Figure VI-2). Fourth grade reading scores were higher than all but one state in the 1990’s, but only higher than one-quarter of states by 2007. Part of this decline may be fueled by increasing demographic changes; Connecticut’s student population has percentages of students belonging to groups whose achievement has long lagged that of others.



**Preparedness of Connecticut low-income students for postsecondary education.** As noted in the Office of Workforce Competitiveness talent pipeline report, an increasing number of Connecticut youth will reside in urban, low income settings. Preparedness of these students to fill workforce needs requiring postsecondary education is questionable given statistics contained in the most recent 2007 Nation’s Report Card. A student’s eligibility for free or reduced-price school lunch is used as an indicator of lower income.

With the exception of Washington, D.C., Connecticut’s 2007 scores show the widest gap between higher- and lower-income students in the entire country (Table VI-3). This discrepancy has not changed over the past decade, and in the absence of strategies to address this issue, will most likely continue as urban, minority students become a larger percentage of the overall student population. There are also performance differences across gender and racial/ethnic groups on Scholastic Aptitude Tests, taken by older students who are considering postsecondary education.

**Table VI-3. State Ranking on Gap Between Higher- and Lower-Income Student Performance in 1996 and 2007**

State	Fourth Grade				Eighth Grade			
	Reading		Math		Reading		Math	
	1996	2007	1996 (N=44)	2007	1996	2007	1996 (N=41)	2007
<b>Connecticut</b>	<b>51</b>	<b>50</b>	<b>42</b>	<b>50</b>	<b>51</b>	<b>50</b>	<b>39</b>	<b>50</b>
Massachusetts	45	36	10	34	38	37	34	49
Rhode Island	34	40	28	38	43	47	27	44
Vermont	21	19	10	13	11	13	6	6
New Hampshire	13	15	-	4	5	6	-	13
Maine	6	7	5	7	1	1	5	3

Source: 1996 and 2007 National Assessment of Educational Progress  
<http://nces.ed.gov/nationsreportcard/>

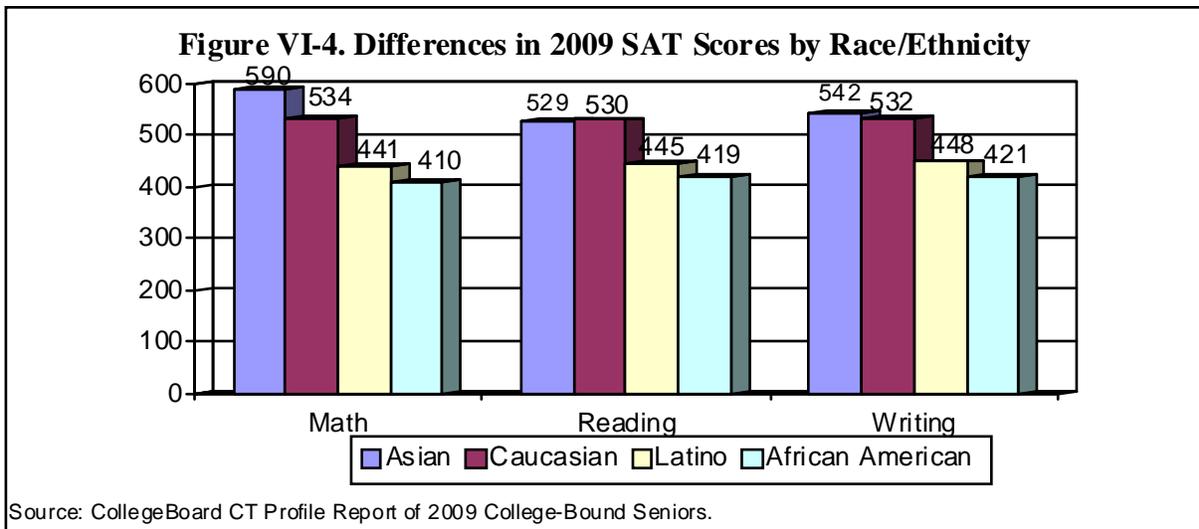
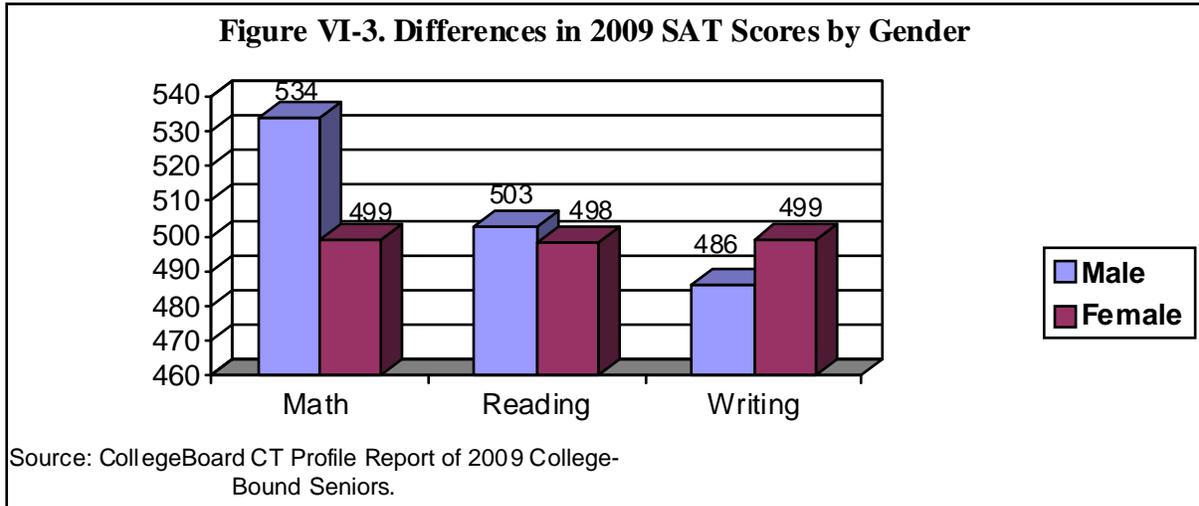
**Differences in Connecticut SAT scores and graduation rates by gender and race/ethnicity.** The College Board recently released the results of the Scholastic Aptitude Tests (SATs) for Connecticut’s 2009 college-bound seniors.<sup>22</sup> Overall, males score higher in math and reading, and females score higher in writing (Figure VI-3). Asian and Caucasian students score higher than Latino and African American students (Figure VI-4).

Despite their lower SAT scores, however, African-American women and Hispanic women were recently reported to have six-year college graduation rates (72% and 76%, respectively) close to the rate for white males (75%), while African-American men and Hispanic men had significantly lower graduation rates (59% and 66%, respectively).<sup>23</sup>

<sup>22</sup> On a scale from 200-800, the SAT assesses reasoning for college-bound students based on knowledge and skills in the areas of math, reading and writing.

<sup>23</sup> Bowen, W. G., Chingos, M. M., & McPherson, M. S. Crossing the Finish Line: Completing College at America’s Public Universities, Princeton University Press, 2009.

These discrepancies in performance may become even more problematic if predictions in the New England 2020 Report<sup>24</sup> come to fruition, where it is estimated that the increase in young minority workers in Connecticut and other southern New England states will account for almost 40 percent of all young workers by 2012, and 50 percent of all young workers by 2020. This lack of preparedness is borne out in the number of college freshmen required to take remedial level courses.



**Preparedness of college freshmen for college-level coursework.** In a national study of college freshmen by the U.S. Department of Education, National Center for Education Statistics,<sup>25</sup> the percent of students reporting their participation in remedial coursework varied by

<sup>24</sup> New England 2020: A Forecast of Educational Attainment and its Implications for the Workforce of New England States, June 2006, Commissioned by Nellie Mae Education Foundation.

<sup>25</sup> 2003/04 Beginning Postsecondary Students Longitudinal Study, First Follow-up.

type of institution. Table VI-4 shows the greatest percent of postsecondary students reporting taking remedial courses in their first year of college were attending public community colleges. Regardless of type of college, math appeared to be the subject most frequently reported as requiring remediation.

<b>Remedial Course</b>	<b>Public Community College</b>	<b>Public Four-Year College</b>	<b>Independent Four-Year College</b>
English	8.4%	5.2%	4.5%
Math	22.3%	13.9%	9.8%
Reading	10.0%	4.7%	3.8%
Study Skills	2.8%	1.9%	2.1%
Writing	9.6%	8.1%	7.3%
Any	28.6%	18.6%	15.2%

Source: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, First Follow-up.

Preparedness of entering students into the Connecticut community college system is assessed by a performance indicator based on the percentage of students who successfully complete course work in developmental mathematics. Table VI-5 shows the percent enrolled and percent passing basic mathematics skills developmental noncredit courses from the fall of 2000 through 2007. The most recent figures report approximately one in five community college students enroll in a remedial or developmental math course, and slightly more than half fail to pass the course. The community colleges have identified a performance improvement goal (to be achieved by 2011) of 60 percent of developmental math students passing the course.

Overall, approximately 25 percent of community college students are in developmental courses (including English and math) in any given semester. Of students who take the Accuplacer placement exam,<sup>26</sup> approximately 60-70 percent need remedial or developmental courses before completing their degrees.<sup>27</sup>

At the four Connecticut State Universities (CSUs), 62 percent of first-time, first year students were enrolled in a remedial or developmental math course in 2007.<sup>28,29</sup> The CSUs believe there is a need to reduce remedial and developmental course work by students entering the CSUS universities, and have prepared new minimum, more stringent high school coursework guidelines for first-time, first-year students seeking admission into a CSUS university by July 1,

<sup>26</sup> The Accuplacer placement test was developed by the College Board to determine the ability of entering students to be successful in college-level coursework, and whether one or more remedial courses are needed to improve their skills in reading, writing, or math.

<sup>27</sup> Personal Communication, Mary Anne Cox, Assistant Chancellor, Connecticut Community Colleges, September 3, 2009.

<sup>28</sup> CSUS STUDENT CHARACTERISTICS - Fall 2007, Personal Communication, Teresa Boyd Cowles, Strategic Planning, Market Research, Institutional Research, Connecticut State University System Office, August 19, 2009.

<sup>29</sup> Remedial courses are for students who have not demonstrated proficiency in the subject area (e.g., math, English) and the remedial courses are non-credit courses. Developmental courses are for students who have demonstrated partial readiness or proficiency; developmental courses are credit courses, but they do not apply to general education graduation requirements.

2015. Incoming students will need to have taken four years of mathematics and English and three years of science,<sup>30</sup> there are currently not similar requirements to graduate from Connecticut public high schools.

**Table VI-5. Percent of Connecticut Community College Students Enrolled in and Passing Developmental Math Course**

Year	# enrolled in community college	% enrolled in developmental math	% passing developmental math
2000	40,825	16%	51%
2001	42,642	17%	50%
2002	44,869	18%	55%
2003	45,160	19%	53%
2004	45,743	20%	50%
2005	46,227	19%	48%
2006	46,489	19%	48%
2007	48,434	19%	47%

Source: Connecticut State Department of Higher Education Report, Higher Education Counts: Achieving Results, 2006-2009.

## 2) Barriers Related to Postsecondary Education Institutions

Some of the barriers to alignment include the multiple goals of colleges and their conflicting viewpoints on whether they are preparing generalists or specialists. Further, community college graduation rates continue to remain lower than expected, despite a sizable percent of students hoping to attain their associate’s degrees.

