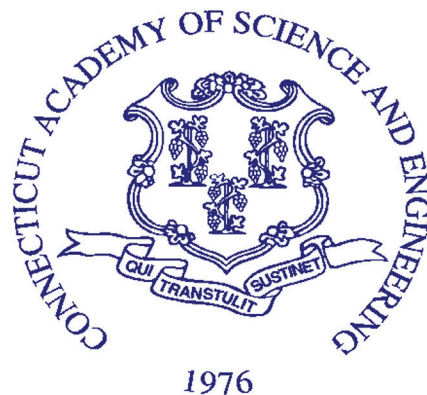


STRATEGIES FOR EVALUATING THE EFFECTIVENESS OF PROGRAMS AND RESOURCES FOR ASSURING CONNECTICUT'S SKILLED WORKFORCE MEETS THE NEEDS OF BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE

DECEMBER 2012

A REPORT BY

THE CONNECTICUT
ACADEMY OF SCIENCE
AND ENGINEERING



FOR

THE CONNECTICUT GENERAL ASSEMBLY
HIGHER EDUCATION AND EMPLOYMENT
ADVANCEMENT COMMITTEE
COMMERCE COMMITTEE
EDUCATION COMMITTEE
LABOR AND PUBLIC EMPLOYEES COMMITTEE

STRATEGIES FOR EVALUATING THE EFFECTIVENESS OF PROGRAMS AND RESOURCES FOR ASSURING CONNECTICUT'S SKILLED WORKFORCE MEETS THE NEEDS OF BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE

A REPORT BY

THE CONNECTICUT ACADEMY
OF SCIENCE AND ENGINEERING

ORIGIN OF INQUIRY: THE CONNECTICUT GENERAL ASSEMBLY

DATE INQUIRY

ESTABLISHED: DECEMBER 23, 2011

DATE RESPONSE

RELEASED: DECEMBER 28, 2012

In accordance with Public Act 11-1, Section 37, the findings of the study shall be reported to the Higher Education and Employment Advancement, Commerce, Education, and Labor and Public Employees Committees of the Connecticut General Assembly.

This study was initiated at the request of the Connecticut General Assembly on December 23, 2011. The project was conducted by an Academy Study Committee with the support of staff of the Connecticut Economic Resource Center serving as the study management team. The content of this report lies within the province of the Academy's Economic Development, Education and Human Resources, and Technology Technical Boards. The report has been reviewed by Academy Members Peter G. Cable, PhD and Herbert S. Levinson, PE. Martha Sherman, the Academy's Managing Editor, edited the report. The report is hereby released with the approval of the Academy Council.

Richard H. Strauss
Executive Director

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE

MEMBERS OF THE STUDY COMMITTEE ON STRATEGIES FOR
EVALUATING THE EFFECTIVENESS OF PROGRAMS AND RESOURCES FOR
ASSURING CONNECTICUT'S SKILLED WORKFORCE MEETS THE NEEDS
OF BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE

Stacie Berdan

Author and International Careers Expert
SNB Consulting

Christopher P. Bruhl

President & CEO
Business Council of Fairfield County

Robert Clifford

Policy Analyst
New England Public Policy Center
Federal Reserve Bank of Boston

Bruce Dixon

Chief Executive Officer
CPEP

Patricia Downs

Director, Workforce Strategy and Planning
CCAT

Niloy K. Dutta, PhD (*Academy Member*)

Professor of Physics
University of Connecticut

Eric Fingerhut

Vice President for Education and STEM
Learning
Battelle

Craig T. Follins, PhD

President, Olive-Harvey College
City Colleges of Chicago

Mary Holz-Clause, PhD

Vice President for Economic Development
University of Connecticut

Susan Johnson

Vice President, Strategic Talent Development
& Diversity
Pitney Bowes, Inc

Philip Jordan

Chief Business Officer, BW Research
Green LMI Division, Wrentham, MA

Stephen Lynch

Senior Project Manager
Jobs for the Future

James O'Donnell (*Academy Member*)

Professor of Marine Sciences, Joint Professor
of Physics
University of Connecticut

Paul R. Pescatello, JD, PhD

President & CEO
CURE

Michael Polo

President/CEO
ACMT AdChem Mfg Technologies

Karl M. Prewo, DrEngSc (*Academy Member*)

President
Innovatech

Devdas Shetty, PhD (*Academy Member*)

Dean of Research, School of Engineering
University of Hartford

Navjeet Singh

Deputy Director
National Fund for Workforce Solutions

Tarek M. Sobh, PhD (*Academy Member*)

Vice President for Graduate Studies and
Dean of the School of Engineering
University of Bridgeport

Susanne D. Spargo

Vice President, Human Resources
Mott Corporation, Farmington, CT

Kanishka Tankala, PhD (*Academy Member*)

Vice President of Operations
Nufern, East Granby, CT

MEMBERS OF THE STUDY COMMITTEE ON STRATEGIES FOR
EVALUATING THE EFFECTIVENESS OF PROGRAMS AND RESOURCES FOR
ASSURING CONNECTICUT'S SKILLED WORKFORCE MEETS THE NEEDS
OF BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
(continued)

RESEARCH TEAM

STUDY MANAGER

Alissa K. DeJonge, Director of Research, Connecticut Economic Resource Center

STUDY RESEARCH CONSULTANT

Michelle Riordan-Nold, Research Consultant, Connecticut Economic Resource Center

RESEARCH ASSOCIATE

Matthew Ross, Research Associate, Connecticut Economic Resource Center

ACADEMY PROJECT STAFF

Richard H. Strauss, Executive Director

Bruce Carlson, Associate Project Director

Terri Clark, Associate Director

Ann G. Bertini, Assistant Director for Programs

TABLE OF CONTENTS

TABLE OF CONTENTS.....	v
EXECUTIVE SUMMARY.....	vii
STUDY BACKGROUND	1
INTRODUCTION	5
2009 LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS (PRI) COMMITTEE REPORT: ALIGNMENT OF POSTSECONDARY EDUCATION AND EMPLOYMENT	7
CURRENT SYSTEM.....	13
Educational System	15
State Agencies	23
Other Related Entities - Councils and Offices.....	25
RECENT LEGISLATIVE CHANGES.....	33
ALIGNMENT PROGRESS IN STEM OCCUPATIONS	39
FINDINGS AND RECOMMENDATIONS.....	61
Organizational Structure and Leadership.....	62
Data and Information	69
Education and Business/Industry Link.....	77
Where can Connecticut Achieve the Greatest Return on Taxpayer Investment?	90
CONCLUDING REMARKS.....	103
APPENDICES	105
Appendix A: Focus Group Summary	105
Appendix B: Summary of Research Interviews.....	109
Appendix C: Detailed Findings from Program Review and Investigations Committee 2009 Study “Alignment of Postsecondary Education and Employment”	111
Appendix D: Strategic Document Review.....	114
Appendix E: Study Committee Meetings and Guest Speakers.....	121

EXECUTIVE SUMMARY

STUDY PURPOSE AND METHODOLOGY

The General Assembly tasked the Connecticut Academy of Science and Engineering (CASE) with studying the workforce alignment system in Connecticut. The impetus for this study was the recognition that on the heels of the Great Recession, the state did not have an effective workforce alignment system to assist residents and businesses in their recovery from the economic downturn. This study was conducted at a time in which the General Assembly and the governor were realigning the workforce system and actively pursuing fundamental structural reforms.

The study's goal is to identify strategies and mechanisms to assess and evaluate the value and effectiveness of those state programs and resources that have a goal of providing businesses and industries in Connecticut with a skilled workforce (with a focus on fields related to science, technology, engineering and mathematics) that meets the needs and expectations of employers, and at the same time, seeks to ensure that students receive the education they need and expect to successfully work in today's jobs/careers and in the jobs/careers of the future. This study is not an evaluation of particular programs or industries in Connecticut, but rather, provides guidance to assure that the state continually maintains an agile, flexible workforce system that can respond to needs of residents and businesses in a constantly changing environment.

A variety of study methods were used to gather data and information for this report. During the CASE study committee meetings, which were conducted throughout the study period, presentations were given by national experts on workforce alignment, representatives from state agencies and state-based businesses, and educators. In addition to the committee meeting presentations, the research staff conducted interviews of various workforce system stakeholders. In addition, focus group sessions were conducted throughout the state. These sessions included representation from secondary and higher education, state agencies, labor and trade associations, the regional workforce investment boards, and industry representatives from small to large manufacturers, healthcare, the nonprofit sector, and technology firms.

The study committee developed a workforce alignment vision that guided the study's research, findings and recommendations, as follows:

Workforce alignment is the efficient and flexible collaboration of state and local public and private entities that educates and trains a dynamic and globally competent workforce that (1) obtains sustainable jobs, (2) provides value to the current and future needs of businesses and industries, and (3) is an asset for the region to attract and retain workers.

SUMMARY OF FINDINGS & RECOMMENDATIONS

The economic well-being of the State of Connecticut and its citizens and businesses is dependent on a vibrant and globally competitive state economy. Therefore, preparing the state's workforce for the jobs of today and tomorrow must be a state priority of the highest level. The workforce system in its broadest form spans an individual's lifetime from pre-natal development through

retirement. It is a complex system that requires coordination, collaboration, and continuous review and improvement of programs and initiatives provided by many state agencies and others (many with principal missions not specifically focused on workforce issues) in order to meet the changing needs of business and industry, and the state's residents.

The CASE study committee's recommendations focus on several areas, with the goal of achieving an effective, aligned workforce system that can adapt to the changing needs of the future workforce. Below is a brief overall summary of findings and recommendations; these are followed by a summary of the specific findings and recommendations for each of the areas examined.

- A statewide workforce system should be coordinated to assure that
 1. clear objectives are established and progress is monitored;
 2. education, economic development and workforce program entities are held accountable regarding each entity's responsibilities related to workforce issues;
 3. implementation of strategies related to the workforce system are assessed and outcomes monitored; and
 4. a system is created that can address and adapt to transformations and globally emerging trends.
- Data and information that provide historical and projected future workforce trends are necessary for informed decision making regarding state and federal investments in workforce-related programs. A data-informed system will ensure that agencies and others with workforce-related responsibilities are held accountable for results and outcomes.
- The needs of business and industry, and therefore how the education and training system prepares students and adults for workforce opportunities, are paramount. The workforce leadership responsibilities of the Connecticut Office of Workforce Competitiveness (OWC) should include facilitating the development of relationships between and across the education and business and industry communities. Also, education and training initiatives should be integrated with key economic growth strategic initiatives to assure workers have the skills needed to support the business sectors identified by the Department of Economic and Community Development (DECD) as key to Connecticut's future.
- Workforce programs and initiatives are principally supported by state and federal funding. Determining where Connecticut can achieve the greatest impact and outcomes requires program evaluation and analysis of available data. Program investments can be targeted to address short-, medium- and long-term goals. Flexibility in use of funds provided by the state and federal government is necessary to provide funding to the types of programs necessary to address each of these time horizons and changes in the economy. The state should advocate for more flexible use of federal funding to better meet the needs and priorities of individual states.
- As a result of the preceding recommendations, it is suggested that the organizational structure of the state's workforce system should be changed to provide focused leadership to create the best opportunity to achieve desired outcomes. OWC should be an independent office that reports directly to the governor and is housed for administrative purposes only within the Office of Policy and Management (OPM). This

will provide OWC with the authority, on behalf of the governor, to assure accountability of all agencies and organizations with workforce system-related responsibilities.

ORGANIZATIONAL STRUCTURE AND LEADERSHIP

FINDINGS:

The state's current organizational structure enhances the potential for inefficiencies and merely encourages voluntary coordination among state agencies and entities involved in the workforce continuum. This results in inconsistent levels of coordination and collaboration, frequent duplication of efforts, and an inefficient use of resources.

OWC, which serves the Connecticut Employment and Training Commission (CETC) in a support function, and is under the direction of the commissioner of the Department of Labor (DOL), lacks the authority to successfully provide leadership and visibility for state workforce programs and initiatives, and to overcome state agency resistance to system improvement to achieve desired outcomes. Since OWC is an office within DOL, it may appear that it is providing guidance under the direction of DOL as opposed to direction from the governor. This type of structure can create friction among state agencies and does not provide OWC with authority to act on behalf of the governor or to garner the greatest level of cooperation and collaboration among the diverse group of state agencies and private sector partners comprising the workforce system. Importantly, even if OWC is given additional authority, success will depend on implementation by the individual agencies in the workforce continuum including, but not limited to, the Connecticut State Department of Education (SDE), the Board of Regents (BOR), the University of Connecticut (UConn), DOL, DECD, and regional workforce investment boards.

Also, because there is no single entity in the state responsible for coordinating workforce resources and programs, there are often many pilot programs conducted throughout the state but rarely brought to scale statewide. Further, pilot programs are often terminated when the grant or federal money ends. Although a small state, Connecticut offers the future workforce a wide array of higher education opportunities. However, the state's institutions of higher education must collaborate and coordinate resources in order to raise the visibility of the opportunities that exist in the state.

RECOMMENDATIONS:

1. Several organizational structures were examined. It is recommended that the leadership for the workforce system take the following form:
 - In order to assure accountability within the workforce system, the first step is to evaluate existing programs' goals and outcomes, then determine what the desired outcomes of workforce development policy for the state should be. OWC should be designated to serve as the entity that has the authority to
 - o work directly with the governor to set objectives, monitor progress, and hold the education, economic development and workforce program entities accountable regarding workforce issues;

- o assess the implementation of the strategies related to workforce;
- o create a system that can address and adapt to transformations and globally emerging techniques; and
- o manage the comprehensive longitudinal workforce data system (with guidance from CETC's Planning and Performance Committee).

Therefore, OWC should work with state agencies and public higher education institutions to evaluate existing programs and establish measurable goals. A key responsibility for OWC is to serve as the "synthesizer and analyzer" of information as shown in Figure ES-1 for the purpose of workforce investment decision making.