**Multiple goals of postsecondary education.** One factor affecting workforce preparation by postsecondary education institutions is the multiple purposes served by colleges. Besides training recent high school graduates in occupations needed by Connecticut employers, community colleges, for example, provide support in skills upgrades for existing workers, and offer noncredit courses for personal growth and of interest to the community.

Beyond offering courses toward degrees, public four-year colleges such as Central Connecticut State University make efforts to engage the community in initiatives such as “green” promotion within cities and helping to end homelessness. As part of its mission, the University of Connecticut has a goal to promote research, including stem cell research. Additionally, students are viewed as the customers of postsecondary education institutions, and many colleges see part of their jobs as helping students find a fit with what *they* want to do, rather than meeting employer needs.

One independent institution representative commented that education at her college is “...about more than employment at the completion of four years. Rather, it is the development of the person, the mind, and the heart. Career development is a part of that process but it is not a means to an end.” The representative went on to note that focusing exclusively on post-

<sup>30</sup> BR# 09-17 Resolution concerning Admissions Policy for First Time First Year Students in the Connecticut State University System, March 12, 2009.

graduation employment would alter what a degree from her college is all about. This point leads to another potential barrier in the alignment of postsecondary education: the lack of consensus on whether postsecondary education institutions should prepare graduates for particular occupations, or produce critical thinkers with the flexibility to meet general workforce needs.

**Preparation of specialists vs. generalists by postsecondary education institutions.** An argument has been made that today's college graduates will experience five or more careers during their working lives, and what they train for today, may not apply to what they are doing five to seven years after graduation. Therefore, rather than specialize in a particular field or occupation, colleges should provide students with the ability to "think" and problem-solve in a variety of contexts.

On the other hand, some businesses have very specific needs they want filled that require students to focus on particular areas. Licensed occupations, such as nursing and pharmacy, for example, require students to follow prescribed curricula that will prepare them to perform certain tasks. Engineering students, while not required to be licensed, also must follow a given curriculum.

Some larger companies may be looking for generalist thinkers and problem-solvers, and then train new hires in-house for specific tasks. Indeed, the employers themselves may not be unified in whether they need specialists or generalists to meet their needs. Regardless, another potential barrier related to postsecondary education institutions is the lower than expected number of students earning college degrees or certificates available to fill the skilled jobs of the 21<sup>st</sup> century.

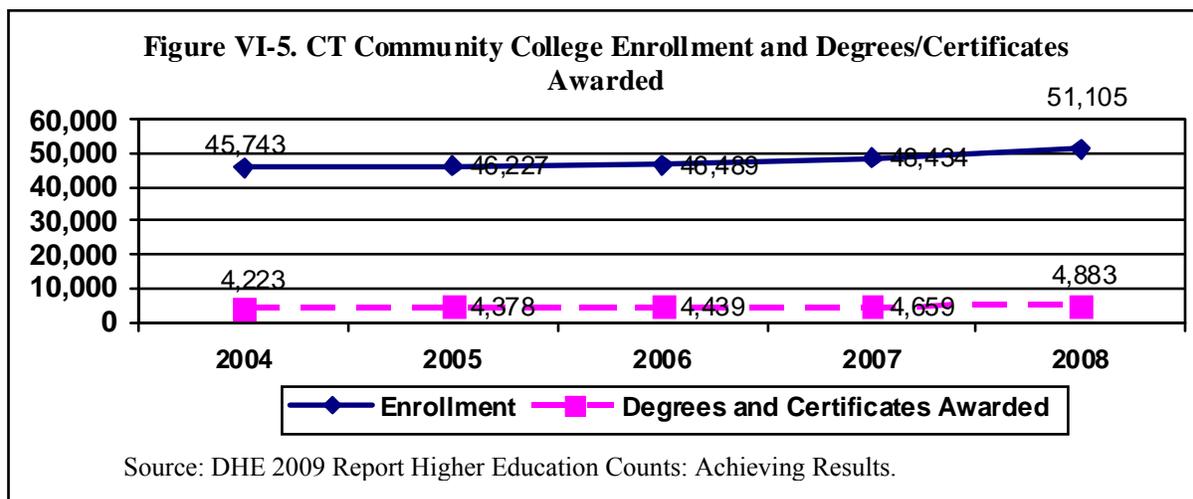
**Lower than expected production of postsecondary students earning certificates or associate's degrees.** The federal government mandates that the college graduation rate be defined as the percentage of first-year, full-time degree seeking students in a cohort who complete within a given time frame (three years for community colleges and six years for four-year colleges). Any transfer students from two-year colleges into four-year colleges are therefore excluded from the graduation rate calculation. Despite these limitations, in general, Connecticut compares favorably in graduating students with bachelor's degrees, but poorly in graduating students with associate's degrees (as well as advanced degrees beyond the bachelor's degree).

Figure VI-5 shows the number of students enrolled in public two-year colleges and the number of degrees and certificates awarded. Despite the increase in enrollment, the annual completion rate for degrees and certificates continues to remain below 10 percent. In a recently published book on college completion, the authors noted that policy makers need to pay more attention to graduation rates, and to the many kinds of waste that are involved when people begin but do not complete college.<sup>31</sup> Others have pointed out the community college emphasis on

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<sup>31</sup> Bowen, W. G., Chingos, M. M., & McPherson, M. S. *Crossing the Finish Line: Completing College at America's Public Universities*, Princeton University Press, 2009.

access rather than completion, and student lack of labor market and potential career ladder knowledge that would enforce the benefit of degree or certificate completion.<sup>32</sup>



In a national comparison, Connecticut — along with three other New England states — ranks in the bottom 20 percent in associate’s degree completion rates (Table VI-6). The 16.1 percent Connecticut rate is well below the 27.9 percent national average. On a more positive note, Connecticut ranks in the top 20 percent of all states in bachelor’s completion rate.

**Table VI-6. Graduation Rates and Ranking for Degrees Conferred in 2007**

State	3-Year Graduation Rates for Associate’s Students		6-Year Graduation Rates for Bachelor’s Students	
	Percent	Rank	Percent	Rank
<b>Connecticut</b>	<b>16.1%</b>	<b>43</b>	<b>63%</b>	<b>9</b>
Massachusetts	18.3%	41	68%	1
Rhode Island	14.5%	47	64.9%	4
Vermont	15.6%	44	63.7%	6
New Hampshire	31.7%	15	62.7%	11
Maine	28.9%	21	57.9%	19
National Average	27.9%	--	56.1%	--

Source: NCES, IPEDS Graduation Rate Survey.

This lower degree completion rate cannot be attributed to a smaller percentage of attendees having a goal of earning an associate’s degree. The results of the “Entering Student Survey” administered each fall to new and transfer students attending Connecticut community colleges further supports the notion that there is a lower than expected production of students earning associate’s degrees at the community colleges (Table VI-7). In the fall 2008 survey of Connecticut community college students, over half (55 percent) reported a primary goal of obtaining an associate’s degree. Obtaining a certificate is a goal for only a small portion of

<sup>32</sup> Grubb, W. N. (1996). Working in the Middle: Strengthening Education and Training for the Mid-Skilled Labor Force, San Francisco: Jossey-Bass Publishers.

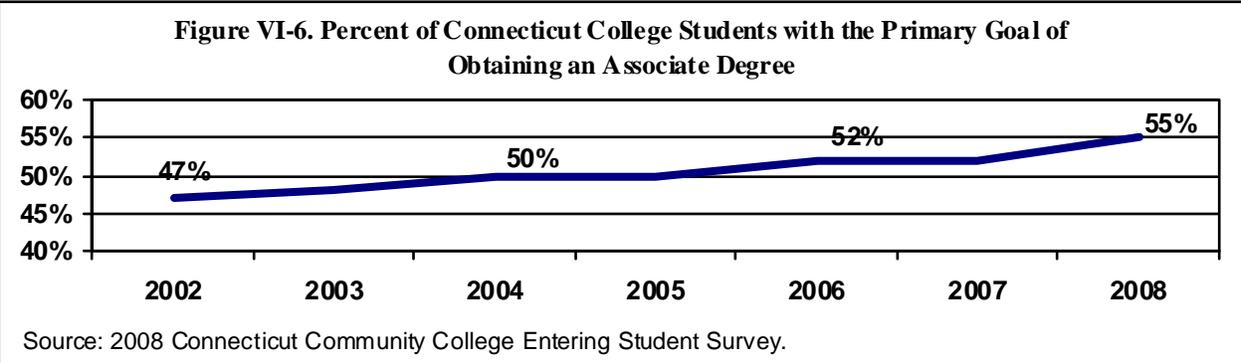
**Table VI-7. Primary Goal for Attending the Community College as Reported on the 2008 Entering Student Survey**

Primary Goal	Percent
Transfer with an associate’s degree	28%
Associate’s degree	27%
Fulfill another college’s requirements	11%
Certificate	6%
Transfer without an associate’s degree	6%
Job preparation/retraining course	4%
Unsure	5%
Personal development course(s)	2%
Missing/Other	11%

Source: 2008 Entering Student Survey  
<http://www.comnet.edu/planning/Research/SurveysStudies/EnteringStudentSurvey/ess.html>

entering students (6 percent). Other goals included in the missing/other category include a desire to improve English proficiency skills and for job promotion purposes.

The goal of obtaining an associate’s degree has been steadily increasing over the past few years (Figure VI-6). The percent with a goal of obtaining a certificate, however, has remained relatively steady, fluctuating between six to seven percent of community college students.



In acknowledgment of Connecticut’s lower associate’s degree completion rate, Special Act 07-9 requires the Chancellor of the community colleges to develop a plan to increase Connecticut community college graduation rates. The plan recommends innovative educational strategies including expanded student support services, professional development for faculty, financial aid strategies, and transfer incentives, many of which will require additional funding.

**3) Difficulty in Making Accurate Demand Projections**

Limited information is available on the accuracy of the DOL job demand projections. Connecticut DOL staff reported that they do not look back to determine whether previous projections made for future years were accurate in terms of the number of job openings that were available when that year arrived.

As part of this study, PRI staff assessed the accuracy of projections made in 1998 for the year 2008. Data were available from both the U.S. Bureau of Labor Statistics and Connecticut Department of Labor websites. Table VI-8 shows the accuracy of projections for occupational employment in Connecticut ranged from a less than one percent difference between actual and projected figures (e.g., pharmacists) to a difference of 50 percent or more (e.g., pharmacy technicians). Figure VI-7 shows that Connecticut projections were within 10 percent of actual estimates about one-third of the time (36 percent), similar to the accuracy of national projections.

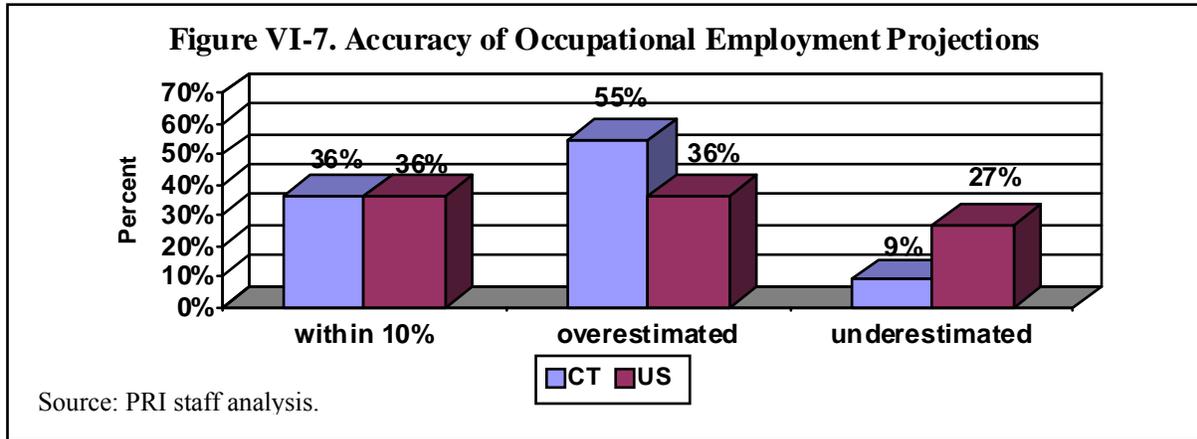
In its analysis, PRI staff found instances where the DOL projected number was greater than the actual number employed in a particular occupation. This may indicate that either DOL overestimated the number of workers that would be needed in that occupation or there is a shortage of workers in that particular field.

**Table VI-8. Accuracy of CT and US DOL Occupational Employment Projections 10 Years Out**

Occupation	# of Connecticut Employees in 2008			# of U.S. Employees in 2008 (in thousands)		
	As projected in 1998	Actual # in 2008 <sup>a</sup>	Accuracy	As projected in 1998	Actual # in 2008	Accuracy
Pharmacists	2,786	2,750	↓1%	199	266	↑34%
Registered Nurse	34,502	35,370	↑2%	2,530	2,543	<1%
Civil Engineers	3,156	3,040	↓4%	236	261	↑11%
Accountants and Auditors	19,325	17,330	↓10%	1,202	1,134	↓6%
Securities, Commodities, Financial Services Sales Agents	8,114	6,780	↓16%	427	272	↓36%
Licensed Practical and Vocational Nurses	9,601	7,940	↓17%	828	730	↓12%
Librarians	3,088	2,490	↓19%	159	151	↓5%
Actuaries	1,043	820	↓21%	17	18	↑6%
Automotive Service Technicians and Mechanics	12,270	8,160	↓33%	922	649	↓30%
Lawyers	14,500	8,090	↓44%	798	554	↓30%
Pharmacy Technicians	2,063	3,230	↑57%	126	324	↑157%

Source: Connecticut Occupational Employment Projections, 1998-2008 (CT DOL); and May 2008 State Occupational Employment and Wage Estimates for Connecticut (U.S. Bureau of Labor Statistics).

<sup>a</sup>The actual number employed does not take into account vacancies. A 2004 survey of CT employers (*Connecticut Job Vacancy Survey*, Spring 2005, CT DOL) highlighted a sizeable number of shortages for registered nurses (1,677), accountants and auditors (809), secondary school teachers (319), and licensed practical and vocational nurses (305).



In general, the ability to forecast 10 years out the types of jobs that will be available in the future is limited. For example, Connecticut's economy was projected to generate over 171,000 new jobs during the 1998-2008 period, for an estimated 1.9 million employment total in 2008.<sup>33</sup> The U.S. Bureau of Labor Statistics, however, estimated the actual number of jobs in Connecticut in May 2008 to be 68,696 fewer compared with 1998 (1.7 million). Projections shorter than ten years away, however, may be more accurate.

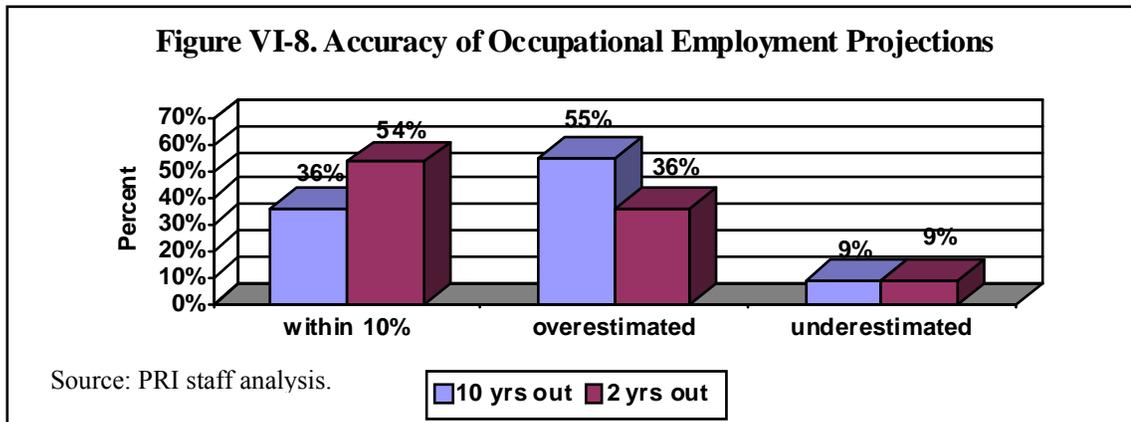
**Short-range projections.** There are shorter range occupational employment projections made by Connecticut DOL that are more accurate and may be more useful (Table VI-9), especially if the state were to adopt a policy of implementing short-term postsecondary education programs to quickly provide students with skills needed by employers. Projections two years into the future, for example, were accurate to within 10 percent approximately half the time (Figure VI-8). There are other challenges in predicting future employer needs such as changes to the projection methodology.

**Table VI-9. Accuracy of CT DOL Occupational Employment Projections Two Years Out for 2007**

Occupation	As projected in 2005	Actual # in 2007	Accuracy
Pharmacists	2,940	2,820	↓4%
Registered Nurse	33,550	34,690	↑3%
Civil Engineers	3,060	3,250	↑6%
Accountants and Auditors	21,290	18,490	↓15%
Securities, Commodities, Financial Services Sales Agents	7,810	6,390	↓22%
Licensed Practical and Vocational Nurses	7,540	7,930	↑5%
Librarians	2,500	2,490	<1%
Actuaries	900	880	↓2%
Automotive Service Technicians and Mechanics	10,850	8,300	↓31%
Lawyers	10,890	7,730	↓41%
Pharmacy Technicians	2,720	3,120	↑13%

Source: Connecticut's Industries and Occupations Forecast 2007, published January 2005 (CT DOL); and May 2007 State Occupational Employment and Wage Estimates for Connecticut (U.S. Bureau of Labor Statistics).

<sup>33</sup> Soaring to New Heights: Connecticut Job Outlook 1998-2008, CT DOL.



**Changing methodology.** One challenge in projecting future employer needs is that the methodology required for such calculations has been modified by the U.S. government several times. One change was in the occupational classification system where, prior to 1999, for example, there was just one category for “computer programmers.” In 1999, a change was made to include several computer-related occupations, such as systems software engineers and application software engineers, which may have been reported as computer programmers in the past.

In 2002, another change was made, this time in the survey reference period. Instead of October, November and December, employers were asked about May and November in an effort to reduce seasonal influences. The federal government is considering additional changes to the methodology that would make the data more suitable to comparisons over time; however, the U.S. Bureau of Labor Statistics reports on their website that such changes are still in the early stages of discussion. Beyond the changes in methodology made by the federal government, there are others projecting employer needs.

**Multiple sources for projections.** Another challenge is that there are multiple sources for projections of future employer needs. Beyond the official Connecticut Department of Labor projections, other state agencies such as the Office of Workforce Competitiveness and Department of Economic and Community Development also produce reports suggesting where future job growth in Connecticut may lie.

More local projections are made by businesses via advisory committees affiliated with public colleges and universities. As described in Section II, statewide associations such as CBIA and CHA also develop projections based on membership surveys of workforce needs, underscoring the different methodologies used to project future employer needs.

**Different methodologies.** Also challenging are the multiple methodologies for determining which occupations are in greatest demand. The Connecticut DOL Labor Market Information website, for example, has different views for looking at occupations in demand including: fastest growing (based on percent increase from two time periods); largest job growth; and most openings. For example, Table VI-10 shows the 10 occupations requiring postsecondary education with the highest growth rate. As the table shows, the projected number of annual

openings can be as few as 16 openings annually (for Airline Pilots, Copilots, and Flight Engineers). Regardless of methodology used, another issue is lack of awareness of the projections.

<b>Occupation</b>	<b>Growth Rate</b>	<b>Annual Openings</b>
Commercial Pilots	50.6%	20
Network Systems and Data Communications Analysts	43.7%	200
Veterinary Technologists and Technicians	41.3%	75
Airline Pilots, Copilots, and Flight Engineers	40.6%	16
Computer Software Engineers, Applications	36.4%	356
Substance Abuse and Behavioral Disorder Counselors	35.5%	67
Radiation Therapists	33.0%	38
Veterinarians	31.2%	54
Mental Health Counselors	29.0%	98
Financial Analysts	28.1%	218

Source: Labor Market Information from the Office of Research, CT DOL, "Top Occupations Requiring Postsecondary Education by Growth Rate" (2006-2016).

**Lack of awareness of projections.** Beyond the challenges associated with the projections themselves, there may also be a lack of awareness of these projections. Overall, the Connecticut DOL makes projections and other career-related information and planning tools available on their web site, but does not proactively notify other state agencies, colleges or members of the public. The Connecticut DOL does mass mailings of certain publications, such as "Connecticut Career Paths," to high schools in the state. This publication contains information about various occupations, job outlook, wages, education and training routes, and educational and employment resources available.

There is also a wealth of information contained on the Connecticut DOL website; however, it requires initiative and awareness that such information exists in order to seek it out. There were instances where State Department of Education staff, for example, reported they were unaware of the occupational projections pertaining to teacher openings made by DOL, and there was no consistent use of this information by the colleges and universities in guiding students. Awareness of the projections, however, does not necessarily lead to *use* of the projections in decision making by college administrators, faculty and students.

**Responsiveness to projections.** Finally, while some may be aware of the occupational projections made by Connecticut DOL, it is unclear how that information is factored into subsequent decision making, both by postsecondary institutions and students. At best, the projections may be one small piece of data considered by the institution when determining which program degrees and certificates to offer.

#### **4) Current Economic Challenges**

A significant factor impacting the jobs projections both at the state and national level are current economic conditions, such as the recent recession. The Connecticut DOL reported a 3.4 percent decline in nonfarm employment between March 2008 and March 2009.<sup>34</sup> During the same period, there was an unemployment increase to 7.5 percent, a level not experienced since May 1992. Employment in nearly all industry sectors in Connecticut declined from July 2008 to July 2009, especially for construction (-22 percent), manufacturing (-8 percent), and professional and business services (-8 percent). This shrinkage in job supply was not foreseen when the most recent 10-year employment demand projections were made.

The current economic challenges may also be impacting college enrollment and decisions of high school students to attend in-state or out-of-state, and to begin postsecondary education at the less-expensive community college versus the four-year state university. The state retirement incentive program may also impact the turnover in faculty at technical high schools, community colleges, state colleges and the University of Connecticut. On the other hand, there are federal initiatives that may come to fruition, promoting attendance at community colleges.