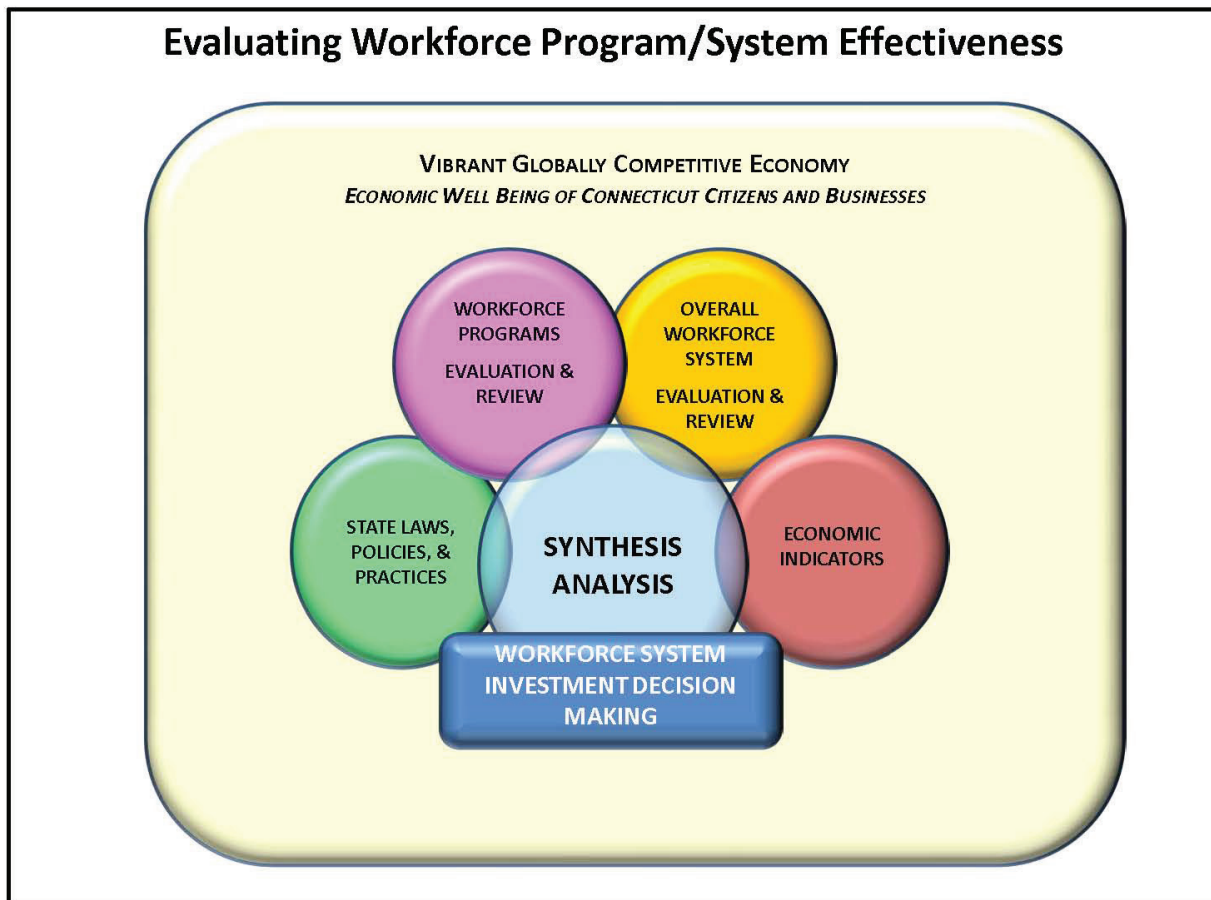


FIGURE ES-1: EVALUATING WORKFORCE PROGRAM/SYSTEM EFFECTIVENESS

This means establishing outcome goals that are directly tied to agency funding and memorialized in legislation for the following agencies: BOR, UConn, SDE, DOL, and DECD, and others as appropriate and to be determined. Until there is accountability in government and public higher education, the state will not have a workforce system that responds to the needs of businesses and state citizens.

- OWC should become a stand-alone entity that reports to the governor and is housed within OPM for administrative purposes only. The head of OWC, an individual with workforce development and policy expertise, should report directly to, and be appointed by, the governor. OWC should be provided with the staff and resources to fulfill its new responsibilities, with additional support provided by the state agencies involved.
 - The governor should provide an overall workforce vision for the state that
 - o raises the level of recognition and importance of workforce development;
 - o develops workforce system goals with guidance from OWC/CETC; and
 - o relies on OWC for data and analysis for decision making and accountability.
 - CETC should provide strategic guidance related to workforce issues, including a vision for targeting resources and for focusing OWC activities. Further, OWC should develop, in consultation with CETC, a process to provide businesses with information regarding all workforce-related programs. This information should be web-based, easily accessible, user friendly and regularly updated. The process should include a mechanism to provide businesses with an opportunity to receive alerts about updated and new programs.
 - A General Assembly Select Committee on Workforce should be created to receive and review data and metrics for monitoring and policymaking related to workforce alignment. The committee should be structured much like the General Assembly's Select Committee on Children and should include, but not be limited to, chairpersons and ranking members from the committees on education, human services, higher education and employment advancement, commerce, and labor.
 - When a new initiative is launched (for example, Connecticut's Innovation Ecosystem or Fast Five Program), OWC should be responsible for ensuring that all workforce-related issues are coordinated and that funds are leveraged to increase the efficient and effective use of public funds.
 - OWC should serve as the convener and facilitator of the various state partners involved in STEM to create collaborations that would make the state more competitive for federal funds. In addition, OWC should create a clearinghouse for all the STEM initiatives underway in the state, disseminate information and create awareness about existing and new programs in order to reach the maximum number of students possible.
2. Add representation from independent colleges and the University of Connecticut to the CETC board so that all entities involved in workforce development are involved in the development of strategies at the state level.
 3. Consider offering and co-locating comprehensive services (including Adult Education, among others) at the One-Stop Centers. This might entail co-locating all offices regionally or having staff work in multiple locations so they can more easily collaborate on initiatives and jointly compete for federal funding. This will enhance collaboration and result in fewer missed opportunities.

DATA AND INFORMATION

FINDINGS:

There is no central authority that consolidates, analyzes, and synthesizes all workforce program data, labor market data, and economic development-related data. Also, it is critically important to go one step beyond analyzing the data by using the information to adapt programs, terminate ineffective programs, or implement new programs based on emerging trends or future needs.

Further, the state currently has no systematic method of collecting data to determine future business needs so that workforce programs could be developed to meet those future needs. Data projections rely on historical information to predict future needs as opposed to surveying employers about the future and using real-time labor information to prepare for future needs.

RECOMMENDATIONS:

1. Although it is very difficult to predict the future and what occupations might exist years into the future, for now a hybrid method should be employed to understand in the short and medium term what occupations could arise or be on the decline. Such a method should incorporate the best data currently available for predicting future trends, including real-time job posting data and data from a newly created and administered quarterly employer survey that assesses current vacancy rates and future hiring plans. These two forward-looking data elements would be utilized, in addition to the current DOL occupational projections that use historical data, to anticipate future trends. Forecasting using these three data elements would enable the projections to provide a more robust picture into what is emerging for the future and also to identify if past trends mirror the current labor market picture. An adequately sized job vacancy survey could provide both industry and occupational vacancies that would allow policymakers to prescribe targeted economic development solutions and maximize the return of existing training resources. The survey would need to be conducted on a quarterly basis in order to provide timely, real-time and trend information. This type of survey not only helps job seekers understand where work is available and the types of occupations in demand, but it also helps employment and training services understand the current labor market and provides an indication of how well the labor market is doing.
2. The longitudinal data system must be supported and promoted by the state. All agencies and entities in the state that are part of the workforce system must provide their data and protocols for data use and sharing must be established. OWC should lead the effort in convening an interagency workgroup to determine the future sustainability of the longitudinal data system.
3. OWC should be responsible for creating a central repository for workforce programs that will: (1) provide information about workforce programs in the state and (2) inform about the quality of the programs for the purposes of statewide implementation (scale-up). Repository data and analysis should be publicly communicated and monitored so that successful programs can be evaluated for bringing them up to scale or determining sustainability efforts.

4. Enhance DOL's research capacity, since three-quarters or more of their funding is from the federal government, to produce more comprehensive data to inform the workforce system. The following should be incorporated into DOL's research: tracking of self-employment and regular analysis of demand and supply of workers.
5. Have OWC serve as the office that systematically assesses program performance and also analyzes the state's overall performance on key metrics and benchmarks for comparison with other states, the nation, and globally. Several benchmark and best practice states and/or countries should be identified based on an analysis of key factors for selection. Relationships should be established with selected benchmark states for periodic joint review and analysis of each state's progress. This would be included in the workforce system evaluation and review, as shown in Figure 7.1.
6. Higher education performance metrics should be tied to meeting the needs of business. This requires that higher education institutions and systems continuously monitor, through surveys, whether their programs and graduates are meeting the needs of business. Results should be used to assess performance and adapt and develop programs to meet the current and future needs of business.

EDUCATION AND BUSINESS/INDUSTRY LINK

FINDINGS:

Although the state has made progress by consolidating its fragmented system of higher education, there is still opportunity to further improve coordination within the entire public education system. A prepared and educated workforce is the only way the state will be able to compete globally. This means that the state's universities and colleges are critical to the state's economic growth and the prosperity of its citizens. It is also recognized that higher education cannot help drive economic growth unless students' academic achievement is linked to the needs of the marketplace.

However, there is a longstanding tradition within public higher education institutions to view themselves as preparing an individual for future success as opposed to a particular career. Reorienting or expanding the missions of universities poses a major challenge for policymakers. Another challenge in responding to the needs of industry is addressing the time it takes to get new programs developed, approved and operational versus the immediate needs of business and industry.

Recognizing that the jobs of the future will continue to demand higher levels of education than those of the past, the National Governors Association has compiled best practices from pioneering states that have undertaken strategies to align postsecondary education with the state's economic goals.

States have taken the following steps to strengthen universities and colleges as agents of workforce preparation and sources of more opportunity, more economic growth, and increased competitive advantage:

1. *Set clear expectations for higher education's role in economic development;*
2. *Emphasize rigorous use of labor market data and other sources to define goals and priorities;*
3. *Encourage employers' input into higher education;*
4. *Require public higher education institutions to collect and publicly report impacts; and*
5. *Emphasize performance as an essential factor in funding.*¹

RECOMMENDATIONS:

1. As recommended by the National Governors Association, strengthen universities and colleges as agents of workforce preparation and sources of more opportunity, economic growth, and increased competitive advantage. Therefore, create an education system (both public and private) that is accountable to the state's workforce system by creating metrics tied to performance evaluation and funding. Metrics for consideration could include, but not be limited to, the following: increasing the number of students graduating and increasing the pipeline of workers to meet future demand; shortening the time frame in which students earn a degree; and achieving and maintaining affordable education opportunities. The development of the longitudinal data system will help provide the information to inform this endeavor.
2. Education and training initiatives, through OWC's leadership and in coordination with education and training institutions (as noted in the Organization Structure and Leadership section), should be integrated into the key economic growth strategic initiatives, such as:
 - o Business sectors identified by the DECD as key to Connecticut's future should each be analyzed regarding key worker skills required to provide guidance to education and training initiatives.
 - o The Fast Five companies should each be assisted in clarifying the skills required for successful workers (at all levels) in their company and business area, which will provide additional guidance to education and training initiatives.
 - o State endeavors such as the Innovation Ecosystem and the planned UConn Technology Park should be tasked with providing continuous guidance as to the workforce skills required for workers who will eventually fill the jobs in the companies and technologies that will emanate from the growth of the companies utilizing these resources.
3. Workforce development partnerships and collaborations that involve the private and public sectors, including philanthropic funders, can be utilized for meeting workforce needs to collaborate with education and training providers. One example that should be considered is creating a collaborative initiative between the technical high school system, community college system, and employers so that equipment and digital simulations can be shared and students can benefit from learning on cutting-edge, technically relevant machinery, tools and other equipment and simulations to reduce, wherever possible, the inefficiencies that exist by having expensive training equipment at multiple facilities.

1 NGA Center for Best Practices, "Degrees For What Jobs? Raising Expectations for Universities and Colleges in a Global Economy." March 2011.

4. Create a visible marketing campaign to make students, residents and workers aware of the commitment to excellence in education and to attract talent to Connecticut with a theme of "Come work and grow in Connecticut. Together we can change the world."
5. Support the elimination of the program approval requirement for all independent colleges being approved by the State Board of Education. The program approval process should be based upon the individual institution's governance process. This change will help streamline the process for colleges and universities to respond to market and employer needs while reflecting the recent reorganization in state government.
6. The SDE and State Board of Education should encourage and provide guidance to school districts to infuse existing K-12 curricula with cross-cultural experiences and learning opportunities to better prepare students to participate in a global workforce.

WHERE CAN CONNECTICUT ACHIEVE THE GREATEST RETURN ON TAXPAYER INVESTMENT?

One of the goals of this study is to provide guidance to the General Assembly regarding methods for evaluating workforce system-related programs for the purpose of determining return on the investment of public funds in such programs. However, there is very little data that assesses program outcomes and looks at the programmatic effects longitudinally. Therefore, this section of the report takes a broader look, examining which programs nationally have been identified as having the greatest return on public investment in the short, medium, and long term.

FINDINGS – SHORT-TERM:

According to the latest Census figures, more than one-third of Connecticut adults have only a high school degree or less and among minorities in Connecticut, that figure is about 55%. Therefore, it is important to recognize that many individuals whose skills and education need to be upgraded to compete are already adults and in the labor force. It is the workforce development system and their employers that are key resources for these people.

Short-term programs are effective for those people who need skill upgrades in order to obtain a job (if unemployed), to keep an existing job (if an incumbent worker), or to change a job (if a dislocated worker), as well as for meeting current business needs. The programs need flexible funding sources that can supply resources as needs arise. Since many businesses, especially small ones (fewer than 100 employees), generally cannot project long-term future employee needs, it is critical to be able to respond to employers as quickly as possible so that they have the workers needed to be productive and competitive. During economic recessions, these needs tend to become greater as more layoffs occur and people are out of work for longer periods of time, where their skills can tend to become obsolete.

RECOMMENDATIONS – SHORT TERM:

1. Pending further evaluation of program outcomes, the early results for the Step-Up program present an opportunity for the state to scale a program beyond the pilot period and sustain it to obtain measurable results.

2. The state should advocate for more flexible federal guidelines for federally funded programs so that appropriate services can be offered with a more “client-centric” approach customized for the needs of individual states and their businesses and workers. State agencies should be aware where federal waivers can be granted and seek out more efficient ways to use the funding. This issue is worthy of consideration and advocacy by the National Governors Association. However, at the state level this also means having up-to-date data and information so that programs and policies can be adapted to the changing demands of the workforce and employers, and so that evaluation metrics can be utilized to determine program outcomes and success.

FINDINGS – MEDIUM TERM:

In the medium term, certificate programs and apprenticeship programs have proved to be effective for providing the skills necessary for gaining employment. The postsecondary certificate serves as a cost-effective tool for increasing postsecondary educational attainment and gainful employment. Two out of every three workers who have a certificate and a college degree earned the certificate first, indicating that the certificate serves as a stepping stone to further educational attainment.

However, the Education Commission on the States found that postsecondary institutions in Connecticut produce far fewer certificates and far more bachelor's degrees than the national rates for those credential types.² Yet, by 2020, 65% of all jobs in the United States will require postsecondary education and training – education beyond high school.³ A real gap that needs to be addressed exists between the degrees and credentials conferred in the state and the needs of employers. And certificates provide a cost-effective mechanism for students to reach gainful employment; particularly minority students and those from low-income households.

Apprenticeship programs are an effective way to create pathways for students to become employed. A recent study by Mathematica Policy Research estimated that the social benefits of the Registered Apprenticeship program, administered by the Employment and Training Administration's Office of Apprenticeship at the US Department of Labor, exceed the social costs by more than \$49,000 and over an entire career, and an apprentice who completes the program earns almost \$250K more than similar non-participants.⁴ Further it is a way for companies to ensure they have a skilled and trained workforce. To create an effective, expanded statewide program, the current structure of the program should be examined and modified as necessary to assure growth and success.

RECOMMENDATION – MEDIUM TERM:

As an initial step, a framework should be developed for how an apprenticeship program could be organized in the state. This entails creating a workgroup of businesses – small, medium, and large manufacturer – to design the necessary components of an apprenticeship program that could have universal appeal to many businesses. For example,

2 The Education Commission of the States presentation at February 7, 2012 CASE committee meeting

3 Georgetown University Center on Education and the Workforce, “Projects of education demand for the future workforce,” April 20, 2012 presentation to the CASE committee.

4 Reed, Yung-Hsu Liu, et al, “An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States,” Mathematica Policy Research, July 25, 2012.

the business participants would work out the number of hours that would be spent in on the job training versus in the classroom setting. Once the businesses develop an appropriate framework, a meeting of state agencies – DOL, technical high schools, DECD, BOR – could determine the appropriate implementation of the framework and funding. This approach is fundamentally different than the way programs are currently developed and operated.

Currently the state has dedicated funding from the federal Workforce Investment Act (WIA) for apprenticeships and decides how to distribute the resources. This results in the funding driving program development as opposed to designing programs to meet the needs of business and then determining where the funding could come from. This recommended approach should inventory what is currently being offered and determine how to consolidate programs into a statewide effort. This new model should extend beyond the traditional trades that are typically involved in an apprenticeship program and also include internship opportunities, certificate programs, and other appropriate creative solutions to hands-on learning.