In addition to federal initiatives, questions have been raised as to whether Connecticut is experiencing a “brain drain.” A review of migratory patterns of college-educated residents sheds light on whether Connecticut is losing its educated workforce.

#### **Review of Migratory Patterns of College-Educated Residents**

A recent study on preparing a quality workforce<sup>35</sup> described the issue of “brain-drain,” the loss of many of the best and brightest Connecticut high school students (as measured by performance on the 10th grade CAPT test) to the state’s future labor market. One cause of brain-drain is attendance at an out-of-state college. As evidence of the brain-drain, the report found that in 2002, for example, nearly half (48 percent) of the best and brightest Connecticut students began their freshmen years in out-of-state colleges, and only 20 percent of those students returned to work in Connecticut following graduation. There is also a more general concern that too many of Connecticut’s students are heading out of state to attend college.

However, Table VI-11 shows that, overall, there has been a slight increase during the past decade of students choosing to remain in Connecticut for their education at a four-year college. Of the other New England states, Rhode Island and Maine also showed an increase in percent of freshmen attending college in-state. The New England figures, however, contrast markedly with the national statistics, showing 74-75 percent of freshmen enrolling in-state during 1996 and 2006.

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<sup>34</sup> September 2009 Connecticut Economic Digest, Vol. 14, No. 9, A joint publication of the CT DOL and the CT Department of Economic and Community Development.

<sup>35</sup>Next Steps: Preparing a Quality Workforce, by Stephen Coelen, Sevinc Rende, and Doug Fulton, Department of Economics and CT Center for Economic Analysis, University of Connecticut, April 2008.

State	Number/Percent of State's Freshmen Attending In-State College			
	Fall 1996		Fall 2006	
	Number	Percent	Number	Percent
Connecticut	6,623	39.6%	9,453	41.2%
Vermont	1,461	47.2%	1,654	41.8%
New Hampshire	2,527	44.7%	3,316	41.8%
Rhode Island	2,160	48.5%	2,973	54.2%
Maine	3,288	51.1%	4,506	57.9%
Massachusetts	19,542	62.0%	23,915	58.8%

Source: The Condition of Education 2008: Indicator 10 Mobility of College Students (U.S. Department of Education Institute of Education Sciences)

**Increasing percent of Connecticut residents attending college in-state.** Recent figures on where Connecticut high school graduates attend college show an even greater percent choosing to attend college in-state (Figure VI-9). In PRI staff interviews held with Connecticut community college and state university personnel, applications had reportedly soared for the 2009-2010 academic year, and increases in enrollment were anticipated.

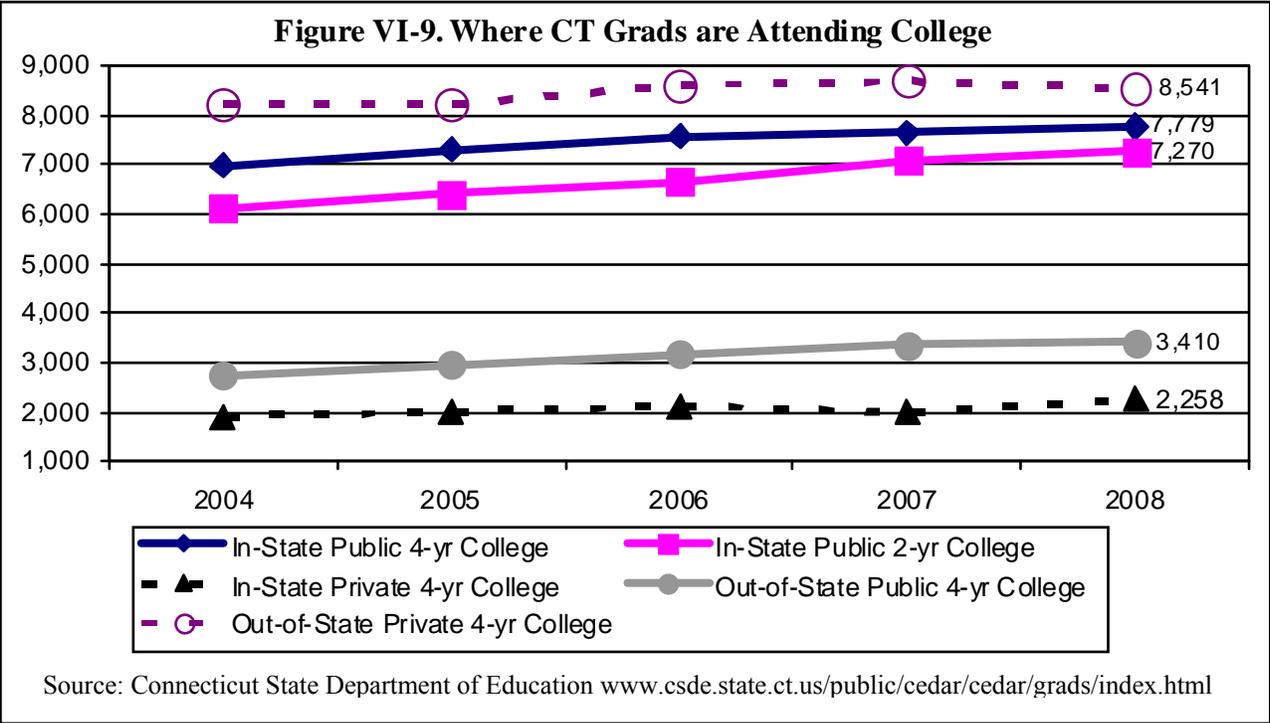
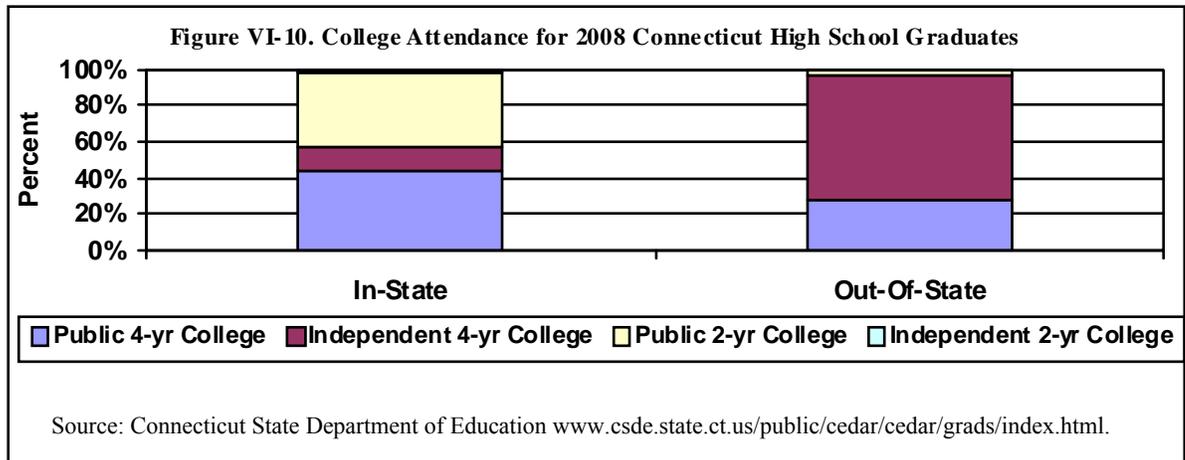


Figure VI-10 shows the majority of 2008 Connecticut high school graduates planning to attend college *in-state* choose *public* colleges, while the majority planning to attend college *out-of-state* select *independent* colleges.



**Migration of citizens with some college or associate’s degrees into and out of Connecticut.** Overall, the six New England states averaged a very slight annual loss (-0.20 percent) in the number of residents with some college or an associate’s degree. This slight loss was driven primarily by Massachusetts and Connecticut, because they are the most populous New England states. Table VI-12 shows the number of persons with some college or associate’s degree who migrated into and out of Connecticut and the other New England states.

State	Residents 25 years and over with Some College or Assoc. Degree			
	Migrating Into State	Migrating Out of State	% Change (net migration)	Total Residents with some college or Assoc. degree
Rhode Island	3,658	5,034	-0.81%	170,528 (24.0%)
Massachusetts	16,617	21,286	-0.47%	998,320 (22.9%)
<b>Connecticut</b>	<b>12,178</b>	<b>13,062</b>	<b>-0.16%</b>	<b>562,383 (23.9%)</b>
Vermont	3,374	3,142	0.22%	104,438 (24.6%)
New Hampshire	7,797	7,246	0.23%	241,920 (27.2%)
Maine	7,026	5,661	0.56%	243,585 (26.5%)

Source: U.S. Census Bureau 2005-2007 American Community Survey 3-Year Estimates.

**Migration of Bachelor-Degreed Persons into and Out of Connecticut.** Combined, the six New England states averaged a slight annual increase (+0.29 percent). All six states netted an increase in the number of people with at least bachelor’s degrees moving into the state than leaving the state. As shown earlier in Section I (Table I-2), Connecticut ranks fifth in percent of heads of households with at least four years of college (2005-2007).

The U.S. Census also collects information on annual net migration rate for each state, including the proportion with at least four years of college. Table VI-13 shows the number of persons with at least a bachelor’s degree who migrated into and out of Connecticut and the other New England states. Given more people with bachelor degrees are moving into Connecticut than

out of Connecticut, and increasingly more Connecticut high school graduates are choosing to attend college in-state, there is a question about the extent of a “brain-drain” in Connecticut.

State	Residents 25 years and over with at Least Bachelor’s Degrees			
	Migrating Into State	Migrating Out of State	% Change (net migration)	Total Residents with at Least Bachelor’s Degree
Massachusetts	56,276	55,007	0.08%	1,614,605 (37.0%)
Rhode Island	9,187	8,661	0.25%	209,264 (29.4%)
<b>Connecticut</b>	<b>29,877</b>	<b>26,904</b>	<b>0.37%</b>	<b>804,909 (34.3%)</b>
New Hampshire	12,902	11,468	0.51%	282,433 (31.8%)
Vermont	7,253	6,358	0.64%	139,002 (32.7%)
Maine	9,878	7,495	1.0%	237,934 (25.9%)

Source: U.S. Census Bureau 2005-2007 American Community Survey 3-Year Estimates.

### 5) Barriers Related to State Agency Organization, Programs, and Policies

As discussed in Sections IV, Connecticut’s system for public higher education is very *decentralized*. Consequently, decisions are often made from the bottom-up - at the individual college or constituent unit level - rather than in a centralized manner that makes strategies uniform across all colleges. An example of this is in a college’s decision to offer a new for-credit academic program of study. Although a new program must ultimately be approved by the Board of Governors of Higher Education, it is the college that brings the idea forward, rather than BGHE suggesting what programs should be offered by which colleges or in what geographic locations. The pros and cons of this decentralized approach will be explored during the next phase of the study.

Another potential organizational barrier is that separate boards of trustees (for UConn, CSUs, CCs, and Charter Oak) rather than BGHE make budgetary allocation decisions once funds have been appropriated by the legislature. This gives those boards of trustees ultimate authority over a wide range of decisions. Thus, *BGHE* has little real authority so its primary focus is on providing coordination and assistance to the constituent units when requested. Committee staff intend to further explore the role of BGHE and its authority, as it relates to the study scope.

Also, colleges are funded according to enrollment figures rather than outcomes, such as degree and certification completion rates. With little budgetary focus on outcomes, the completion rates, particularly within the community college system, are quite low. Further, a policy of adding or dropping college programs based on enrollment figures rather than employer needs, makes the alignment of postsecondary education and employer needs challenging.

Another potential barrier is the *high level of coordination needed* across the multiple boards and state agencies that have a variety of responsibilities. For example, in order to create a talent pipeline - as endorsed by the governor, CETC, and OWC - inadequate student performance needs to be addressed at a much younger age, before students actually enroll in college. Studies have found that college graduation rates for students who need remedial education are poor.

Although the P-20 Commission was constituted to address this issue, in addition to many broader issues, and there have been successful programs implemented to bridge the gap between expectations of college-level coursework and high school curricula, the level of coordination that needs to be fostered among the two boards and the two departments is high. Furthermore, in a survey given to P-20 Commission members in April, 2009, members were asked to rank the “current level of trust” among the various groups represented on the commission on a scale of 1 to 10. Survey results show that members gave the current level of trust a ranking of “5,” with a 9.4 ranking of how important it is to have trust. Committee staff will examine whether the P-20 Commission is an adequate vehicle to address coordination, and if so, whether it should be codified in statute and its charge expanded.

A fourth potential barrier is the lack of program funding for state agency initiatives to help align postsecondary education and employment. Committee staff presented information in Sections IV and V on statutory programs that sought to address workforce shortages by providing loan incentives or contained loan forgiveness provisions. As the sections describe, many of these programs were “within available appropriation,” or pilot programs that never were institutionalized so that funding was discontinued, even if they had been successful. Committee staff will examine the success of these programs, particularly in the “drill down” areas, to determine their impact.

Finally, higher education is increasingly being asked to provide non-academic support services to students, particularly within the community college system. However, as a postsecondary education institution, the focus has been on educating students and providing academic supports where needed. Some individuals interviewed by committee staff indicated that there needs to be a shift in the types of supports the state is willing to provide to students to help them stay in college. Evidence suggests that students, particularly at the community college level, have more social service needs, because they are often older, part-time, commuters, and have additional work and family responsibilities. For example, the availability of day care could have a major effect on retention rates. Whether resources need to be shifted in order to address some of these “non-traditional” needs in an academic setting will also be examined further.



## **APPENDICES**



## Appendix A

### Connecticut’s Emerging Occupations

Beyond the occupations identified by CT DOL as in high demand, workers will be needed for new occupations linked to the technologically advanced, global economy of the 21<sup>st</sup> century. The following provides an overview of some of the most frequently mentioned emerging jobs of the 21<sup>st</sup> century.

**Green collar jobs.** One of the challenges in this emerging field is the difficulty in defining exactly what constitutes a “green” job. Nicholas Jolly, of the CT DOL noted that green encompasses many areas of the economy and which occupations are considered “green” vary from day to day. He said the greatest numbers of green jobs in Connecticut were currently in waste management and remediation, and the most lucrative jobs were in hydroelectric power generation.<sup>36</sup> The Institute for Sustainable Energy at Eastern Connecticut State University identified green-collar jobs as “jobs that preserve, restore, or improve the environment” and “jobs that help save energy, advance new energy efficient technologies, and foster a more sustainable regional and national energy system.”<sup>37</sup>

Impact of the American Recovery and Reinvestment Plan on green collar jobs. Table I-8 shows a sample of jobs projected to be created from the federal American Recovery and Reinvestment Plan.

Strategy	Sample Jobs
Building Retrofitting	Electricians, Heating/Air Conditioning Installers, Carpenters, Construction Equipment Operators, Roofers, Insulation Workers, Carpenter Helpers, Industrial Truck Drivers, Construction Managers, Building Inspectors
Mass Transit/Freight Rail	Civil Engineers, Rail Track Layers, Electricians, Welders, Metal Fabricators, Engine Assemblers, Bus Drivers, Dispatchers, Locomotive Engineers, Railroad Conductors
Smart Grid	Computer Software Engineers, Electrical Engineers, Electrical Equipment Assemblers, Electrical Equipment Technicians, Machinists, Team Assemblers, Construction Laborers, Operating Engineers, Electrical Power Line

<sup>36</sup> Quoted in March 2, 2009 Hartford Courant article, “Green-collar Jobs’: Two Rell Directives Would Create Environmentally Oriented Projects.”

<sup>37</sup> Distributed by the Institute for Sustainable Energy at the Hartford, New Haven and Fairfield County Federal Recovery Act Program--April 13, 14, and 17, 2009.

The Institute for Sustainable Energy was established in 2001 to identify, develop, and implement the means for achieving a sustainable energy future for Connecticut. The institute focuses on matters relating to energy education, energy policy, energy efficiency, renewable energy, protection of environmental resources, and the dissemination of useful information on alternatives and sustainability to users and providers of energy.

	Installers and Repairers
Wind Power	Environmental Engineers, Iron and Steel Workers, Millwrights, Sheet Metal Workers, Machinists, Electrical Equipment Assemblers, Construction Equipment Operators, Industrial Truck Drivers, Industrial Production Managers, First-Line Production Supervisors
Solar Power	Electrical Engineers, Electricians, Industrial Machinery Mechanics, Welders, Metal Fabricators, Electrical Equipment Assemblers, Construction Equipment Operators, Installation Helpers, Laborers, Construction Managers
Advanced Biofuels	Chemical Engineers, Chemists, Chemical Equipment Operators, Chemical Technicians, Mixing and Blending Machine Operators, Agriculture Workers, Industrial Truck Drivers, Farm Product Purchasers, Agricultural and Forestry Supervisors, Agricultural Inspectors
Source: Christina Romer and Jared Bernstein, "Green Recovery," January 9, 2009.	

Governor Rell recently issued Executive Order No. 23, which stabled a blueprint for green collar job creation. Green collar jobs typically include both white and blue collar jobs in environmentally friendly businesses. Professions considered green collar jobs include engineers, architects, and chemists. Blue collar occupations included as part of green collar jobs include plumbers, HVAC technicians, electricians, auto mechanics, energy-efficient appliance installers, manufacturers, landscapers, and builders. Table I-6 shows emerging occupations in the green collar field identified the Eastern Connecticut State University Institute for Sustainable Energy.<sup>38</sup>

<b>Table I-6. Emerging Occupations in the Green Collar Field</b>	
• Power Purchaser & Carbon Trader	• CHP installers and operators
• Renewable energy site assessor	• Ice storage Technician
• Geothermal assessment specialist	• Biofuel Processing Technician
• Tradesmen and Supervisors for energy efficiency construction	• Fuel Cell Technician
• Renewable energy systems installer	• Sustainability Coordinator
• Building automation specialist	• Advanced Transportation Systems technician
Source: Presentation by William Leahy, Director of the Institute for Sustainable Energy at Eastern Connecticut State University, "Preparing Connecticut's Workforce for Green Collar Jobs," EPA Technical Forum, February 24, 2009.	

Applications of green collar technologies range from weatherization and retrofitting existing buildings to make them more energy efficient, to renewable energy systems such as solar, photovoltaic, solar thermal, geothermal, and wind.

<sup>38</sup> Presented by William Leahy, Director of the Institute for Sustainable Energy at Eastern Connecticut State University, Preparing Connecticut's Workforce for Green Collar Jobs, EPA Technical Forum, February 24, 2009.

Postsecondary education required. Green collar jobs require a range of education and training levels. Research opportunities and business applications and public policy in the green collar workforce require a four-year bachelor's degree or graduate degree in business, engineering, and the sciences. As shown in Table I-6, jobs requiring bachelor's or higher degrees include: energy accountants and analysts, power purchasers and carbon traders; energy policy specialists and business entrepreneurs; energy efficiency application specialists and program administrators; renewable energy application specialists, including geothermal and fuel cells; business, campus and community sustainability coordinators; and researchers for future energy solutions such as fuel cells, biofuels and other renewable energy technologies.

On the other hand, the high-tech technicians will most likely receive preparation for these positions from the community college technical certification and associate degree programs pertaining to the construction and manufacturing industries, building operations, alternative fuel transportation and the installation of alternate energy systems. As shown in Table I-6, jobs requiring a community college certificate or associate degree include: green building construction managers; building operations and automation specialist; advanced transportation systems technician; supervisors and mechanical engineers in green manufacturing; renewable energy systems site assessor and application specialist; and commercial and government building energy auditors.

**Nanotechnology jobs.** The National Science Foundation anticipates a worldwide need of 2 million workers in this field by the year 2015 (with 0.8-0.9 million in the U.S.), a sizeable increase from the current 20,000 employed in nanotechnology worldwide. Nanotechnology is the use of scientific and engineering principles to develop and manipulate extremely small matter (one sheet of paper is approximately 100,000 nanometers thick). Application of nanotechnology range from use in commercial products and processes such as reduction of energy use and waste products in the manufacture of chemicals, eyeglasses coating to reduce scratches and make them easier to keep clean, and to fill holes in bones after removing a bone tumor. Future uses include: nanotechnology-based medicines to deliver toxic drugs directly to tumors, while minimizing damage to healthy tissue; improvements to MRIs, CAT scans and other medical imaging tools; and purification of drinking water and detection and clean up of environmental waste and damage.<sup>39</sup>

Postsecondary education required. Nanotechnology jobs include nanotechnology researchers, technicians, manufacturing engineers, and production workers. Many of the jobs will require a minimum of a bachelor's degree in electrical, mechanical, or chemical engineering; however, other potential fields of study include the physical sciences (e.g., biology, chemistry, and physics), medicine, law, and business. The education level is expected to range from technical programs and associate degrees up to masters and doctorate degrees.<sup>40</sup>

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<sup>39</sup> National Nanotechnology Initiative website at [www.nano.gov](http://www.nano.gov).

<sup>40</sup> National Nanotechnology Infrastructure Network website at [www.nnin.org](http://www.nnin.org).

**APPENDIX B**  
**CT DOL OCCUPATIONAL EMPLOYMENT AND WAGES**  
**Methodology**

***SCOPE***

The Occupational Employment Statistics (OES) survey is a semiannual mail survey measuring occupational employment and wage rates for wage and salary workers in nonfarm establishments. In November 2002, the OES survey changed from an annual survey of 7,000 establishments to a semiannual survey of 3,500 establishments. The OES survey samples and contacts establishments in May and November of each year and, over 3 years, contacts approximately 21,000 establishments. The full three-year sample allows the production of estimates at fine levels of geographic, industrial, and occupational detail.

The OES survey covers all full-time and part-time wage and salary workers in nonfarm industries. The survey does not include the self-employed, owners and partners in unincorporated firms, household workers, or unpaid family workers.

In 1999, the OES survey began using the Office of Management and Budget's occupational classification system, the Standard Occupational Classification system (SOC). The OES survey categorizes workers in one of about 800 detailed occupations. Together, these detailed occupations comprise 22 major occupational groups. The major groups of the SOC system are as follows:

- □ Management occupations
- Business and financial operations occupations
- Computer and mathematical occupations
- Architecture and engineering occupations
- Life, physical, and social science occupations
- Community and social services occupations
- Legal occupations
- Education, training, and library occupations
- Arts, design, entertainment, sports, and media occupations
- Healthcare practitioners and technical occupations
- Healthcare support occupations
- Protective service occupations
- Food preparation and serving related occupations
- Building and grounds cleaning and maintenance occupations
- Personal care and service occupations
- Sales and related occupations
- Office and administrative support occupations
- Farming, fishing, and forestry occupations
- Construction, and extraction occupations
- Installation, maintenance, and repair occupations
- Production occupations
- Transportation and material moving occupations
- Military specific occupations (not surveyed in OES)

## ***RESPONSE***

The statewide response rate for the May 2007 survey was 77 percent for establishments, covering 73 percent of weighted employment.