FINDINGS – LONG TERM:

The longer society waits to intervene in the life cycle of a disadvantaged child, the more costly it will be to remediate and the less likely to achieve results. Investments focused on birth to age 5 produce a higher per-dollar return than K-12 schooling and later job training. Further they reduce the need for special education, and cut juvenile delinquency, teenage pregnancy and dropout rates. Several longitudinal evaluations all reach essentially the same conclusion: the return on early-childhood-development programs that focus on at-risk families far exceed the return on other projects economic development funded initiatives.

Currently the delivery system for early childhood programs is fragmented and driven by funding streams, which leads to an inefficient use of resources. In 2011, P.A. 11-181, "An Act Concerning Early Childhood Education and the Establishment of a Coordinated System of Early Care and Education and Child Development," was adopted. The act made some organizational changes and also appointed a planning director within the Office of Policy and Management to develop a plan for the system that consolidates existing early childhood education and child care programs and services for children from birth to age 8 into a coordinated system. While coordination and consolidation is the necessary next step for the state, there also needs to be an effort to ensure all traditionally underrepresented children have access to high-quality birth to age 5 education.

RECOMMENDATION – LONG TERM:

At a minimum, the state should create a scholarship program so that all historically underrepresented children in the state can attend a high-quality preschool program. This is a market-based approach where programs are not funded but rather parents receive scholarship money to choose the best high-quality program for their family. Good early childhood programs generate public sector gains through reduced expenditures and increased revenues by having more citizens contributing taxes as opposed to receiving public benefits. To that end, the state should consider Social Impact Bonds as a means for paying for universal early intervention and preschool for at-risk children.⁵

5 http://www.readynation.org/uploads/db_files/Kauffman-ReadyNation PKSE Report 12041922.pdf

CONCLUDING REMARKS

Evaluating the effectiveness of workforce programs and the workforce system requires ongoing analysis of data and information and outcomes with the principal goal of assuring that Connecticut's workforce is prepared to meet the needs of business and industry today and in the future. This requires involvement of many state agencies and others, many of which do not include workforce as their central mission.

The development of an effective workforce system requires system-wide leadership and expertise to conduct comprehensive synthesis analysis for the purpose of continually adapting programs and initiatives and allocating funding to those priorities that will have the greatest impact in meeting the needs of business and industry and the state's residents to maintain a vibrant state economy.

Connecticut should benchmark its workforce programs and initiatives with other similar states/regions on an ongoing basis both to learn from other states and to ensure that Connecticut remains competitive. Also, best practices from other states, regions and countries should be continually identified for consideration for piloting or implementation in Connecticut. To accomplish this, it is important to have effective and sustainable leadership in place with the authority to guide and cause the communication, collaboration, and cooperation among and with many state agencies and others with workforce-related responsibilities.

Results and progress should be reported quarterly to CETC, the governor and the General Assembly. The General Assembly should form a Select Committee on Workforce comprising the leadership of the committees of cognizance for workforce-related issues. This would provide a mechanism by which all key committees could be informed about the status of workforce-related programs and initiatives, and would help to assure that both the executive and legislative branches of government maintain a keen awareness of the importance of workforce development to the economic well-being of the state and its citizens.

STUDY BACKGROUND

Connecticut historically has been known as a national leader in providing business and industry with an educated and skilled workforce. The challenge for Connecticut is to meet business and industry workforce needs today and in the future with multiple state agencies and organizations involved in projecting demand, identifying the current state of the workforce, and funding programs for a variety of workforce development initiatives. In October 2011, the General Assembly tasked the Connecticut Academy of Science and Engineering (CASE) with studying the workforce alignment system in Connecticut. The Connecticut Economic Resource Center, Inc. facilitated the research portion of this project.

The study's goal is to identify strategies and mechanisms to assess and evaluate the value and effectiveness of those state programs and resources that have a goal of providing businesses and industries in Connecticut with a skilled workforce (with a focus on fields related to science, technology, engineering and mathematics) that meets the needs and expectations of employers, and at the same time, seeks to ensure that students receive the education they need and expect to successfully work in today's jobs/careers and in the jobs/careers of the future. This study is not an evaluation of particular programs or industries in Connecticut, but rather, provides guidance to assure that the state continually maintains an agile, flexible workforce system that can respond to needs of residents and businesses in a constantly changing environment.

STUDY DESCRIPTION

The report includes the following elements:

- summary of the 2009 Legislative Program Review and Investigations (PRI) Committee Report
- status of the PRI report recommendations since 2009
- overview of the current workforce system
- recent legislative changes
- alignment progress in STEM occupations
- findings and recommendations, including best practices, in four major categories: organizational structure and leadership; data and information for use in decision making; education and business/industry link; and concepts for where Connecticut can achieve the greatest return on taxpayer investment.
- appendices that provide additional information used for the development of the recommendations, including:
 - o A summary of the findings of the focus group sessions that were conducted in three locations (Franklin/Bridgeport, Norwich, and Rocky Hill) with a total of approximately 50 participants.
 - o A summary of research interviews that were conducted with business and state leaders.

- o Detailed findings from the PRI Committee 2009 Study on Alignment of Postsecondary Education and Employment.
- o A summary of strategic documents

STUDY COMMITTEE ACTIVITIES AND RESEARCH METHODOLOGY

APPROACH

The CASE study committee meetings were conducted throughout the study period. The following is a list of organizations that presented at the committee meetings:

- Connecticut Board of Regents for Higher Education (BOR)
- Connecticut Department of Economic and Community Development (DECD)
- Connecticut Department of Labor (DOL)
- Connecticut Office of Workforce Competitiveness (OWC)
- Connecticut State Department of Education (SDE)
- Education Commission of the States
- Georgetown Center on Education and the Workforce, Georgetown University
- Jobs for the Future
- Lex Products
- Olive-Harvey College, City Colleges of Chicago
- SkillProof
- The Next American Economy
- Towers Watson
- University of Minnesota
- University of Pennsylvania, Wharton School
- Western Interstate Commission for Higher Education
- World Affairs Council of Connecticut
- Wallingford Public Schools

In addition to the committee meeting presentations, the research staff conducted interviews of various workforce system stakeholders. Focus group sessions were also conducted throughout the state; these sessions included representation from secondary and higher education, state agencies, labor and trade associations, the regional workforce investment boards, and industry representatives from small to large manufacturers, healthcare, nonprofit sector, and technology firms.

In accordance with the legislation authorizing this study, Public Act 11-1, Section 37, the study was conducted in consultation with DECD, DOL, and BOR, as well as SDE. These agencies were invited to attend all study committee meetings; provided access to study research materials and video recordings of most study committee meetings and guest speakers; and asked to provide comments as a “fact check” on the content of the study report. Additionally, staff of several state agencies were interviewed and participated in the study’s focus group sessions.

VISION

The study committee developed a workforce alignment vision that guided the study’s research, findings and recommendations, as follows:

Workforce alignment is the efficient and flexible collaboration of state and local public and private entities that educates and trains a dynamic and globally competent workforce that (1) obtains sustainable jobs, (2) provides value to the current and future needs of businesses and industries, and (3) is an asset for the region to attract and retain workers.

INTRODUCTION

The impetus for this study was the recognition that, on the heels of the Great Recession, the state did not have an effective workforce alignment system to help residents and businesses recover from the economic downturn. This study was conducted at a time in which the General Assembly and the governor were realigning the workforce system and actively pursuing fundamental structural reforms.

The state is increasingly under pressure from other states and global competitors. A recent study by the Center for Postsecondary and Economic Success shows that to remain globally competitive, the United States must produce 24 million additional degrees—115,713 of them in Connecticut—by 2025 to achieve a 60% degree attainment rate among adults ages 25 to 64.⁶ Further, the recent recession has made it even more evident that policymakers need to focus on matching the skills of the workforce with the needs of employers. For example, Harvard Business School professor Rosabeth Moss Kanter estimated that as much as a third of the increase in unemployment during the Great Recession was due to the mismatch between skills and jobs, with the gap greatest between jobs that require more than a high school diploma but less than a bachelor's degree.⁷

Although Connecticut has high educational attainment and personal income among its residents, high net in-migration of residents with college degrees masks degree completion challenges among Connecticut residents, particularly underrepresented and low-income students. Some of the challenges facing the state include⁸:

- difference in college attainment between whites and minorities—46th in nation
- low degree productivity among adults age 18 to 44 who do not have a degree—33rd in nation
- low minority degree completion—15th in nation
- high unemployment—3rd highest in Northeast and 20th nationally

However, the General Assembly and governor have been actively seeking ways to address education and workforce challenges. With the change in executive leadership, there have been many changes within the workforce alignment system. This has resulted in a state of flux for the system. A few examples of such changes include restructuring of state agencies, absorption of commissions and many personnel changes, including some positions that have yet to be filled. Therefore, many agencies are in the process of developing new strategic plans and setting goals.

Furthermore, prior to the Malloy administration, there were significant gaps in the focus on workforce alignment so there was no structured, formal dialogue or coordination of public policymakers to discuss and react to workforce alignment system needs. Some of these gaps

⁶ The Center for Postsecondary and Economic Success, "Credential Differential: The Public Return to Increasing Postsecondary Credential Attainment," April 2012.

⁷ Foroohar, Rana, "These Schools Mean Business," TIME, April 9, 2012

⁸ Education Commission for the States, "Connecticut Policy Profile," 2012.

were addressed during the 2011 and 2012 legislative sessions and information on some of the major bills can be found later in this report. Given increased national and global competition, the state will need to determine ways in which it can leverage investments to align workforce supply with current and future employer needs so that students and employers are competitive on a national and global scale.

2009 LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS (PRI) COMMITTEE REPORT: ALIGNMENT OF POSTSECONDARY EDUCATION AND EMPLOYMENT

SUMMARY OF THE REPORT

The PRI committee conducted a study of *Alignment of Postsecondary Education and Employment (2009)*, examining whether a formal alignment mechanism exists in Connecticut to match the production of skilled graduates from the state's higher education institutions with the current and projected workforce needs of the state's employers. The study also assessed current workforce supply and employer needs, and reviewed whether pathways exist for technical high school graduates to pursue postsecondary education certificates and degrees. Finally, the study examined two areas in depth—nursing and green collar jobs—to see if there were successful state strategies to be replicated in other occupational shortage areas.^{9, 10}

Therefore, the CASE study begins with an analysis of the PRI study to provide context for the workforce alignment system. Although the PRI study was recently completed, there have been many changes in government that warrant another examination of Connecticut's workforce system. For example, Governor Malloy was elected in 2010 and enacted several major changes to the structure of the workforce system, in addition to addressing some of the recommendations put forth by the PRI committee. This section highlights the PRI committee's major findings and recommendations, with more detail provided in Appendix C.

OVERALL FINDINGS

The PRI committee found that the alignment of postsecondary education and employment was not a new issue; there had been many efforts through either legislation or by organizations and businesses outside of government to create desired linkages. Although multiple efforts were identified, there was no central authority that could implement across-the-board strategies, policies, or programs. Therefore, initiatives were occurring in a fragmented fashion rather than through a systematic process.

The committee identified five broad barriers contributing to the misalignment of postsecondary education and employment:

⁹ The analysis and recommendations related to this part of the study are not included since they do not pertain to the scope of this study.

¹⁰ Green Collar Jobs was included in the analysis not because a shortage or misalignment was identified but because of recent national and state efforts to promote the industry. These include an array of grants from the American Recovery and Reinvestment Act of 2009, Governor Rell's Executive Order No. 23, and statutory changes promoting green industries. In fact the study committee found that there isn't a standard definition for a green collar job which makes it difficult to estimate the size of the workforce; projecting future demand; and aligning education and training needs for the industry. However, in the late 1990s a nursing shortage was identified and the legislature mandated a study. The study cited the poor quality of state data but used existing national and state survey information to identify the shortage and proposed strategies that helped alleviate the shortage.

1. Barriers Related to Elementary and Secondary School Systems

- o *Findings:* Increasingly, more students entering college are not prepared for college-level work and require remedial or developmental courses.
- o *Recommendations:* Strengthen high school graduation standards and increase efforts in high school to reduce the need for remediation in college.

2. Barriers Related to Postsecondary Education Institutions

- o *Findings:* As a result of an increase in students entering college unprepared academically, particularly at community colleges, graduation rates have remained low. For example, Connecticut ranks in the bottom 20% nationally for associate degree completion rates and in the top 20% for bachelor's degree completion rates. Further, many colleges see the student as the customer and the college's role as finding a fit for what the student wants to do rather than meeting employer needs. There are conflicting viewpoints on whether they are preparing generalists or specialists.
- o *Recommendations:* Encourage the use of computer-assisted tools and contextual learning for remedial coursework, use peer tutors, and implement an early warning system when students appear to be struggling.

3. Difficulty in Making Accurate Demand Projections

- o *Findings:* In general, the ability to forecast ten years into the future the types of jobs that will be available is limited and there is a lack of awareness of the projections by postsecondary education institutions and students. In particular, the committee found that while local school districts know about teacher shortage information, it is not shared with colleges that have teacher preparatory programs. There is also limited information on the accuracy of the state Department of Labor (DOL) job demand projections. For instance, department staff do not look back to determine whether previous projections were accurate. However, PRI assessed the accuracy of projections made in 1998 for the year 2008 and found they were within 10% of actual estimates about one-third of the time, similar to the accuracy of national projections. Projections two years into the future were accurate to within 10% approximately half the time.
- o *Recommendations:* The PRI committee recommended: 1) pursue development and use of an electronic job vacancy methodology to provide current and near-future information on job demand in Connecticut; 2) annually compile teacher shortage area data for at least the past five years and make teacher preparation programs aware of this data; 3) change the electronic distribution of the DOL job demand information in an effort to make more people aware of it; and 4) solicit feedback on what information students need in making career decisions.

4. Current Economic Challenges

- o *Findings:* It is difficult to predict economic recessions and their impact on employment.

5. Barriers Related to State Agency Organization, Programs, and Policies

- o *Findings:* Connecticut's public higher education process for decision making occurs 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. Colleges are funded according to enrollment, revenues received, and operating expenses rather than outcomes such as degree completion rates.
- o *Recommendations:* Develop a master strategic plan that links the roles of the separate constituent units and includes how the higher education system relates to the P-12 system and workforce needs of the state; develop strategies for constituent units to implement if they fail to make progress on accountability measures; establish a pilot program within the Department of Higher Education to reward colleges, universities, or systems that are meeting pre-established accountability goals; examine whether academic programs or career pathways need to be established to meet workforce needs; and require the CT Community College System to examine the feasibility of transferring adult education programs from the technical high schools to the community colleges.

STATUS OF PRI REPORT RECOMMENDATIONS SINCE 2009

The following is a summary of the action steps that have been taken to address the five barriers identified in the 2009 PRI report since the report was issued:

1. Barriers related to elementary and secondary school systems

- o P.A. 10-111 was passed, which increased the number of credits needed to graduate from high school starting with the graduating class of 2018.
- o The full PRI recommendation encouraged high school juniors to take the Accuplacer exam as a way to avoid remedial classes in college. However, since the districts would have to pay for the cost of Accuplacer, no action was taken.
- o Adoption of the Common Core State Standards – however implementation is still underway.

2. Barriers related to postsecondary education institutions

- o Most of the recommendations did not receive any action. However, four community colleges in the state are involved in the Carnegie Foundation for the Advancement of Teaching pilot and there are efforts to develop a Statistics Pathway course that integrates basic skills into the college-level math curriculum.