## ***CONCEPTS***

Data were collected primarily by mail. Survey schedules were initially mailed out to most of the sample establishments while personal visits were made to some of the larger companies. Two additional mailings were sent to nonrespondents at approximately three-week intervals. Telephone follow-ups and, in some cases, personal visit follow-ups were made for those nonrespondents considered critical to the survey due to their size.

Employment is the estimate of total wage and salary employment in an occupation across the industries in which it was reported. The OES survey form sent to an establishment contains between 50 and 225 SOC occupations selected on the basis of the industry classification and size class of the sampled establishments. Each survey form is structured to allow a respondent to provide information for each detailed occupation employed at the establishment; that is, unlisted occupations can be added to the survey form.

Wages for the OES survey are straight-time, gross pay, exclusive of premium pay. Base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay including commissions and production bonuses, tips, and on-call pay are included. Excluded are back pay, jury duty pay, overtime pay, severance pay, shift differentials, nonproduction bonuses, employer cost of supplementary benefits, and tuition reimbursements.

Each industry-specific questionnaire contained a grid of occupational titles, grouped by occupational division, with twelve wage ranges and a total column. Employers were asked to indicate the number of workers they employed in each wage range by occupation. Workers performing the functions of more than one occupation were to be classified in the occupation with the highest level of skill; or, if there was no measurable difference in skill requirements, workers were to be classified in the occupation in which they spent most of their time.

The wage intervals are defined both as hourly rates and the corresponding annual rates, where the annual rates are constructed by multiplying the hourly wage rate for the interval by the typical work year of 2,080 hours. In reporting, the respondent can reference either the hourly or the annual rate, but is instructed to report the hourly rate for part-time workers. Wage interval endpoints are determined by using the wage rate data collected by the Bureau of Labor Statistics' National Compensation Survey (NCS). In the case of the open-ended lower interval (Range A), Connecticut's 2007 minimum wage of \$7.65 was used as the interval's starting point.

Range	Hourly	Annual
A	Under \$7.50	Under \$15,600
B	\$7.50 - \$9.49	\$15,600 - \$19,759
C	\$9.50 - \$11.99	\$19,760 - \$24,959
D	\$12.00 - \$15.24	\$24,960 - \$31,719
E	\$15.25 - \$19.24	\$31,720 - \$40,039
F	\$19.25 - \$24.49	\$40,040 - \$50,959
G	\$24.50 - \$30.99	\$50,960 - \$64,479
H	\$31.00 - \$39.24	\$64,480 - \$81,639
I	\$39.25 - \$49.74	\$81,640 - \$103,479
J	\$49.75 - \$63.24	\$103,480 - \$131,559
K	\$63.25 - \$79.99	\$131,560 - \$166,399
L	\$80.00 and over	\$166,400 and over

Because OES wage data are collected into 12 contiguous, nonoverlapping wage intervals, the individual wage rates of the workers are not captured. A mean wage value is calculated for each wage interval based on occupational wage data collected by the Office of Compensation and Working Conditions for the National Compensation Survey (NCS).

### ***STATE DATA***

Data are collected for the universe of state government agencies, rather than a sample of employment. State government operations are surveyed every year, with the data collected and processed with the rest of the survey responses.

### ***ESTIMATION METHODOLOGY***

Beginning with the fourth quarter of 2002, the OES survey samples approximately 3,500 establishments semiannually in two panels. One panel is sampled in the second quarter, the other in the fourth quarter. Approximately 21,000 establishments are sampled over a six-panel cycle. While estimates can be made from a single panel or a single year of data, the OES survey is designed to produce estimates at a desired level of precision using six panels. A six-panel sample allows the production of estimates at fine levels of geographical, industrial, and occupational detail. For the May 2007 OES survey, estimates are based on data collected from establishments in May 2007, November 2006, May 2006, November 2005, May 2005 and November 2004.

Combining multiple years of data has statistical advantages. Significant reductions in sampling error can be achieved by taking advantage of a full three years of data, which covers over 70 percent of the employment in Connecticut. While there are significant advantages, the limitation associated with this estimation procedure is that it requires "wage-updating" for the earlier years of data. For "wage-updating" purposes, the OES program has been using the Bureau of Labor Statistic's Employment Cost Index (ECI) to update wage rate data from previous panels before combining them with the current panel. The wage updating process assumes that: (1) each occupation's wage rate, as

measured in earlier panels, shifts across time at the same pace as the broader occupational division that encompasses it and (2) geography and industry are not major factors in the wage updating process. The Bureau has conducted research over the past several years on the accuracy of updating wage rates using the ECI. In this research, the ECI wage-updating approach was compared to alternative modeling approaches. Current research results support the continued use of ECI wage-updating.

In addition, a "nearest neighbor" hot deck imputation procedure was used to impute occupational employment totals for establishments that reported no employment data. For establishments that reported or imputed occupational employment totals but did not report an employment distribution across the wage intervals, a variation of mean imputation was used to impute the distribution. During estimates processing, OES employment estimates are benchmarked to the mean of employment totals extracted from the Bureau of Labor Statistic's November 2006 and May 2007 Quarterly Micro Files.

### ***RELIABILITY OF ESTIMATES***

Estimates calculated from a sample survey are subject to two types of error: sampling and nonsampling.

Sampling error occurs when estimates are calculated from a subset of the population (i.e., a sample) instead of the full population. When a subset of the population is sampled, it is very likely that the sample estimate of the characteristic of interest will differ from the population value of that characteristic. Differences between the sample estimate and the population value will vary depending on the sample selected. This variability can be estimated by calculating the standard error (SE) of the sample estimate. The OES survey uses the relative standard error (RSE) of a sample estimate to measure sampling error. RSE is defined as the sample error of a sample estimate divided by the sample estimate itself. This statistic provides the user with a measure of the relative precision of the sample estimate. Relative standard errors (RSEs) are calculated for both occupational employment and mean wage rate estimates. In general, estimates based on many establishments have lower RSEs than estimates based on few establishments.

Nonsampling error occurs for a variety of reasons, none of which are directly connected to sampling like sampling error. Examples of nonsampling error include: nonresponse, data incorrectly reported by the respondent, mistakes made in entering collected data into the database, mistakes made in editing and processing the collected data.

Source: <http://www.ctdol.state.ct.us/lmi/internet/methodology.htm>

## Appendix C

### Occupations and CT Postsecondary Education Institution Completion Figures for 2008 Certificates of Degrees Earned

<b>Table A. Occupations and CT Postsecondary Education Institution Completion Figures for 2008 Certificates or Degrees Earned</b>	
<b>Occupation</b>	<b>CT postsecondary institutions offering certificates or degrees in the Occupation</b>
<b>Healthcare Practitioners and Technical Occupations</b>	
Emergency Medical Technicians and Paramedics (510904)	29 (Goodwin: 5; NorwalkCC: 2; CCC: 22)
Registered Nurses (511601)	1,109 (GCC: 60; CCC: 89; CCSU: 9; Fairfield: 84; Goodwin: 113; HCC: 14; Naugatuck CC: 79; Norwalk CC: 55; Quinnipiac: 105; Sacred Heart: 38; St Joseph: 49; SCSU: 73; St. Vincent's: 57; Three Rivers CC: 74; UConn: 142; UHart: 27; WCSU: 41)
Licensed Practical and Licensed Vocational Nurses (511613)	324 (No detailed info)
Surgical Technologists (510909)	12 (MCC: 12)
Radiation Therapists (510907)	120 (CCC=17; GCC=5; MiddlesexCC=17; NaugCC=17; Quinnipiac=33; St. Vincent's College=15; UHart=16)
Occupational Therapy (512306)	47 (Quinnipiac: 36; Sacred Heart: 11)
Occupational Therapy Assistant (510803)	32 (Briarwood: 8; Housatonic CC: 9; MCC: 15)
Physical Therapy (512308)	47 (UConn: 28; UHart: 19)
Physical Therapy Assistant (510806)	17 (CCC: 1; Housatonic CC: 2; MCC: 3; Naugatuck CC: 8; Northwestern CC: 2; Tunxis CC: 1)
Nutrition and Dietetics (513101)	37 (UConn: 18; UNH: 19)
Dental Hygienist (510602)	143 (Tunxis CC: 32; U of Bridgeport: 67; UNH: 44)
Social Worker (440701)	373 (CCSU: 11; ECSU: 22; Post: 8; Sacred Heart: 13; St. Jo: 17; SCSU: 100; WCSU: 33; UConn: 169)
Substance Abuse and Behavioral Disorder Counselors (511501)	61 (GCC: 38; MCC: 20; NaugCC: 1; TunxisCC: 2)
Pharmacists (512001)	103 (UConn: 103)
Pharmacy Technicians (510805)	0 (Trained OJT by chain drug stores)
Veterinarians (291131)	0
Veterinary Technologists and Technicians (510808)	11 (NWCC: 11)

<b>Occupation/Certificate</b>	<b>CT postsecondary institutions offering certificates or degrees in the Occupation</b>
<b>Education, Training &amp; Library Occupations</b>	
Art Education (131302)	92 (CCSU: 34; SCSU: 56; UHart: 1; U of Bridgeport: 1)
Bilingual Education, PK-12	0
Comprehensive Special Education, 1-12 (131001)	200 (CCSU: 12; Fairfield U: 14; St. Joseph: 32; SCSU: 92; UConn: 20; UHart: 25; CREC: 5)
Elementary School Teachers, Except Special Education (131202)	1,358 (CCSU: 164; ECSU: 68; Fairfield: 19; Quinnipiac: 54; SCSU: 168; U of Bridgeport: 253; UConn: 48; UHart: 23; WCSU: 88; Conn Coll: 14; Sacred Heart: 290; St. Jo: 63; UNH: 105; Yale: 1)
English, 7-12	218 (CCSU: 30; ECSU: 12; SCSU: 36; UConn: 23; WCSU: 5; Albertus Magnus: 2; Conn Coll: 6; Fairfield: 13; Quinnipiac: 8; Sacred Heart: 24; St. Jo: 10; U of Bridgeport: 22; UHart: 3; UNH: 21; Yale: 3)
Intermediate Administrator	554 (WCSU: 9; Fairfield U: 2; UHart: 10; SCSU: 147; Sacred Heart: 191; CCSU: 76; U of Bridgeport: 46; UConn: 73)
Mathematics, 7-12	123 (CCSU: 27; ECSU: 7; SCSU: 19; UConn: 14; WCSU: 4; Albertus Magnus: 4; Conn Coll: 1; Fairfield: 9; Quinnipiac: 4; Sacred Heart: 13; U of Bridgeport: 13; UNH: 3; St. Jo: 5)
Music, PK-12 (131312)	88 (CCSU: 11; SCSU: 1; UConn: 13; ECSU: 1; UHart: 27; WCSU: 26; Conn Coll: 1; U of Bridgeport: 8)
Physical Education (131314)	117 (CCSU: 41; ECSU: 39; SCSU: 37)
Science, 7-12	121 (CCSU: 12; SCSU: 30; UConn: 15; WCSU: 2; ECSU: 2; Conn Coll: 3; Fairfield: 8; Quinnipiac: 2; Saint Jo: 2; Sacred Heart: 14; U of Bridgeport: 17; UNH: 13; Yale: 1)
Secondary School Teachers, Except Special and Voc. Ed. (131205)	742 (CCSU: 107; UConn: 76; SCSU: 128; WCSU: 29; ECSU: 36; Quinnipiac: 23; U of Bridgeport: 89; Conn Coll: 12; Fairfield: 48; UHart: 5; UNH: 68; Sacred Heart: 80; St. Jo: 24; Yale: 10; Albertus Magnus: 7)
Speech and Language Pathology (510204)	47 (SCSU: 38; UConn: 9)
Technology Education, PK-12 (131309)	13 (CCSU: 13)
World Languages, 7-12	46 (SCSU: 14; WCSU: 6; CCSU: 7; UConn: 6; Fairfield: 5; Quinnipiac: 4; Sacred Heart: 3; Conn Coll: 1)
Business, 7-12	20 (CCSU: 2; UNH: 9; Sacred Heart: 4; U of Bridgeport: 5)
History & Social Studies, 7-12	260 (WCSU: 18; SCSU: 43; CCSU: 36; UConn: 24; ECSU: 15; Quinnipiac: 9; Conn Coll: 2; Fairfield: 18; UNH: 22; Sacred Heart: 25; U of Bridgeport: 32; St. Jo: 7; Yale: 6; Albertus Magnus: 1; UHart: 2)
School Counselor	125 (WCSU: 23; UConn: 11; SCSU: 17; CCSU: 25; Fairfield: 14; UHart: 14; St. Jo: 21)
Librarians (250101)	119 (SCSU: 119)
Library Media Specialist	13 (Fairfield: 2; SCSU: 11)

<b>Architecture &amp; Engineering</b>	
Civil Engineers (140801)	81 (UConn: 56; UNH: 9; UHart: 16)
Industrial Engineers (143501)	36 (Fairfield: 16; UConn: 12; UNH: 8)
Mechanical Engineers (141901)	290 (Fairfield: 22; Rensselaer: 22; U of Bridgeport: 58; UConn: 109; UHart: 30; UNH: 19; Yale: 30)
Mechanical Engineering Technicians (150805)	44 (GCC: 2; Naugatuck CC: 1; Three Rivers CC: 3; CCSU: 25; UHart: 13)
Architect (040201)	102 (UHart: 6; Yale: 96)
<b>Other Occupations</b>	
Airline Pilots, Copilots, and Flight Engineers (532022)	0
Accountants and Auditors (520301)	732 (CCSU: 92; ECSU: 48; Fairfield: 68; Post: 23; Quinnipiac: 30; Sacred Heart: 47; U of Bridgeport: 16; UConn: 161; UHart: 30; UNH: 18; WCSU: 36)
Actuaries (521304)	44 (UConn: 44)
Forensic Science (430106)	111 (UNH: 111)
Lawyers (220101)	513 (Quinnipiac: 125; UConn: 188; Yale: 200)
Paralegal and Legal Assistant (220302)	96 (Briarwood: 3; MCC: 19; Naugatuck CC: 22; Norwalk CC: 19; Post: 1; UHart: 21; UNH: 11)
Real Estate Sales Agents (521501)	1,148 (mostly public ccs)
Automotive Service Technicians/Mechanics	415 (No detailed info)
Source: <sup>a</sup> CT DOL Office of Research Labor Market Information. <a href="http://www.ctdol.state.ct.us/lmi/misc/mostopen.htm">www.ctdol.state.ct.us/lmi/misc/mostopen.htm</a>	
<sup>b</sup> State of Connecticut Department of Higher Education Degree Completions <a href="http://www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level">www.ctdhe.org/database/CompletionsPG81.htm#Degree%20level</a>	

<b>Appendix D. Colleges and Universities Located in Connecticut</b>		
<i>College or University</i>	<i>Location</i>	<i>Type</i>
Albertus Magnus College	New Haven	Independent
Asnuntuck Community College	Enfield	Public
Bais Binyomin Academy	Stamford	Independent
Briarwood College	Southington	Independent For Profit
Capital Community College	Hartford	Public
Central Connecticut State University	New Britain	Public
Charter Oak State College	New Britain	Public
Clemens College	Suffield	Independent For Profit
Connecticut College	New London	Independent
Eastern Connecticut State University	Willimantic	Public
Fairfield University	Fairfield	Independent
Gateway Community College	New Haven	Public
Goodwin College	East Hartford	Independent
Graduate Institute, The	New London	Independent
Hartford Seminary	Hartford	Independent
Holy Apostles College and Seminary	Cromwell	Independent
Housatonic Community College	Bridgeport	Public
Legion of Christ College of Humanities	Cheshire	Independent
Lyme Academy College of Fine Arts	Old Lyme	Independent
Manchester Community College	Manchester	Public
Middlesex Community College	Middletown	Public
Mitchell College	New London	Independent
Naugatuck Valley Community College	Waterbury	Public
Northwestern Connecticut Community College	Winsted	Public
Norwalk Community College	Norwalk	Public
Paier College of Art	Hamden	Independent For Profit
Post University	Waterbury	Independent For Profit
Quinebaug Valley Community College	Danielson	Public
Quinnipiac University	Hamden	Independent
Rensselaer at Hartford	Hartford	Independent
Sacred Heart University	Fairfield	Independent
Saint Joseph College	West Hartford	Independent
Southern Connecticut State University	New Haven	Public
St. Basil College	Stamford	Independent
St. Thomas Seminary	Bloomfield	Independent
St. Vincent's College	Bridgeport	Independent
Talmudic Institute of Connecticut	Bridgeport	Independent
Three Rivers Community College	Norwich	Public
Trinity College	Hartford	Independent
Tunxis Community College	Farmington	Public
United States Coast Guard Academy	New London	Public
University of Bridgeport	Bridgeport	Independent
University of Connecticut - Health Center	Farmington	Public
University of Connecticut - Law School	Hartford	Public
University of Connecticut, Avery Point	Groton	Public
University of Connecticut, Stamford	Stamford	Public
University of Connecticut, Storrs Campus	Storrs	Public

<b>Appendix D. Colleges and Universities Located in Connecticut</b>		
<i>College or University</i>	<i>Location</i>	<i>Type</i>
University of Connecticut, Tri-Campus	Torrington, Waterbury, West Hartford	Public
University of Hartford	West Hartford	Independent
University of New Haven	West Haven	Independent
Wesleyan University	Middletown	Independent
Western Connecticut State University	Danbury	Public
Yale University	New Haven	Independent
Source: DHE		

## Appendix E

### Technical High Schools

The State Board of Education operates the Connecticut Technical High School System through the state Department of Education. There are 17 schools, two satellite facilities, and one technical educational center. The schools dropped the word “vocational” and are called technical schools, although this name has not been codified in statute.

State law (C.G.S. Sec. 10-95) allows the State Board of Education to establish a statewide system of regional vocational-technical schools to offer programs in "vocational, technical and technological education and training." The commissioner of education is authorized to oversee management of the system in accordance with the policies established by the state board. State vocational-technical schools in Connecticut date back to 1910, when the first two trade schools were established in Bridgeport and New Britain.

Day-to-day oversight of the technical school system is the responsibility of a superintendent of schools, who answers to the commissioner of education and a subcommittee of the state board, known as the Technical School Committee.

The state's regional technical school system offers 26 different secondary-level trade programs. Programs for adults are available in the health services field (LPN, dental assisting, certified nurse's aide, medical assistant, and surgical technology), and in aviation maintenance technology. Some secondary programs are available at every school; others are available at just a few schools or only at satellite facilities.

From year to year, the trade programs offered within the technical school system may change. The introduction of a new program to the system or the elimination of an existing program is under the jurisdiction of the State Board of Education. A change in the specific schools offering an existing program can be made by the superintendent of the regional technical school system.

Since 1990, the State Board of Education has been required by C.G.S. Sec. 10-95i(b) to evaluate existing trade programs at least every five years on the basis of:

- *projected employment demand* for students enrolled in the program;
- anticipated technological changes;
- availability of qualified instructors;
- existence of similar programs at other educational institutions; and
- student interest in the program.

Following the evaluation, programs can be reauthorized for periods of up to five years.

**Graduation rates.** Table E-1 provides a statewide snapshot of technical school graduates and their future plans. The table also breaks down graduates by the type of

technical school program they selected to concentrate in. There were a total of 2,185 graduates of which 41 percent planned on enrolling in postsecondary school.

**Table E-1. 2007-2008 Technical School Graduates by Program and Future Plans.**

<i>Program</i>	<i>Number Graduates</i>	<i>% Pursuing Education</i>	<i>% in Military</i>	<i>% Available for Employment</i>
Auto Body Repair	109	29.4	4.6	60.6
Automotive Mechanic	219	41.1	5.0	51.1
Baking	17	52.9	5.9	35.3
Bioscience Environmental Technology	13	76.9	0	23.1
Carpentry	170	38.8	5.3	55.3
Culinary Arts	225	63.6	3.6	28.4
Diesel Mechanics Technology	15	40.0	6.7	53.3
Drafting: Architectural	34	70.6	2.9	23.5
Drafting: Machine	109	61.5	4.6	33.0
Early Care and Education	10	90.0	0.0	10.0
Electrical	226	25.7	3.5	69.9
Electromechanical	37	54.1	8.1	35.1
Electronics	117	65.8	2.6	30.8
Fashion Technology	55	87.3	0.0	10.9
Graphic Communication	63	54.0	6.3	36.5
Hairdressing/Barbering/Cosmetology	188	43.6	3.7	47.9
Health Technology	33	66.7	0.0	33.3
Heating/Ventilation/Air Conditioning	125	21.6	4.8	68.8
Hotel/Hospitality Technology	19	89.5	0.0	10.5
Information Support and Services	20	95.0	0.0	5.0
Interactive Media	6	50.0	0.0	50.0
Manufacturing Technology	125	38.4	1.6	53.6
Masonry	34	47.1	8.8	44.1
Microcomputer Software Technician	57	80.7	1.8	14.0
Plumbing and Heating	150	20.0	6.7	72.7
Welding	9	55.6	0.0	44.4
Total	2,185			

Source: Connecticut Technical Schools

**Pursuit of postsecondary education.** The proportion of technical school graduates pursuing postsecondary education has increased greatly since the 1980s. In 1985, only 18 percent of the graduates were in this category. By 1995, it was 27 percent; it grew to 37 percent in 2004, and in 2007, it increased again to 41 percent.

Many graduating classes attend a mix of two-year or four-year schools. Table E-2 compares the number of 2002 and 2007 graduates attending college by enrollment in two or four year colleges. Although the majority of technical high school graduates enrolled in two year colleges for both years examined, the number and percent of students enrolling in four

year colleges is growing – from 33 percent in 2004 to 39 percent in 2007. Some students earn college credit while attending technical high schools.