3. Difficulty in making accurate demand projections

- o The DOL Office of Research is actively involved in a research program to examine electronic job board data as a measure of “real time” occupational demand/forecasting capability for green jobs and occupations. Under the umbrella of the Northeast Consortium green LMI research project, the group is currently defining the location and usability of such data, and anticipates recommendations to result.

- o With the passage of P.A. 11-133, SDE is required to annually compile and electronically distribute information on teacher shortage areas, for at least the past five years, to institutions of higher education in the state offering a teacher preparatory program.
- o A statewide survey of guidance counselors, admission officers, and career counselors will be conducted in anticipation of the 2012 Career Pathways publication issued by the Connecticut Department of Labor.

4. Current Economic Challenges

- o The report did not make any specific recommendations for addressing this barrier.

5. Barriers related to State Agency Organization, Programs, and Policies

- o Proposed legislation for all these recommendations either was not recommended by the PRI committee or failed in other committees. Therefore, the recommendations as proposed by this report have not been implemented. However, during the 2011 legislative session, major changes were made to the structure of public higher education in Connecticut which addressed the finding that Connecticut's system is decentralized.

Based on the PRI committee's findings and recommendations, five bills were raised in the 2010 legislative session, with one (HB 5164) adopted as P.A. 10-156:

1. SB 266, which required a review of whether the transfer of adult education programs from the technical high school system to the community college system would better promote career ladders for adults if these programs were offered in a higher education environment;
2. SB 268, which created a pilot program that would create incentives for public institutions of higher education to achieve certain outcomes, giving the commissioner of the Department of Higher Education (which no longer exists) discretionary funds to reward those institutions;
3. HB 5164 (P.A. 10-156) addressed potential barriers to the alignment of postsecondary education and employment in the green industry requiring greater collaboration and communication for green technology initiatives in higher education and across the workforce system;
4. HB 5165 attempted to strengthen high school graduation standards as a way to better prepare graduates for the skills and knowledge needed to succeed in the workforce and in college; and
5. HB 5349 required creation of a strategic plan and coordination process for aligning postsecondary education and employment.

Since many of the recommendations made by the PRI committee were not adopted, several of the findings of this report mirror what was found in the PRI report. For example, DOL is still exploring the possibility of using real-time data to enhance projection of future occupational needs. The continued need to enhance workforce projections through the use of real-time data as opposed to only historical data is discussed in this report's findings on data and information.

There is also still a need for communicating to the public information that is produced and available through DOL.

Further, a major finding of the PRI report included barriers related to Connecticut's decentralized system for public higher education. As previously noted, Governor Malloy, with approval of the General Assembly, consolidated the public state university and community college system for the purpose of aligning and consolidating public higher education. Additionally, the newly created Board of Regents, as of the fall of 2012, began the process of developing a strategic plan for the universities under its control. Also, the governor recently reconstituted the Higher Education Coordinating Council and tasked it with developing accountability metrics, another recommendation of the PRI committee.

CURRENT SYSTEM

Connecticut is home to approximately 3.5 million people. Of the state's population, approximately 22% are under the age of 18 and 63% are between the ages of 18 and 64. However, population projections predict the state's share of the population that is over the age of 65 will grow from 14% to 22% by 2030. Further, the state's pool of potential workers will peak in 2015, at about 2.2 million, and then decline to 2 million by 2030.¹¹

Currently the state's working-age population (age 20-64) is predominantly non-Hispanic white, at about 72%; however, by 2030 this group is expected to shrink to only about 58% of the working-age population. This means minorities will grow, from comprising 28% of the working-age population to making up 42% in 2030.¹²

With the changing demographics, the state faces potential future workforce shortages due to lower population levels and lower levels of educational attainment. In order to prepare for the future, the state must first ensure it has a system that can respond to the changing needs of the population. The first step in addressing these future challenges is to look at the current state agencies, councils, boards, and entities that are involved in the workforce system and then determine if the state has the right structure and system to align the workforce with current and future needs.

Since Governor Malloy took office in January 2011, he and the General Assembly have made some significant changes to the structure of the executive branch and have placed a great deal of emphasis on recognizing that the state's talent and future workforce are an essential component for economic growth. To this end, the public higher education system was consolidated, with the exception of the University of Connecticut, and the Connecticut Employment and Training Commission (CETC) was reconstituted to lead efforts across state agencies to ensure that Connecticut "creates and sustains the global economy's best educated, most skilled, and most productive workforce" (CETC 2012 Annual Plan).

This section of the report examines the key agencies, councils, offices, and advisory boards that have a role in workforce development and coordinating workforce alignment efforts even if it is not part of the agencies' missions. Figure 4.1 shows an overview of the structure of the state's current workforce system.

11 CT State Data Center

12 Rodriguez, Orlando, "Connecticut's Changing CT Voices for Children, February 2012.

EDUCATIONAL SYSTEM

Connecticut has a robust higher education system, with 18 public higher education institutions, 29 independent colleges and universities, and the US Coast Guard Academy, which operates under federal authority. This section describes the various educational institutions in Connecticut from preK-12 through higher education.

BOARD OF REGENTS

The Board of Regents for Higher Education governs the regional community college system, the Connecticut State University System, and Charter Oak State College. All 17 college and university presidents report directly to the president of the Board of Regents. In the 2011 budget implementer (Public Act 11-48), the four universities of the Connecticut State University System, the 12 public community colleges, Charter Oak State College and the Department of Higher Education were consolidated, and a Board of Regents was created to oversee the new system.

The Board consists of 19 members, with

- nine appointed by the governor
- one appointed by the Senate president pro tempore
- one appointed by the minority leader of the Senate
- one appointed by the speaker of the House
- one appointed by the minority leader of the House
- two university system students and
- four ex-officio members, including the commissioners of education, labor, public health, and economic and community development.

The governor is responsible for appointing the president of the Board of Regents, which is then responsible for recommending the presidents of the individual colleges or universities. The board's responsibilities, laid out in C.G.S. Sec. 10a-6, are to

- establish statewide policy and guidelines for Connecticut's system for public higher education
- develop a higher and postsecondary education master plan
- establish statewide tuition and financial aid policies
- evaluate institutional effectiveness
- merge and close institutions
- review and approve mission statements of the constituent units and the role and scope statements for the individual institutions
- review and approve new academic programs

- develop criteria to ensure acceptable quality in programs and institutions and enforce standards through licensing and accreditation
- prepare and present to the governor and the General Assembly a consolidated operating and capital expenditure budget for public higher education
- review and make recommendations on plans received from the constituent unit boards of trustees for the continuing development and maximization utilization of the state's public higher education 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 private institutions to study ways to coordinate efforts of all state universities and colleges
- 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
- develop and maintain a central higher education information system and establish definitions and data requirements for the state system of higher education, and
- undertake studies and activities as will best serve the higher education interests of the state.

Connecticut State Universities (CSU) - The CSU comprises four universities geographically dispersed throughout the state (New Britain, Willimantic, Danbury and New Haven). The universities offer certificates and associate degrees to doctorate degrees, depending on the university. Table 4.1 shows fall 2011 enrollment figures for the four universities. Overall undergraduate enrollment was 29,949 with graduate enrollment totaling 6,098 students.

TABLE 4.1: FALL 2011 ENROLLMENT AT CONNECTICUT STATE UNIVERSITIES
SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS, FALL 2011 DATA

	Central	Eastern	Southern	Western	Total
Undergraduate	10,092	5,346	8,696	5,815	29,949
Graduate	2,429	240	2,837	592	6,098
% Minority*	28%	23%	34%	27%	
% CT residents*	95%	92%	92%	91%	
*Undergraduates only					

Connecticut Community Colleges - There are 12 community colleges in the state, regionally dispersed throughout the state (Enfield, Hartford, New Haven, Bridgeport, Manchester, Middletown, Waterbury, Winchester, Norwalk, Killingly, Norwich and Farmington). Table 4.2 shows fall 2011 enrollment figures for the twelve community colleges. Collectively, a total of 57,674 students, almost all from Connecticut, were enrolled in the community colleges.

TABLE 4.2: FALL 2011 ENROLLMENT AT CONNECTICUT COMMUNITY COLLEGES
SOURCE: NATIONAL CENTER FOR EDUCATION STATISTICS, FALL 2011 DATA

	Enrollment	% Minority	% CT residents
Asnuntuck	1,687	21%	89%
Capital	4,512	79%	100%
Gateway	7,261	54%	99%
Housatonic	5,975	63%	100%
Manchester	7,499	40%	100%
Middlesex	2,876	32%	100%
Naugatuck Valley	7,361	39%	99%
Northwestern CT	1,701	14%	99%
Norwalk	6,807	59%	99%
Quinebaug	2,101	31%	99%
Three Rivers	5,154	32%	100%
Tunxis	4,740	31%	100%
Total	57,674	46%	99%

Charter Oak State College - In 1973, the legislature established Charter Oak State College to provide an alternative way for adults to earn certificates, associate and bachelor's degrees. It is a distance learning college offering video and online courses to both Connecticut and non-Connecticut residents. It also provides lifelong learning opportunities whereby students can earn college credits through assessments that prove proficiency. A few examples of these opportunities include foreign languages, public speaking, and physical education courses. In fall 2011, there were 2,241 students enrolled and 89% were part time.

UNIVERSITY OF CONNECTICUT

The University of Connecticut is the state's public research university. The university was founded in 1881 as the Storrs Agricultural School and became the University of Connecticut in 1939. In the fall of 2012, there were 30,256 undergraduate and graduate students enrolled, of which 74% are undergraduate students; 79% of the undergraduates attend the Storrs campus.

The university has ten schools and colleges at the main campus in Storrs in addition to a School of Law and Graduate Business and a School of Social Work in Hartford, five regional campuses throughout the state, and a dental school and medical school at the UConn Health Center in Farmington, with 102 majors, 88 graduate fields of study, and 5 professional degree programs.

The university is governed by a 21-member board of trustees, of which 12 members are appointed by the governor, students and alumni elect two members each, and there are five ex-officio members including the governor and commissioners of agriculture, education, and economic and community development. The UConn board is responsible for governing the university and developing its mission statement, including the role and scope of each branch campus.

CONNECTICUT CONFERENCE OF INDEPENDENT COLLEGES (CCIC)

The Connecticut Conference of Independent Colleges represents 16 nonprofit independent colleges and universities in the state. The following institutions are members of CCIC:

- Albertus Magnus College
- Connecticut College
- Fairfield University
- Goodwin College
- Mitchell College
- Quinnipiac University
- Rensselaer at Hartford
- Sacred Heart University
- St. Vincent's College
- Trinity College
- University of Bridgeport
- University of Hartford
- University of New Haven
- University of Saint Joseph
- Wesleyan University
- Yale University

The presidents of the member institutions comprise the board of the CCIC. Member institutions offer associate degrees through graduate and professional degrees. There are approximately 66,000 students enrolled in the private colleges and 42% are Connecticut residents. The independent colleges enroll 36% of all postsecondary students statewide and award 47% of all degrees granted in the state.¹³

OFFICE OF HIGHER EDUCATION

The Office of Higher Education (OHE) – formerly known as the Office of Financial Academic Affairs for Higher Education but renamed in P.A. 12-156, An Act Consolidating Connecticut's Higher Education System – administers several programs previously administered by the former Department of Higher Education and the Board of Governors for Higher Education. The OHE was placed within the Board of Regents for administrative purposes only. The office is led by an executive director who is appointed by the governor and subject to legislative confirmation.

13 http://www.theccic.org/Resources/CCIC_Presentations/ accessed 10/25/12

OHE administers financial aid programs, licenses and accredits independent colleges and universities, oversees private occupational schools, administers the alternate route to certification program, and administers the student community service fellowship program.

STATE BOARD OF EDUCATION

The State Board of Education (SBE) governs the SDE. As of July 2012, the board consists of 14 members appointed by the governor with the advice and consent of the General Assembly. Two of the members must have experience in manufacturing or a trade offered by the technical high school system; one member must have experience in agriculture; and two must be non-voting student members. The members are appointed to four-year terms, and the student members are appointed to one-year terms. The president of the Board of Regents serves as an ex officio, non-voting member along with the chairperson of the technical high school system board. The State Board of Education recommends to the governor the appointment of the commissioner of education, who serves as the secretary to the Board for a term coterminous with that of the governor.

Section 10-4 of the Connecticut General Statutes assigns to the Board responsibility for "... general supervision and control of the educational interests of the state, which interests shall include preschool, elementary and secondary education, special education, vocational education and adult education..." Section 1 of Public Act 97-290 amended the definition of "educational interests of the state" by including the following language: "In order to reduce racial, ethnic and economic isolation, each school district shall provide educational opportunities for its students to interact with students and teachers from other racial, ethnic, and economic backgrounds..." The Board establishes education policy, prepares legislative proposals, sets academic standards for teachers and students, administers a \$2.45 billion annual general fund budget and provides leadership and support services to Connecticut's 149 local and 17 regional school districts.

The Board's priorities are described in its existing five-year plan, *A Superior Education for Connecticut's 21st Century Learners -2006-2011*.¹⁴ The plan states the Board's rationale for selecting the following three priorities, and actions the state will take to achieve expected outcomes in each area: high-quality preschool education for all students; high academic achievement of all students in reading and writing, mathematics and science; and high school reform.

CONNECTICUT STATE DEPARTMENT OF EDUCATION

The Connecticut State Department of Education (SDE) is the administrative arm of the Connecticut State Board of Education. Through leadership, curriculum, research, planning, evaluation, assessment, data analyses and other assistance, the department helps to ensure equal opportunity and excellence in education for all Connecticut students. The department is responsible for distributing funds to the state's 166 school districts. It also operates the state's technical high school system and adult education programs. In the 2010-2011 school year there were 556,184 students attending public schools.

Career and Technical Education - Through the federal Carl D. Perkins Career and Technical Education Improvement Act of 2006, P.L. 109-270, the SDE distributes funds to approximately 117 districts, 12 Connecticut community colleges, and the University of Connecticut for the

¹⁴ As of November 2012, SDE is in the process of developing a new 5-year plan that will likely cover the period of 2013 - 2018.

improvement of career technical education (CTE) programs (formerly known as vocation education). In 2011-12, districts reported secondary level student participation of 133,037 in CTE courses. In the same year, at the postsecondary level, 64,049 community college students participated in CTE courses. In addition to Perkins formula distribution of funds, districts and community colleges apply for Perkins competitive funds for innovative programs.

Carl D. Perkins funds are utilized in the comprehensive high schools for elective courses in career pathways leading to postsecondary education. Courses in Agricultural Science, Business and Finance Technology, Cooperative Work Education, Family and Consumer Sciences, Medical Careers, Marketing Education, and Technology Education are aligned to the nationally-recognized 16 Career Clusters, one identified as the STEM cluster. However, CTE courses throughout the career clusters may be considered STEM, such as those offered through Medical Careers and Agricultural Sciences.

CTE Programs in Connecticut high schools provide students with opportunities to

- explore and investigate careers as an extension of their classroom curriculum in order to make more informed decisions regarding post-secondary education and career plans;
- attain career, technical and academic skills leading to postsecondary education and careers;
- learn about workplace safety through exposure to the Connecticut Young Worker Safety curriculum;
- earn CTE and college academic course credit while in high school through the College Career Pathways Program (CCP);
- participate in a continuum of developmentally appropriate, structured work-based learning opportunities such as career fairs, college and career tours, job shadows, community service projects, and paid internships; and
- through a collaboration between SDE and DOL and a strict SDE/DOL review and approval process, students enrolled in approved CTE programs that have a required work-based learning component are able to be placed in paid internships, including paid internships within potentially hazardous occupations typically prohibited to minors such as manufacturing; these positions are highly structured, monitored by SDE and mentored by the employers. An example of this opportunity is the Sikorsky/Teamsters Career Pathways Summer Internship Program.

Perkins IV legislation requires states to report performance levels for secondary students who concentrate in CTE courses under the following core indicators:

1. Academic Achievement: based on math and reading standardized scores
2. Skill Attainment: based on CTE skill performance derived from the Connecticut CTE Assessment System
3. Placement : derived from a graduate student survey six months following graduation which indicate student placement in employment, the military, or postsecondary education

4. Completion: completion rate for students who have participated in a concentration of CTE courses and graduate
5. Graduation: graduation rate for students who have concentrated in CTE courses and graduate
6. Non-Traditional Participation: participation of students who enroll in CTE courses where 25% or less of a particular gender occupies a specified occupational area, i.e., female participation in CTE pre-engineering courses
7. Non-Traditional Completion: Students who complete a concentration of CTE courses where 25% or less of a particular gender occupies a specified occupational area, i.e., males completing a concentration of courses in early childhood

In 2011-12, students who concentrated in CTE courses performed at approximately 8.0% higher than students who did not concentrate in CTE courses on the Connecticut Academic Performance Test (CAPT) in mathematics and reading. Historically, students who concentrate in CTE courses well outperform the NCLB targets for mathematics and reading on an annual basis.

States must meet federally agreed upon performance levels for each of the above core indicators each fiscal year as a part of the Perkins State Plan. The Connecticut Community College System has comparable core indicators reported to the US Department of Education, Office of Adult and Vocation Education (OVAE), on an annual basis required for the continuation of Perkins funds.

Technical High School System (CTHSS) – As a result of P.A. 12-116, An Act Concerning Educational Reform, the regional vocational-technical (V-T) schools were renamed to the technical high school system. There are 16 degree-granting technical high schools, one technical education center, and two aviation maintenance programs serving approximately 11,200 full-time high school and adult day students. The system is overseen by a superintendent who is jointly recommended by the Technical High School Board and commissioner of education and appointed by the SBE. The superintendent is responsible for the operation and administration of the technical high school system. The mission of the technical high school system is to provide a unique and rigorous high school learning environment that

- ensures both student academic success, and trade/technology mastery and instills a zest for lifelong learning;
- prepares students for postsecondary education, including apprenticeships, and immediate productive employment; and
- responds to employers' and industries' current and emerging and changing global workforce needs and expectations through business/school partnerships.

Adult Education – In Connecticut, state legislation mandates the provision of adult education services, free of charge, to any adult 17 year of age or older not enrolled in a public elementary or secondary school program. Adult education services include instruction in elementary and secondary completion programs or classes; English as a second language; and American citizenship classes. There are currently over 300 locations throughout the state that deliver adult

education services. The providers of services include local school districts, regional educational service centers (RESC), community faith-based organizations, and other agencies. Nearly 30,000 residents are served annually through these providers.

Title II of the federal Workforce Investment Act (WIA) Public Law 105-220 requires each state to submit a five-year plan for adult education to the US Department of Education. Connecticut utilizes federal adult education funds to expand program offerings and provide a wide variety of agencies the opportunity to offer locally responsive programs.

Title II of WIA outlines the following three core indicators of performance for adult education programs:

1. Demonstrated improvements in literacy skill levels.
2. Placement in, retention in, or completion of postsecondary education, training, unsubsidized employment or career advancement.
3. Receipt of a secondary school diploma or its recognized equivalent.

For each of these core indicators, states must negotiate performance targets based on the projected percentage of students that achieve each indicator. Connecticut's negotiated performance levels for each fiscal year are included in its annual State Plan revision, as required by Title II of WIA, and then submitted to the CETC for its approval and to the governor for final review.

TECHNICAL HIGH SCHOOLS BOARD

During the 2012 legislative session, the Education Reform Act created a new board to govern the state's technical high school system and transferred authority for running the system from SBE to the new board. The new 11-member board consists of

- four executives of Connecticut-based employers appointed by the governor from nominees from the Connecticut Employment and Training Commission;
- five members appointed by SBE; and
- the commissioners of the departments of economic and community development and labor.

The governor appoints the chairperson of the CTHSS board, who also serves as a nonvoting ex-officio member of the SBE. The SBE appoints the system's superintendent based on a joint recommendation of the CTHSS board and the SDE commissioner. The board is also responsible for approving operating budgets, establishing specific achievement goals for students, and is required to identify quantifiable measures for each school and measure its performance. Examples of measures to be included are

- performance on the 10th grade Connecticut Academic Performance Test (CAPT);
- trade-related assessment tests;
- dropout rates; and
- graduation rates.

STATE AGENCIES

DEPARTMENT OF LABOR

The Department of Labor (DOL) is part of the executive branch, with the commissioner appointed by the governor. The commissioner's workforce development duties, as set forth in statute (C.G.S. Sec. 31-2), include: coordinating all employment and training programs in the state; implementing the CETC plan; and maintaining an inventory of all employment and training programs in the state including funding sources and numbers served for each program.

Within the DOL, regional workforce investment boards for each of the five workforce development regions in the state are responsible for providing the commissioner with labor information for their region and also for carrying out the duties and responsibilities for purposes of the federal Workforce Investment Act. Board responsibilities include oversight, strategic planning, and policy-making related to workforce development activities provided through the One-Stop delivery system. Nineteen One-Stop delivery centers are located locally in eight regions of the state and work in close collaboration with local elected officials. They are essentially responsible for leading the workforce investment system in each local area. The boards comprise representatives from community-based organizations, state and local organized labor, state and municipal government, human service agencies, economic development agencies, community colleges and other educational institutions, including secondary and postsecondary institutions and regional technical high schools. The DOL disperses funding for particular programs, such as funding for incumbent worker training and youth employment and training, through the boards.

The One-Stop delivery system is the front line of the state's workforce investment system. These locally based centers are intended to allow services to be streamlined and accessible to those who need the services by requiring the co-location of workforce partner representatives in the One-Stop centers.

OFFICE OF WORKFORCE COMPETITIVENESS

Prior to 2011, OWC served as an independent state agency within the Office of Policy and Management for administrative purposes only; however, Governor Malloy changed the structure so that OWC is now an administrative unit within the DOL and provides administrative services for the CETC. During the 2011 legislative session, OWC was transferred to the DOL, making it an administrative unit of DOL.

OWC's primary responsibilities are to assist the labor commissioner with the following:

1. Serve as the governor's principal workforce development policy advisor and liaison with local, state, and federal workforce development agencies
2. Coordinate the state's implementation of the federal Workforce Investment Act of 1998, P.L. 105-220
3. Annually forecast workforce needs and recommend ways to meet those needs

4. Review, evaluate, and recommend improvements to the certification and degree programs offered by the technical high schools and the community colleges and develop strategies linking education skill standards to business and industry training and employment needs
5. Create an integrated system of statewide advisory committees for each career cluster offered as part of the regional technical high schools and community college systems
6. Participate in a working group to define preservice and minimum training requirements and competencies for people involved in early childhood education

After OWC was made an administrative unit of DOL, many of its previous responsibilities were either transferred to be the responsibility of DOL or DECD. For example, OWC now assists (whereas previously it was solely responsible for) the DOL commissioner in creating, in consultation with the superintendent of the regional technical high school system, an integrated system of statewide industry advisory committees for each career cluster offered as part of the regional technical high school and regional community college systems.

DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT

The Department of Economic and Community Development (DECD) is part of the executive branch, with the commissioner appointed by the governor. The agency's workforce development duties and responsibilities, according to C.G.S. Sec 32-1c, include the following:

- to encourage and promote the development of industry and business in the state
- to promote and encourage the location and development of new business in the state as well as the maintenance and expansion of existing business

The DECD mission is to develop and implement strategies to attract and retain businesses and jobs, revitalize neighborhoods and communities, ensure quality housing and foster appropriate development in Connecticut's towns and cities.

With the reorganization of OWC to DOL, DECD was given additional workforce-related responsibilities that were previously the responsibility of OWC. These additional responsibilities include

- running the Innovation Challenge Grant program and establishing a Council of Advisors on Strategies for the Knowledge Economy to promote the formation of university-industry partnerships;
- funding a grant program, within available appropriations, to promote the commercialization of research completed by institutions of higher education and also to create a grant program to promote research collaboration between industry and higher education.

OTHER STATE AGENCIES WITH WORKFORCE PROGRAMS

Department of Social Services (DSS) – The department administers the Supplemental Nutrition Assistance Employment and Training program, which assists Supplemental Nutrition Assistance Program (SNAP) recipients. Services under this program include, but are not

limited to, job search training and education and training programs. DSS also operates the Senior Community Service Employment Program under Title V of the Older Americans Act. This provides employment at nonprofit settings for persons 55 years and older. Although DSS administers Temporary Family Assistance, the employment component of this program, Jobs First Employment Services, is administered by the Department of Labor in partnership with DSS and the five regional workforce investment boards.

Department of Corrections (DOC) – The department administers a Work Release program to assist offenders in obtaining meaningful employment. The goal upon discharge is for each offender to secure stable employment, a place to live, and sufficient savings to live independently. Offenders reside in these programs for four months under 24/7 supervision. The department also runs a non-residential employment program for released offenders to obtain and maintain employment.

Department of Children and Families (DCF) – The department administers a work/learn program that helps young people, ages 14-23, address the challenges for successful transition to a self-sufficient adulthood.

Department of Mental Health & Addiction Services (DMHAS) – The department funds 35 community-based organizations across Connecticut to provide a broad menu of employment and education services. These services include career planning, job search assistance, job placement, job coaching, and supported education.

OTHER RELATED ENTITIES - COUNCILS AND OFFICES

CONNECTICUT EMPLOYMENT AND TRAINING COMMISSION (CETC)

The Connecticut Employment and Training Commission (CETC) is Connecticut's State Workforce Investment Board, authorized under federal law (the Workforce Investment Act of 1998, or "WIA") and state statute. As such, CETC provides workforce-related policy and planning guidance to the governor and General Assembly, in pursuit of four broad goals:

- a competitive and growing state economy
- a highly skilled and competitive state workforce
- adult workers capable of attaining financial self-sufficiency
- students ready for work and postsecondary education upon high school graduation

Governor Malloy reconstituted the CETC in fall 2011 as the lead organization to guide the state's workforce-related policy and strategy. This was accomplished by reorganizing and restructuring the CETC and involving businesses and employers from key industries in the state.

Appointed by the governor, the majority of CETC's members represent business-sector employers, with the balance coming from public agencies, organized labor, education, regional workforce investment boards and community-based organizations. The governor appoints

a representative of business and industry to be the chairperson. The following list shows the current members of the committee:

- Lieutenant Governor
- Commissioner, DOL
- Commissioner, DSS
- Commissioner, SDE
- Commissioner, DECD
- Commissioner, DEEP
- President, Board of Regents
- Twelve representatives from business
- One representative from government
- One representative from a Community Action Agency
- Two representatives from labor
- Ex-Officio members representing:
 - o Labor
 - o CCSU
 - o Business
 - o Nonprofit foundation
 - o DMHAS
 - o Nonprofit organization
 - o DOC
 - o Hartford Public Schools
 - o OWC

CETC's efforts are focused on developing opportunities to strategically align the broad array of Connecticut's workforce development efforts with its job creation initiatives. Working through its committees and work groups, CETC is responsible for the following tasks:

- Study the workforce-related priorities and challenges of targeted industry sectors and economic drivers critical to state economic growth.
- Study the challenges impacting different segments of the state's talent pipeline (youth/future workforce; higher education students; incumbent workers; dislocated workers; aging workers; special populations, etc.).
- Study effective workforce-development policies, strategies and programs here in Connecticut and nationally to identify approaches that work to prepare people for productive, rewarding careers, focusing on key in-demand occupations in targeted industry sectors.

- Develop policy recommendations to align effective workforce-related resources, investments and strategies with economic development strategies to create and grow jobs.
- Assess and report regularly on the impact of these efforts.

CETC's work is conducted through its committees and associated work groups, with recommendations presented to the full CETC for consideration and action. During the last half of 2011, the members of CETC were assigned to the following committees and work groups:

- Planning and Performance Committee
- Connecticut's Green Jobs Partnership
- Career Advancement Committee
- Youth Employment Committee
- Industry Sectors Committee
 - o Allied Health Workforce Policy Board
 - o Advanced Manufacturing Work Group
- Adult Literacy Improvement Work Group

The committee, in fulfilling its tasks as mentioned above, completed and approved its annual plan in September 2012. The plan includes four overarching goals that serve as a broad framework for its policy and strategy. These four goals are

1. Business Growth—Connecticut businesses, particularly those in key industry sectors, will have access to the human resources and talent they need to compete effectively, prosper in Connecticut and create new jobs for Connecticut workers.
2. Current Workforce—All Connecticut workers will have the skills and credentials they need to prosper and advance in careers that pay well and provide good benefits to support their families.
3. Future Talent—All Connecticut youth will be ready for career and postsecondary success as productive contributors to a vibrant and competitive state economy.
4. System Transformation—Connecticut's workforce/talent-development system will support a world-class workforce and competitive economy through aligned and integrated goals, strategies, policies, services and infrastructure whose performance is regularly monitored and results evaluated.

For each of the four goals, CETC identified a set of indicators to be used to monitor progress quarterly. However, the progress metrics that were chosen are still pending review and approval by the commission. The Performance and Planning Committee continues to meet to develop the metrics. Also discussed at the CETC meeting in September was the possible addition of a life sciences work group.

HIGHER EDUCATION COORDINATING COUNCIL

The Higher Education Coordinating Council was established in statute in 1999 and is composed of the chairmen of the boards of trustees and the chief executive officers of each constituent unit of the state system of higher education along with the secretary of OPM and the commissioner of higher education. However, the legislation never specified who would organize the meetings and be administratively responsible so the council never materialized. In 2011, in conjunction with the reorganization of the higher education system, Governor Malloy reinvigorated the council, clarified its objectives and purpose, and assigned OPM responsibility for the administrative duties of the council.

The council now includes the Secretary of the Office of Policy and Management, President of the Board of Regents for Higher Education (BOR), President of the University of Connecticut, BOR Vice President for Community Colleges, BOR Vice President for Connecticut State University Systems, Chair of the Board of Regents for Higher Education, Chair of the Board of Trustees for the University of Connecticut, and Commissioner of State Department of Education. All members must attend the meetings, and only OPM can send a designee to the meetings. Since its reconstitution the council has met twice.

The council's purpose is to set accountability measures by which to assess each public institution of higher education's progress toward meeting the following goals:

1. Enhance student learning and promote academic excellence
2. Join with elementary and secondary schools to improve teaching and learning at all levels
3. Ensure access to and affordability of higher education
4. Promote the economic development of the state to help business and industry sustain strong economic growth
5. Respond to the needs and problems of society
6. Ensure the efficient use of resources

The council must also develop an implementation plan for use of the accountability measures. The council must consider graduation rates, retention rates, degree completions, tuition and fees, transfer patterns of students, trends in enrollment, and data on graduates by academic program, among others. The council must also work with the Department of Labor to produce periodic reports on the employment and earnings of graduates and develop an annual affordability index for public higher education that is based on statewide median family income. Each constituent unit is required to annually submit an accountability report to the BOR by November 1st each year. A consolidated report will then be submitted to the General Assembly by December 1st of each year. To carry out this work, the BOR was the recipient of a National Governors Association grant that will assist the council with developing and analyzing the metrics into a report. The council has met twice in 2012 and is working on the goals as set forth in the legislation.

P-20 COUNCIL

In January 2009, a P-20 Council was formed by executive order. The P-20 Council supported collaboration among four sectors: early childhood, K-12 education, higher education, and workforce training. The council was co-chaired by the president of the Connecticut Board of Regents for Higher Education and the state commissioner of education.