<i>Type of College</i>	<i>2004</i>		<i>2007</i>	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
2 Year College	490	67%	547	61%
4 Year College	241	33%	356	39%
Total	731	100%	903	100%

Source: CT Technical High Schools

**College Career Pathways (CCP) program.** The College Career Pathways (CCP) program is a course of study intended to encourage and prepare high school and technical high school students to pursue an associate or baccalaureate degree in their chosen technical areas. The program begins for high school students at the end of their second year. Students in the 10th grade apply to the program by submitting a special application available through their guidance counselors; these courses are part of their school requirements and are taken at their high schools.

The course pathway toward the degree or certificate, beginning in high school, is a coherent sequence and does not require repetition of the same learning outcomes. To be considered a complete curriculum, high school coursework must include math, communications, science, and a career subject (e.g., accounting and architectural drafting).

Up to 14 college credits may be earned by the end of the senior year of high school. Students formally enroll in a community college and register for articulated academic and technical courses. In order to be eligible for the program, a student must:

- have completed a planned sequence of academic courses (English, math, and science) and a technical program in 9th and 10th grade;
- achieve an overall C+ or higher average in 10th grade;
- have at least 11th grade standing; and
- have parental permission;

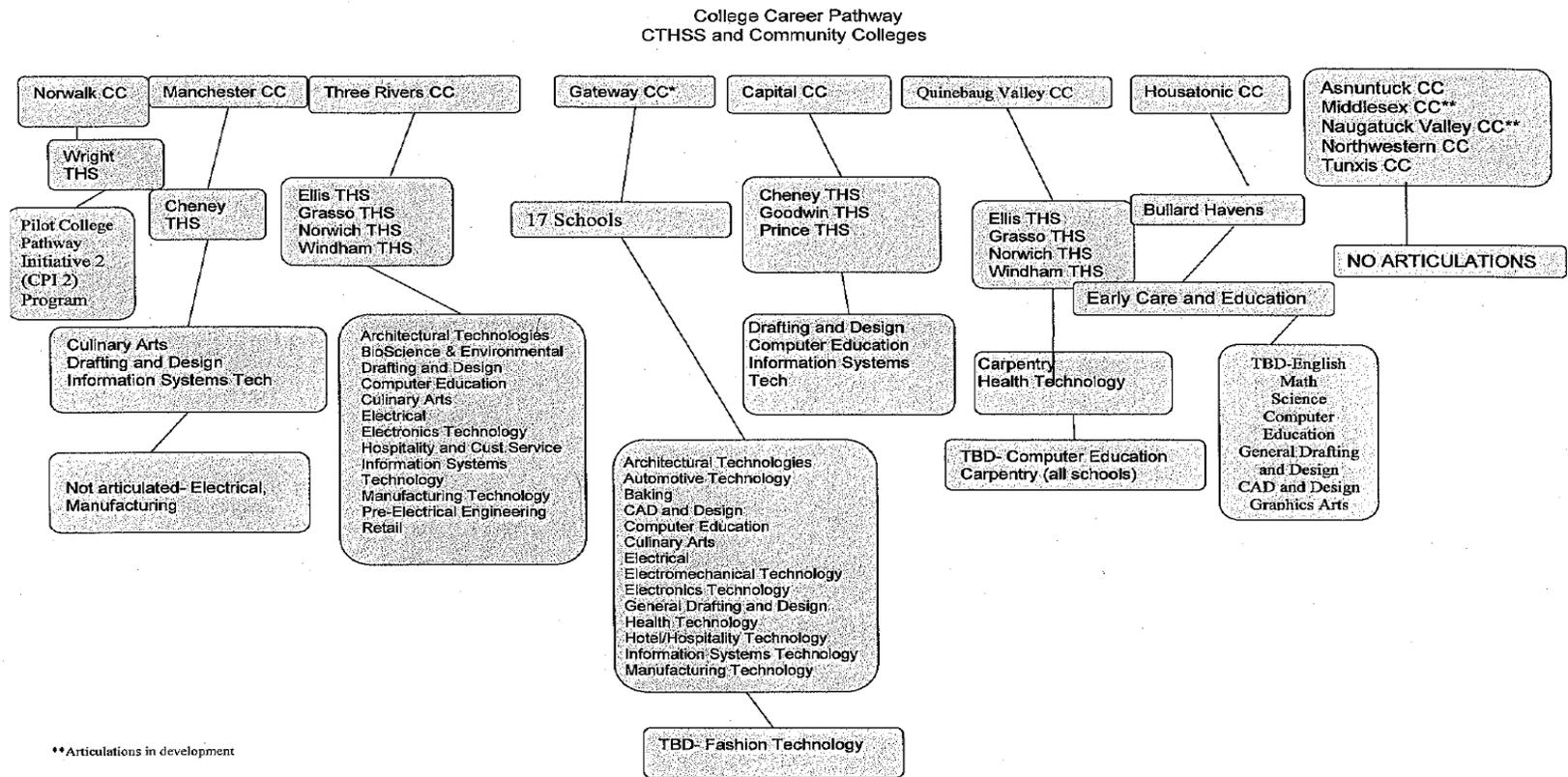
*Articulation agreements with community colleges.* Figure E-1 shows articulation agreements that the technical schools have with the community colleges. Five of the 12 community colleges do not have articulation agreements signed, although two of them are currently in development. The trade/technology programs with formally established course credit pathways with designated community colleges include:

- Architectural Technologies;
- Automated Manufacturing, Automotive;
- Bioscience and Environmental Technology;
- Carpentry; and
- Computer-aided Drafting and Design;
- Culinary Arts;
- Early Care and Education;
- Electrical;

- Electronics;
- Electromechanical;
- General Drafting and Design;
- Health Technology;
- Tourism, Hospitality and Guest Service Management;
- Information Systems Technology;
- Manufacturing Technology;
- Pre-Electrical Engineering and Audio Visual Technology; and
- Retail Management and Entrepreneurship.

These articulation agreements may result in an even greater proportion of technical high school graduates pursuing postsecondary education.

Figure E-1



Source: Connecticut Technical High Schools

## Appendix F

### **REPORTS AND STUDIES FROM THE OFFICE FOR WORKFORCE COMPETITIVENESS**

At various times, OWC has been asked by the Governor and the legislature to study various issues involving the workforce and the economic and technological changes that affect the state's economic competitiveness. OWC is also responsible for the production of various national and state reports on behalf of the Connecticut Employment and Training Commission and others. A listing of OWC publications and reports is provided below.

**Workforce Investment Act: State Five Year Implementation Plan**, (Connecticut Employment and Training Commission (CETC)/Office for Workforce Competitiveness (OWC)/CT Department of Labor (CTDOL), January 2001).

**An Information Technology Workforce Strategy for the State of Connecticut**, (CETC/OWC, January 2001).

**Workforce Investment Study Team Report (WIST)**, (OWC, January 2001).

**New England's Information Technology Workforce Challenge: Strengthening the Region's Economic Competitiveness**, (OWC, February 2001).

**Strategic Vision for Information Technology Workforce Development in Connecticut**, (CETC/OWC, January 2002).

**Connecticut Career Choices: The Federal School-to-Career Experience in Connecticut and Recommendations for the Future**, (OWC, February 2002).

**Final Report of the Governor's Task Force on the Future of the Regional Vocational-Technical High School System**, (OWC, January 2003).

**A Progress Report on Technology Workforce Development in Connecticut**, (CETC/OWC, February 2003).

**JOBS 2010: A Look at Connecticut's Workforce Needs Over the Coming Decade**, (OWC/CERC, March 2003).

**The Northeast Research and Education Network (NEREN): Developing a High Speed "Digital Highway" for Research and Education for the Northeast Region**, (OWC, July 2003).

**Connecticut Workforce Demands and the Implications for Education**, (CTDOL/OWC, July 2003).

**Ad Hoc Task Force Report on Connecticut Works System**, (CETC/OWC, September 2003).

**New England Governors' Conference Report: Improving the Region's Technology Position – Four regional Action Strategies**, (OWC, September 2003).

**Generating the Talent and Innovations for the 21st Century Knowledge Economy**, (OWC, December 2003).

**Connecticut Employment and Training Commission (CETC) Annual Reports**, (OWC, 2000 -2004).

**Connecticut Career Ladder Advisory Committee Three Year Strategic Plan**, (OWC, February 2004).

**Generating the Talent and Innovations for the 21<sup>st</sup> Century Knowledge Economy: a Report on Connecticut's Technology Preparedness**, (OWC, February 2004).

**2003 Report Card for Employment and Training Programs: Covering Programs July 1, 1998-June 30, 2003** (CETC/OWC, June 2004).

**Connecticut's Broadband Infrastructure: a Distinct Competitive Advantage**, (OWC, July 2004).

**Demographics and Economics in Connecticut: A Collision in the Making?** (PPT), (OWC, July 2004).

**Building Upon Connecticut's Core Competencies in the Knowledge Economy: A Case Statement for Meeting the Challenges of the 21<sup>st</sup> Century Knowledge Economy**, (OWC, April 2005).

**Building an Allied Health Workforce Pipeline for the Greater Waterbury Region**, (OWC, April 2005).

**A Call to Action: Advancing Nanotechnology Development in Connecticut**, (OWC, May 2005).

**State of Connecticut Strategic Two-Year State Workforce Investment Plan: July 1, 2005 – June 30, 2007**, (OWC/CTDOL June 2005).

**The Real Cost of Living in 2005: The Self-Sufficiency Standard for Connecticut**, (OWC, December 2005)

**Allied Health Workforce Policy Board: 2005 Legislative Report**, (OWC, January 2006).

**Final Report: Recommendations to Advance Connecticut's Position in Nanotechnology Development**, (OWC, February 2006).

**Career Ladder Advisory Committee: Pilot Project Update**, (OWC, February 2006).

**Allied Health Workforce Policy Board: 2006 Legislative Report**, (OWC, January 2007).

**Nursing and Allied Health Faculty Staffing Plan, Allied Health Workforce Policy Board**, (January 2007).

**A Talent-Based Strategy to Keep Connecticut Competitive in the 21<sup>st</sup> Century**, (OWC, February 2007).

**Career Ladder Advisory Committee: Pilot Project Update**, (OWC, February 2007).

**Advancing Connecticut in Nanotechnology Development: A Report on Ongoing Activities and a Call for Future Investments**, (OWC, April 2007).

**Connecticut Employment and Training Commission (CETC) CETC Annual Plan**, (OWC, 2000 - June 2007).

**Clinical Placement Capacity Assessment Project Report**, (Allied Health Workforce Policy Board, July 2007)

**Data Interoperability Initiative – Data Sharing Resource Guide**, (OWC/Public Consulting Group, Fall 2007).

**Connecticut's Framework for Positive Youth Development**, (Youth Futures Committee, January 2008).

**Allied Health Workforce Policy Board: 2007 Legislative Report**, (OWC, January 2008).

**Career Ladder Advisory Committee: Pilot Project Update**, (OWC, February 2008).

**Connecticut Centers for Nanoscale Sciences: Investing in Institutionally-Based, Shared-Use Nanotechnology Facilities for Research, Education and Product Development**, (OWC, February 2008).

**Allied Health Workforce Policy Board: 2008 Legislative Report**, (OWC, January 2009).

**Career Ladder Advisory Committee: Pilot Project Update**, (OWC, January 2009).