Since 2009, the P-20 Council met five times, with the last meeting occurring in September 2011. The council's focus was two-pronged: 1) creating data linkages across the education continuum, and 2) improving educator effectiveness.

In terms of addressing their first goal, creating linkages across the education continuum, the P-20 Council focused on collecting and broadly disseminating remediation data and 6-year college completion rates. Prior to the P-20 Council, this information was not broadly disseminated. As mentioned previously, the second focus of the council has been on educator effectiveness. In October 2011, the council hosted a series of workshops focused on college and career readiness that brought together leaders from K-12 and postsecondary education, career and technical education, adult education, state agencies, and other interested parties. Participants were given a college and career readiness toolkit that contained tools, techniques and strategies to work locally to improve college readiness.

In October 2012, the governor announced through executive order a revitalization of the objectives and updating of the membership of the P-20 Council. The reconstitution of the council reflects the reorganization of the state's of higher education system and also capitalizes on legislatively mandated education reform initiatives. The group's first meeting was set for November 30, 2012. The newly reinstated council will serve as an advisory group to the governor, with the following goals:

1. Serve as an advisory group that will have the capacity and responsibility to raise issues, discuss new ideas, and develop initiatives to address how the state can build a unified educational system.
2. Create a structure in the education community to allow stakeholders to lend their experience, perspective and feedback to the educational leaders of the state.
3. Act as an advocacy organization to promote educational standards and reforms that are being undertaken from early childhood education through graduate education.

The newly reconstituted council shall be chaired by the governor as a non-voting member and will comprise the following:

1. Ex-officio voting members, who can designate an individual to participate in their place:
 - o Commissioner, State Department of Education (Vice-Chair)
 - o President, Board of Regents for Higher Education (Vice-Chair)
 - o Commissioner, Department of Economic and Community Development
 - o Commissioner, Department of Labor
 - o Commissioner, Department of Social Services

- o Commissioner, Department of Children and Families
 - o President, University of Connecticut
 - o Early Childhood Planning Director, Office of Policy Management
 - o Vice-President (State Universities), Board of Regents for Higher Education
 - o Vice-President (Community Colleges), Board of Regents for Higher Education
 - o Chair, Connecticut Technical High School Governing Board
 - o Chair, Connecticut Employment and Training Commission
 - o President, Connecticut Conference of Independent Colleges (CCIC)
 - o Executive Director, Connecticut Association of Public School Superintendents (CAPSS)
 - o Executive Director, Connecticut Association of Boards of Education
 - o Executive Director, Connecticut Association of Schools (CAS)
 - o President, American Federation of Teachers, Connecticut Chapter (AFT)
 - o President, Connecticut Education Association (CEA)
 - o President, Connecticut Federation of School Administrators (CFSA)
 - o President, Connecticut Charter School Association
 - o Chair, Regional Education Service Center Alliance
2. Representatives from educational institutions and organizations within the state to be chosen by their institutions/organizations:
- o President, CCIC Member Institution
 - o Superintendent, CAPSS Member
 - o Chair of a district Board of Education, CABA Member
 - o Administrator, CAS Member
 - o Educator (AFT-CT Affiliation)
 - o Educator (CEA Affiliation)
 - o Administrator, CFSA Member
3. Three individuals to be appointed by the governor who represent the interests of parents and the Connecticut business community

OFFICE OF EARLY CHILDHOOD EDUCATION

The Office of Early Childhood Education was created as a result of P.A. 11-181 within the Office of Policy and Management. In May 2012 a director was appointed who is responsible for the planning and development of a coordinated system of early care and education. The plan is to

consolidate existing early childhood education and child care programs and services serving children, birth to age 8.

Currently delivery and design of early childhood education programs is driven by funding sources, with little to no coordination or collaboration between different agencies. For example, there is a child care component in the Welfare to Work program administered by the Department of Social Services but there is also the federal Head Start program run through the Department of Education. There also are limited data on whether the programs are producing the desired outcomes. However, as directed in the legislation, the newly created office is responsible for addressing these issues of fragmentation and lack of outcome data. The governor is also committed to the importance of early childhood education as indicated by increased funding for additional early childhood education openings, and he hosts regular meetings with the director of the Office of Early Childhood Education and the commissioners of DSS, DCF, SDE, and DPH to discuss ways to consolidate and create a statewide coordinated system.

In summary, there are many entities within the state that comprise the workforce system. Although many of the entities' missions do not directly specify job creation or workforce development, they still impact the workforce system and implement programs and policies related to Connecticut's workforce system. Therefore, when considering alignment of the workforce system in the state, it is important to factor in all entities that can and do have an impact.

RECENT LEGISLATIVE CHANGES

This section of the report highlights several major legislative changes that directly impact the workforce alignment system that occurred during the 2011 and 2012 legislative sessions. Governor Malloy and the General Assembly have been very active in enacting policy changes to address workforce challenges such as the state's structure for higher education and early childhood education, the need for more data and information, and preparation of the future workforce. However, the full extent of the impact on the workforce system from this recent legislation has not been realized and cannot be assessed at this time.

2011 SESSION

Public Act 11-1: An Act Promoting Economic Growth and Job Creation in the State

Job Training Incentives— The act established the Subsidized Training and Employment Program (STEP) within the Department of Labor to provide eligible small businesses and small manufacturers with grants for a portion of an eligible employee's costs of employment, including training, during the first six months of employment. A total of \$20 million in general obligation bonds was authorized for Fiscal Years 2012 and 2013. By June 30, 2012, the labor commissioner must report on the status of the program and include: 1) the number of small businesses and small manufacturers that participated in the program; 2) number of individuals employed under the program; and 3) most recent estimates of jobs created or maintained.

Workforce Development— The act requires the labor commissioner to review 1) DOL's current training programs; and 2) use of manufacturing industry volunteers for training in manufacturing skills at the vocational-technical schools outside of regular school hours and at the community-technical colleges. In November 2011 the Connecticut Employment and Training Commission established an Advanced Manufacturing Workgroup charged with developing short- and long-term recommendations to address the workforce challenges confronting the growth of advanced manufacturing in Connecticut. In March 2012, the workgroup issued their Phase One report, which inventoried DOL training programs, addressed the use of volunteers for training youth in the manufacturing industry, and provided recommendations intended to have short-term impact. In Phase Two the group will examine all manufacturing-relevant training programs, not just those within DOL, and provide recommendations to be implemented over the long term.

Workforce Forecasting and Coordination (section 34)— The act makes DECD an engaged and active partner in ensuring workforce needs are addressed through the vocational-technical (v-tech) schools where necessary based on feedback from the business community. In particular, DECD is required to submit the following:

1. Information regarding the relationship between DECD and v-tech schools
2. Information on collaboration with the v-tech schools and the business community

3. Workforce training needs
4. Recommendations to address workforce training needs
5. Information regarding efforts of DECD to utilize the v-tech schools in business assistance and economic development programs

Public Act 11-70: A New Master Planning Cycle for Higher Education

This act

1. modifies the requirements of the strategic master plan for higher education required by existing law;
2. renames the Blue Ribbon Commission originally formed to develop and implement the plan as the Planning Commission for Higher Education;
3. specifies that the commission must develop the plan and ensure its implementation, rather than develop and implement it as under prior law; and
4. restates and expands some existing plan requirements while eliminating others.

The act restates existing requirements in the strategic master plan concerning degree attainment, the number of people entering the workforce, and the achievement gap. It requires the plan to establish numerical goals for 2015 and 2020 that 1) eliminate the postsecondary achievement gap between minority students and the general student population and 2) increase the number of people who

- o earn a bachelor degree, associate degree, or certificate;
- o complete coursework at community colleges;
- o enter the state's workforce.

The plan must also provide specific strategies for meeting these goals and consider the impact of education trends on higher education in Connecticut.

The act also requires public and independent higher education institutions receiving state funding to track unique student identifiers for all in-state students enrolled at the institutions until the student graduates or is no longer enrolled.

Public Act 11-85: An Act Concerning Closing the Achievement Gap

The act authorizes or requires a number of steps to help state and local school districts address the achievement gap between racial and ethnic student groups. Among other things, the act establishes an Achievement Gap Task Force; establishes an interagency council for ending the achievement gap that assists the task force; permits low-achieving schools to extend the school year and school day; and requires SDE to approve and distribute model curricula for math and reading for grades prekindergarten to 4.

Public Act 11-133: Alignment of Postsecondary Education and Employment

The act requires OWC, biennially, to identify and report on the sectors or subsectors in which workforce shortages exist, the workforce skills needed in those sectors or subsectors, and which career pathways should be established, to the Board of Governors of Higher Education (now known as the Board of Regents), effective October 1, 2011.

The act also requires SDE to electronically distribute information on teacher shortage areas for at least the previous five-year period. This information must be distributed annually, by March 1, to the president of every higher education institution in Connecticut that offers teacher preparation programs. Effective July 1, 2011.

Public Act 11-135: High School Reform Delay

The act delays by two years the implementation of the secondary school reforms enacted in 2010 that increased the minimum number of credits to graduate from 20 to 25. Instead of the requirement starting with classes graduating in 2018, it will start with classes graduating in 2020.

The act also requires, starting July 1, 2012, that each local and regional board of education create a student success plan for each student enrolled in public school starting in grade six. A student success plan includes a student's career and academic choices in grades 6–12.

Public Act 11-140: An Act Concerning the Continuance of the Majority Leaders' Job Growth Roundtable

Sec. 1 - Revamps the eligibility criteria for student loan reimbursements for Connecticut residents graduating from public colleges and universities with degrees in specified fields and eliminates the reimbursements for non-degree training certificates in these fields. Among other things, the act expands the range of eligible degrees to include biomedical engineering and the manufacture of medical devices, but limits eligibility to residents working for a business related to their degree. Under prior law, residents had to hold a job related to their degree, but the job could have been in business, government, or the nonprofit sector.

Sec. 9- Creates a task force to study business and industry barriers in the state and identifies seven items the task force should focus on. A few of the items the task force was required to focus on include the establishment of links between state and international companies and institutions of higher education; the development of a global business plan; and the offering of fellowships to top entrepreneurs who spend one year developing a new firm in the state. By February 2012, the task force should have completed its work; however, a chairperson was never appointed and therefore a task force was never organized.

Sec. 30- Creates the Learn Here, Live Here Program which provides an incentive for graduates of public higher education institutions or regional vocational-technical schools to buy a first home in the state.

Public Act 11-181 –An Act Concerning Early Childhood Education and the Establishment of a Coordinated System of Early Care and Education and Child Development

The act creates, by July 1, 2013, a coordinated system of early care and education and child development. It requires the governor to appoint a planning director with the Office of Policy and Management (OPM) to develop a plan to implement the system. The act lists the systems' duties and specific items the planning director must consider in developing the implementation plan. The act eliminates SDE's Office of Early Childhood Planning, Outreach and Coordination. The act also changed the membership of the Early Childhood Education Cabinet and expanded it from 17 to 20.

2012 SESSION

Public Act 12-94: An Act Concerning Higher Education

Requires higher education institutions that participate in the Connecticut Independent College Student Grant (CICSG) program, Connecticut Aid for Public College Students (CAPCS) program, or Capitol Scholarship grant program to annually submit to the Connecticut Office of Higher Education information on recipients of the program such as grade point average, expected graduation data, and family contributions toward education costs.

Public Act 12-31: An Act Concerning the Development of a General Education Core of Courses to Allow for the Seamless Transfer Among Public Institutions of Higher Education

Requires the regional community college system and Connecticut State University System to implement a general education core of courses such that students can easily transfer between institutions and receive appropriate credit for courses taken. The University of Connecticut is not included in the bill.

Public Act 12-192: An Act Concerning the Sharing of Information between the Labor Department and the Board of Regents for Higher Education

This act allows the DOL to disclose employment records with the identifiers to the *president* of the Board of Regents for Higher Education (BOR) for use in his official duties to the extent necessary to evaluate programs at higher education institutions governed by BOR. Under current law, this information can be disclosed to nonpublic entities under contract with DOL to administer grants related to unemployment or to regional workforce boards administering certain state and federal programs. This bill allows the information to be disclosed to the BOR president only and not to other institutions of higher education or their governing boards such as the University of Connecticut or the private higher education institutions in the state.

Public Act 12-116: An Act Concerning Education Reform

This act makes major changes in education law including, but not limited to, the following: addresses the state's achievement gap; identifies and intervenes in school districts with low academic performance; and establishes a separate governing board for the state's technical high school system.

Achievement Gap—The act makes several changes to try to improve the state's achievement gap. The act extends the Early Literacy Pilot program established in P.A. 11-85; requires the SDE to develop or approve reading assessments for K-3 students at a level below proficiency; and requires the education commissioner to develop a professional development program in reading research and instruction for teachers and principals.

School Performance Index—The act revamps the accountability law in several ways, including creating a school performance index (SPI) based on student performance on mastery tests and other factors. SBE action and oversight in a school will be based on the SPI.

Commissioner's Network Schools – Requires the commissioner to establish a network of schools to improve student academic achievement in low-performing schools. By July 2014, the commissioner must select up to 25 schools that have been classified as poor performing according to the newly established SPI index. The identified schools will receive help from a “turnaround committee” and a turnaround plan will be created.

School Readiness Program—For fiscal year 2013, the act increases the number of school readiness spaces by 1,000. The act also allocates funding to update a 2008 study that looked at the space and facilities required to provide universal early childhood education for all three-and four-year-olds in the state. The study results and recommendations are due to the Legislative Education Committee by April 2013.

Technical high schools—The act transfers authority from the State Board of Education (SBE) and creates a new, 11-member board to govern the state's technical high school system. The act also changes the name of the regional vocational-technical (V-T) schools to the technical high school system (CTHSS). Members of the new board are appointed as follows: four executives of Connecticut-based employers appointed by the governor from nominees submitted by the Connecticut Employment and Training Commission; five members appointed by SBE; and two members appointed by the economic and community development and labor commissioners, respectively. The governor appoints the chairperson, who also serves as a non-voting ex-officio member of SBE.

Public Act 12-40: An Act Concerning College Readiness and Completion

Requires the Connecticut State University System (CSUS) and the community-technical colleges (CTC), beginning by the 2014 fall semester, to offer certain students remedial support embedded with the corresponding entry-level course in a college-level program and certain other students an intensive college readiness program. It generally prohibits other forms of remedial education after that time.

The bill also requires public high schools, CSUS, and CTC to align their curricula by the fall semester of 2016. Beginning by the 2014-2015 school year, it requires early assessment of eighth- and tenth-grade students' college readiness and the sharing of such results. Lastly, it requires a report on 1) the transition of working adults to higher education and 2) the bill's impact on CSUS and CTC programs for deaf and hearing-impaired students.

Public Act 12-75: An Act Concerning the Learn Here, Live Here Program

The legislature expanded the Learn Here, Live Here Program to include any student graduating after January 1, 2014, from a public or private college in Connecticut or a health care training school located in the state. Previously, only graduates of state colleges and universities or regional technical schools could participate.

The program helps students save towards a down payment on their first home in Connecticut by segregating a portion of their state income tax payments (\$2,500 per year) for up to 10 years after they graduate.

ALIGNMENT PROGRESS IN STEM OCCUPATIONS

The study includes an evaluation component of Science, Technology, Engineering and Mathematics (STEM) occupations in Connecticut. Recent research indicates the increasing importance of STEM occupations in making states economically competitive, specifically due to the correlation between STEM occupations and innovation, economic growth, and productivity. In 2011, 9.2% of all Connecticut jobs were in STEM occupations.¹⁵ More than 9 out of the 10 STEM jobs will require more than a high school degree.¹⁶ Further, more than half of the STEM jobs in Connecticut will be in computer occupations.¹⁷

This section of the report examines: 1) trends in STEM occupational employment, wages, and projections for the future; 2) the CT STEM Jobs project results; and 3) the implications for the future on alignment within the workforce system.

STEM OCCUPATIONAL TRENDS IN EMPLOYMENT, WAGES AND PROJECTIONS FOR THE FUTURE

Connecticut's existing employment and training systems can be harnessed to provide a workforce training pipeline for the state's 21st century economy. The availability of public and proprietary data sources for analysis and reporting is a critical task in implementing the most efficient use of resources. Targeted economic development requires timely and descriptive labor market indicators that allow for policymakers to assess the state's existing employment dynamics. A variety of economic indicators will be used to analyze the current labor market conditions in Connecticut, with a particular focus on STEM occupations.

The Department of Labor's (DOL) Occupational Information Network (O*Net) classifies occupations as having a projected positive future outlook based on a variety of positive projected employment statistics. These occupations are broadly categorized as Bright Outlook occupations. In addition to identifying Bright Outlook occupations, the DOL also provides a list of occupations that primarily engage in activities related to science, technology, engineering, and mathematics (STEM). Industries and occupations related to STEM are increasingly considered to be the catalysts of sustained economic prosperity in the ever-emerging knowledge economy. This analysis focuses principally on the assessment of current economic conditions as related to STEM occupations and industries. However, the DOL's Bright Outlook occupations will be used as both a point of comparison and to diagnose future economic conditions.

The DOL's O*Net classifies an occupation as having a bright outlook¹⁸ by analyzing the following indicators:

- **Rapid Growth:** The projected employment growth rate is significantly higher than the average for all occupations from 2010-20.

¹⁵ Bureau of Labor Statistics. 2011

¹⁶ <http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/stemconnecticut1.pdf>

¹⁷ *ibid*

¹⁸ A list of all Bright Outlook and STEM occupations identified by the Occupational Information Network can be found at www.onetonline.org.

- **Numerous Job Openings:** The expected net change in employment is significantly higher than the average for all occupations from 2010-20.
- **New & Emerging Occupations:** The demand for these occupations is expected to increase as a result of technology, consumer preferences, and environmental awareness.

The DOL's O*Net classifies an occupation as STEM based on educational and skill requirements:

- **STEM:** These occupations require education in science, technology, engineering, and mathematics disciplines.

In an effort to better assess Connecticut's employment and training systems, several key labor market indicators have been examined longitudinally in Connecticut for both STEM and Bright Outlook occupations. Additional geographic jurisdictions have been used as points of comparison when appropriate. The Bright Outlook occupational category consists of the aggregate of the Rapid Growth, Numerous Job Openings, and New & Emerging categories. A small sample of occupations appears in more than one of these categories. For example, freight forwarders (SOC 45-5011) have been classified by the DOL as both a Rapid Growth occupation and a New & Emerging Occupation. The STEM occupational category is not included in the aggregate Bright Outlook category but some specific STEM occupations can be found in the New & Emerging, Numerous Job Openings, or Rapid Growth categories.

OCCUPATIONAL EMPLOYMENT WAGES AND CONCENTRATIONS

The concentration of occupations and wages are both key indicators to assess the state's readiness to meet future labor demands. The relative concentration of employment provides a metric to compare the availability of key occupational groupings with other regional and national geographic jurisdictions. The concentration of employment in occupational groupings provides a relative metric with which to gauge the state's workforce. Similarly, the relative wages by occupational grouping provide an indicator for both surplus and shortage across and within regional labor markets. The following section shows how Connecticut fares compared to the nation and New England in terms of employment concentration and wages in STEM and Bright Outlook occupations.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

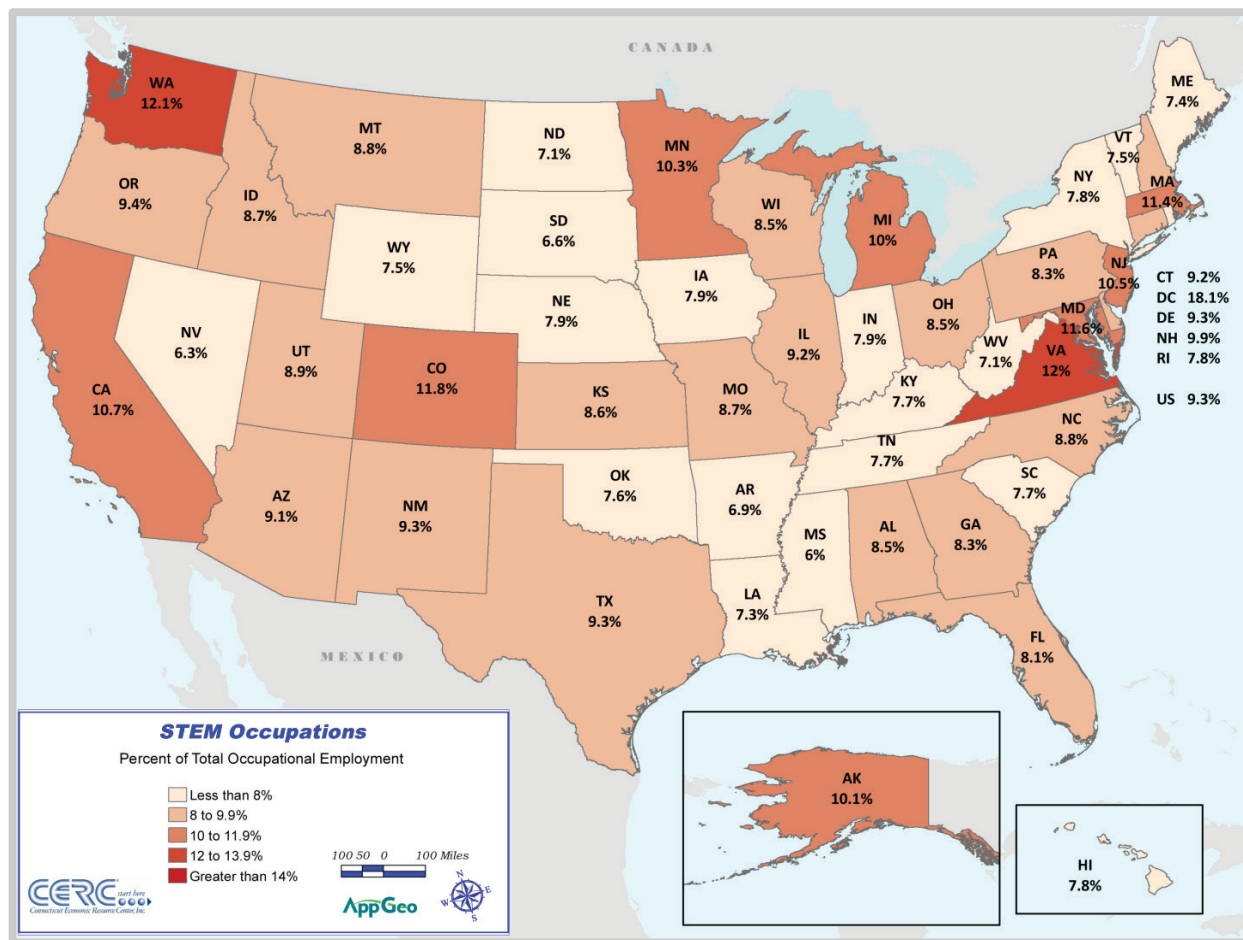


FIGURE 6.1: EMPLOYMENT IN STEM OCCUPATIONS AS A PERCENT OF TOTAL EMPLOYMENT, 2011

SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS, BUREAU OF LABOR STATISTICS, 2011

As described in Figure 6.1, Total employment in STEM occupations expressed as a percent of overall employment was 9.3% in the United States in 2011. Connecticut's employment in STEM occupations fell just below the US average at 9.2% of total employment. The highest concentration of STEM occupations could be found in Washington State, with 12.1%, while the lowest was found in Mississippi, with 6% of total employment. The largest concentration of STEM occupations in the Northeast could be found in Massachusetts, where these occupations constituted 11.4% of employment in 2011.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

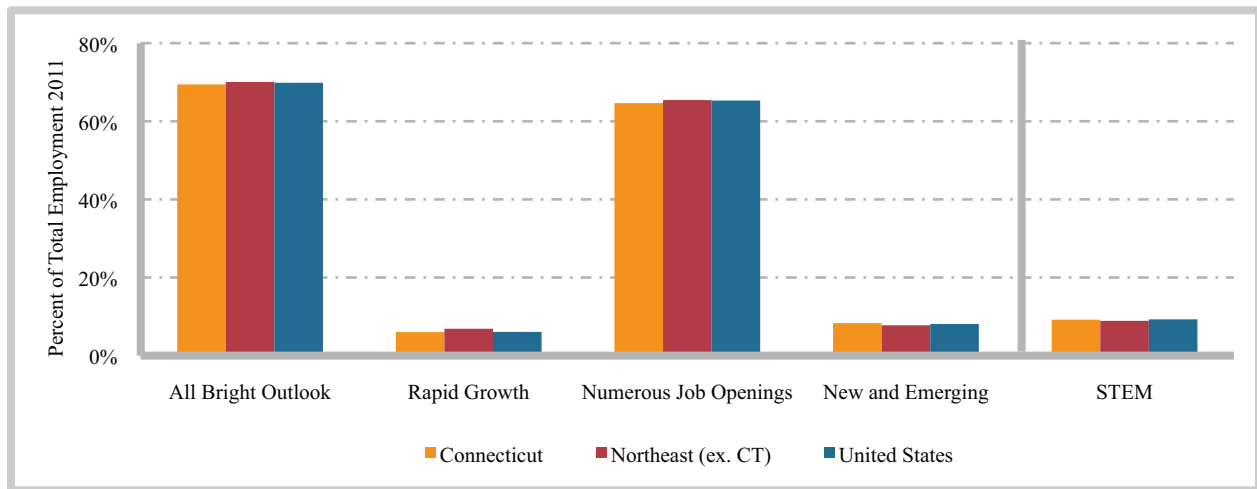


FIGURE 6.2: OCCUPATIONAL GROUPINGS AS A
PERCENT OF TOTAL OCCUPATIONAL EMPLOYMENT, 2011
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2011

Figure 6.2 describes occupational groupings as a percent of total occupational employment (2011). The concentration of employment in Bright Outlook occupations in Connecticut was quite similar to both that of the nation and the other northeastern states in 2011. Percent employment in Bright Outlook occupations was 69.4% in Connecticut as compared to 70.1% in both the Northeast and United States. Rapid Growth occupations represented about 6% of employment in both Connecticut and the United States but were slightly higher at 6.9% in the Northeast. The Numerous Job Openings represented a significant component of overall employment and constituted 64.7% in Connecticut as compared to about 65% in the Northeast and the United States. Similarly, employment in New & Emerging occupations was consistent across all three regions and constituted about 8% of the workforce. STEM occupations were also fairly consistent, with roughly 9% of total employment across the three respective geographies.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

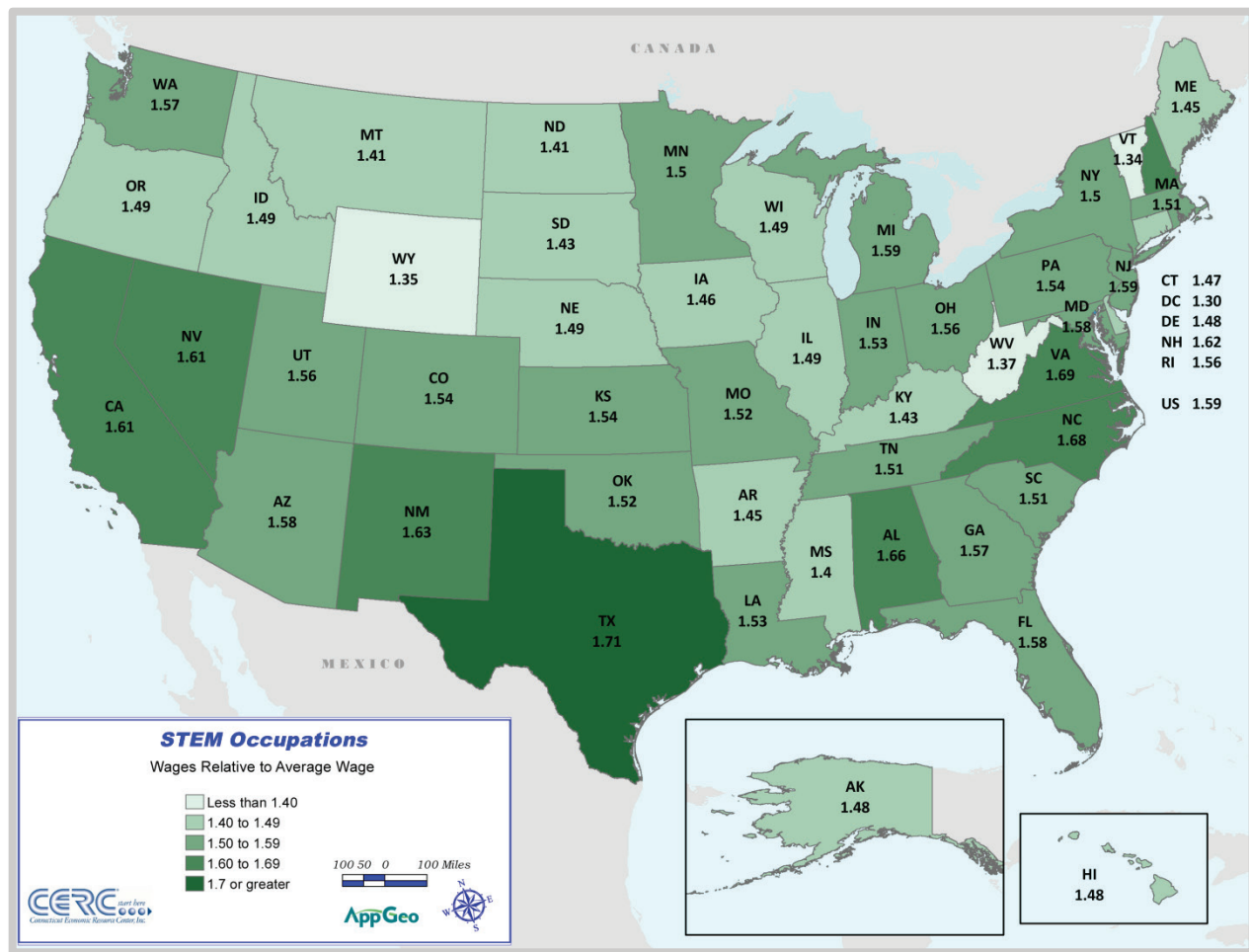


FIGURE 6.3: WAGES IN STEM OCCUPATIONS RELATIVE TO AVERAGE WAGES, 2011
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2011

The average wages in STEM occupations expressed as a ratio of average overall wages was 1.6 in the United States in 2011, as noted in Figure 6.3. Further, Connecticut's STEM wage ratio was slightly lower than the national ratio at 1.5 compared to overall wages. This means that STEM jobs in Connecticut pay on average 1.5 times the average wage of all other jobs. The occupational wage ratio in Connecticut was likely lower than other states as a result of elevated cross-occupational average wages for skilled labor, a surplus of educated workers, and a higher standard of living than other states with similar characteristics in the region. The highest ratio could be found in Texas with 1.7 while the lowest was found in Vermont with a ratio of 1.3 compared to overall wages. The largest STEM wage ratio in the Northeast could be found in New Hampshire with 1.6 compared to overall wages.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

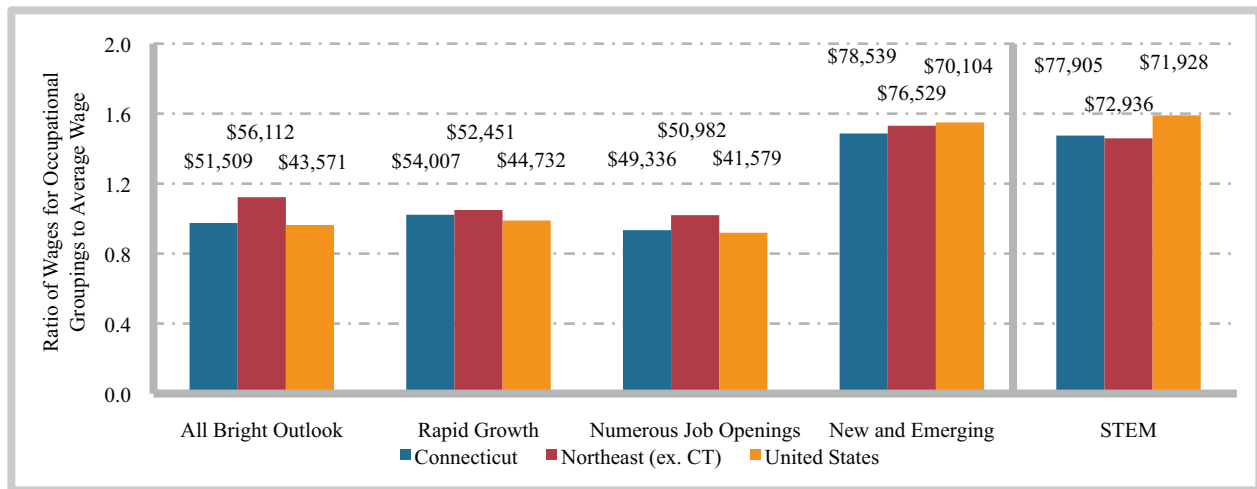


FIGURE 6.4: WAGES IN OCCUPATIONAL GROUPINGS RELATIVE TO AVERAGE WAGES, 2011
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2011

The ratio of average wages by occupational grouping to average cross-occupational wages by region in 2011 (Figure 6.4) provides a relative measure of compensation that accounts for differentials in cost of living. The largest ratio of wages can be seen in the STEM occupational grouping with 1.6 in the United States and 1.5 in both the Northeast and Connecticut. Real wages in STEM occupations in Connecticut were \$77,905 compared to \$72,936 in the Northeast and \$71,928 in the United States. The New & Emerging occupational grouping had a wage ratio that remained consistently above par for each of the three distinct regions. The ratio of New & Emerging occupational wages was 1.6 for the United States and 1.5 for both the Northeast and the United States.

Real wages in New & Emerging occupations in Connecticut were \$78,539 compared to \$76,646 in the Northeast and \$70,104 in the United States. The ratio of average occupational wages to average cross-occupational wages for each occupational grouping was, for the most part, consistently lower in Connecticut than the Northeast and often the United States. The occupational wage ratio in Connecticut was likely lower than the Northeast and the United States as a result of elevated cross-occupational average wages, a surplus of educated labor, and a higher standard of living than other states with similar characteristics in the region. Cross-occupational wages reached \$52,830 in Connecticut as compared to \$49,992 in the Northeast and \$45,230 in the United States.

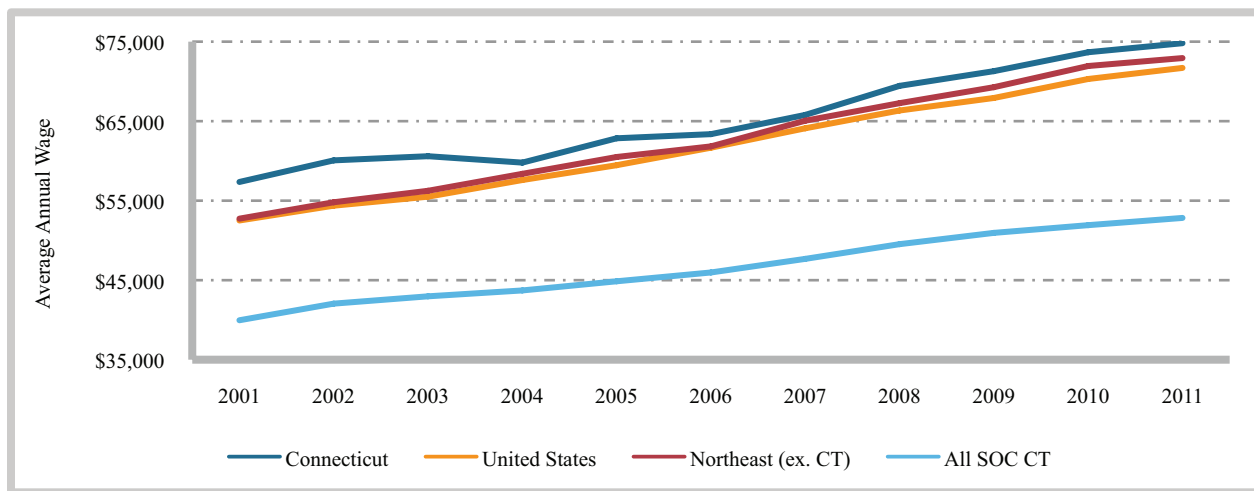


FIGURE 6.5: WAGES FOR STEM OCCUPATIONS BY REGION, 2001-11
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2001-11

The average wage for STEM occupations in Connecticut was slightly above the wages in the Northeast and the United States but the premium declined significantly from 2001 until 2006, as shown in Figure 6.5. The average wage for STEM occupations was significantly above the average wage across all occupations in Connecticut from 2001 to 2011. Average wages in STEM occupations grew from \$57,354 in 2001 to \$74,806 in 2011, a 30% increase. While the average wages across all occupations, rose from \$39,960 in 2001 to \$52,830 in 2011, a 32% increase.

OCCUPATIONAL EMPLOYMENT GROWTH AND PROJECTIONS

Occupational employment growth and projections provide a longitudinal indicator of both past and future trends in the regional labor market. Past employment growth has been segmented into three distinct time periods based on both changes to the occupational coding system and changes in the business cycle. The changes in the occupational coding system along with the nuances of the survey itself make a longitudinal analysis difficult, and the results should be viewed with some degree of caution.¹⁹ With these complications in mind, the historic growth of these occupations provides some interesting insight into changes in the regional labor market.

The state employment projections from 2008 until 2018 afford a critical insight into what the labor market might look like in the not too distant future. These indicators are crucial for policymakers to appropriately prepare state workforce systems for future economic conditions. It is important to note that the projections should be used as indicating general trends and not to predict the actual number of future job openings.

¹⁹ Occupational codes were added, removed, and altered at each point of discontinuity. The data is produced from an aggregation of three years' worth of surveys. As a result of both of these complications it is difficult to produce a longitudinal trend line.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

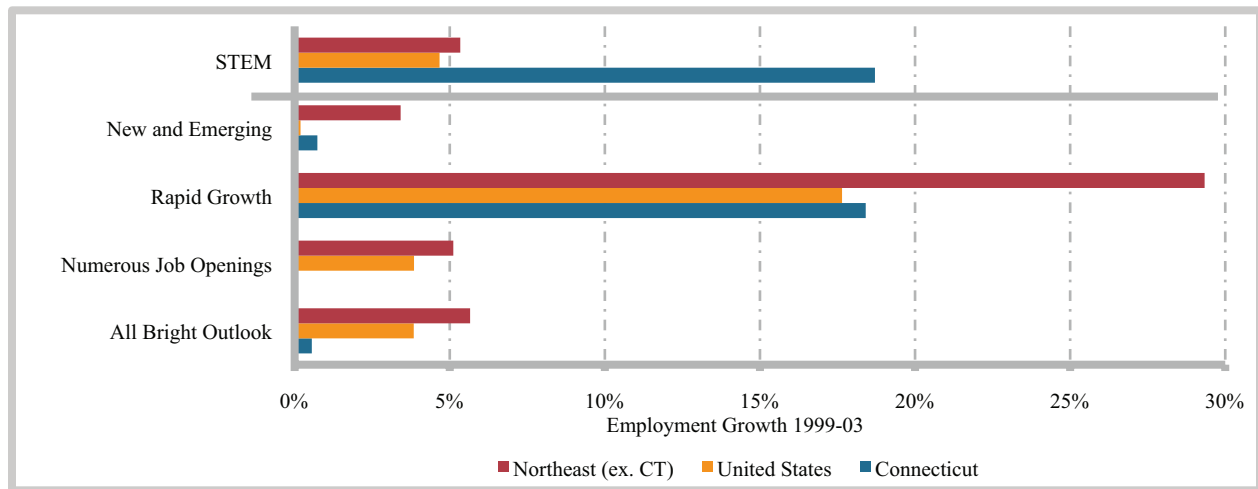


FIGURE 6.6: EMPLOYMENT GROWTH BY OCCUPATIONAL GROUPING, 1999-03
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 1999-03

Employment growth by occupational grouping for the period of 1999 - 2003 is shown in Figure 6.6. Employment in Bright Outlook occupations grew by only 0.6% in Connecticut while growth reached 5.7% in the Northeast and 3.8% in the United States. The Numerous Jobs occupations grew by only 0.4% in Connecticut compared to 5.1% in the Northeast and 3.8% in the United States. The Rapid Growth occupations grew by a staggering 18.4% in Connecticut compared to an even larger 29.3% in the Northeast and 17.6% in the United States. New & Emerging occupations grew by only 0.7% in Connecticut while the Northeast experienced 3.4% growth and the United States had 0.2% growth. STEM occupations grew at a far greater rate of 18.7% in Connecticut as compared to 5.3% in the Northeast and 4.7% in the United States.

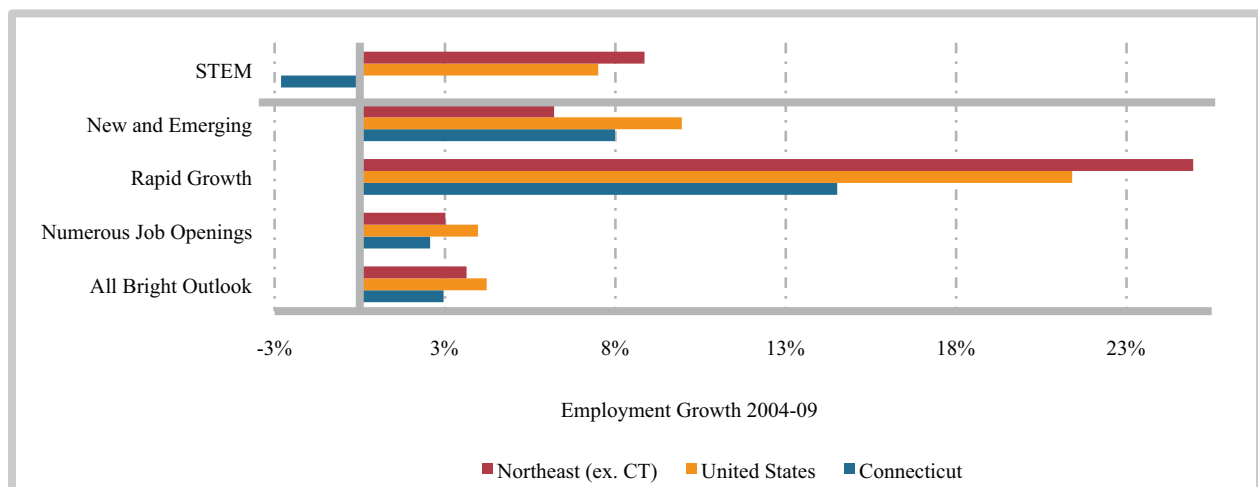


FIGURE 6.7: EMPLOYMENT GROWTH BY OCCUPATIONAL GROUPING, 2004-09
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2004-09

Figure 6.7 shows employment growth by occupational grouping for the period of 2004 - 2009. During this time period, employment in all Bright Outlook occupations grew by 2.5% in

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

Connecticut, faster than the preceding four years. However growth in the Northeast (3.1%) and the United States (3.7%) slowed down compared to the previous four years, but was still higher than Connecticut growth. Numerous Job occupations grew by only 2.1% in Connecticut while growth in the Northeast and the United States reached 2.5% and 3.5% respectively. Rapid Growth occupations experienced 14% growth in Connecticut while occupational employment growth reached 24.5% and 20.9% in the Northeast and the United States. New & Emerging Occupations experienced 7.5% growth in Connecticut as compared to 5.7% in the Northeast and 9.5% in the United States. STEM occupations experienced a 2.3% decline in Connecticut while these same occupations experienced an 8.4% rate of growth in the Northeast and 7% in the United States as a whole.

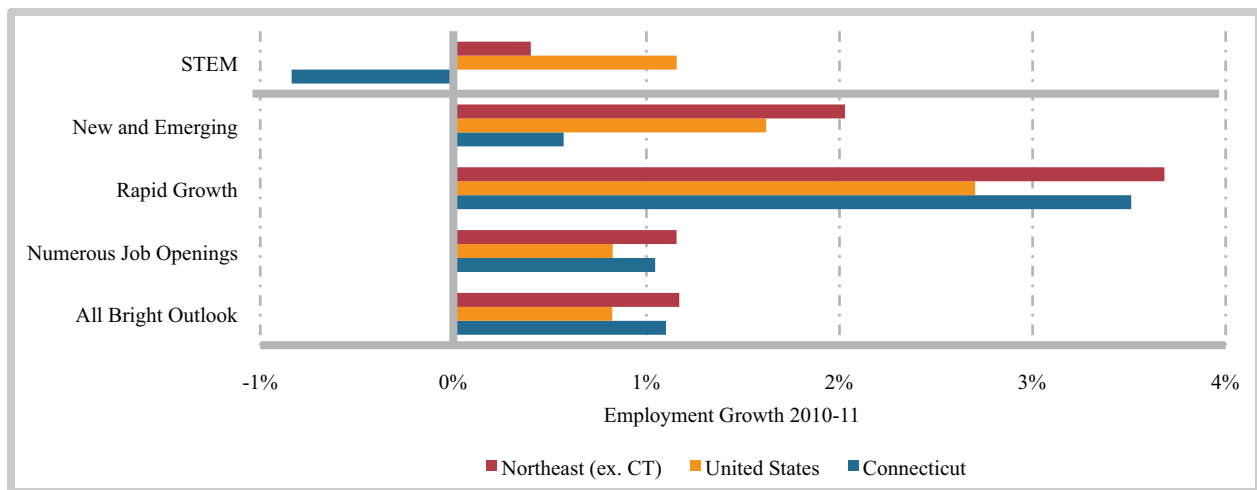


FIGURE 6.8: EMPLOYMENT GROWTH BY OCCUPATIONAL GROUPING, 2010-11
SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2010-11

Employment growth from 2010 to 2011 (Figure 6.8) varied widely across both the three regions observed in this analysis as well as the occupational subcategories. The aggregate of all Bright Outlook occupations grew by slightly more than 1% for both the Northeast and Connecticut while the United States experienced growth of 0.8%. The Numerous Job Openings occupations had a very similar pattern of growth in the period, with Connecticut and the Northeast experiencing just over 1% growth while the United States again had 0.8%. Those occupations projected to experience rapid growth grew by 3.5% in Connecticut and 3.7% in the Northeast as compared to just over 2.7% in the United States as a whole. New & Emerging occupations grew by 0.6% in Connecticut while these occupations grew by 2% in the Northeast and 1.6% in the United States. STEM occupations declined by 0.8% from 2010 to 2011 in Connecticut while the Northeast experienced growth of 0.4% and the United States grew 1.2%.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

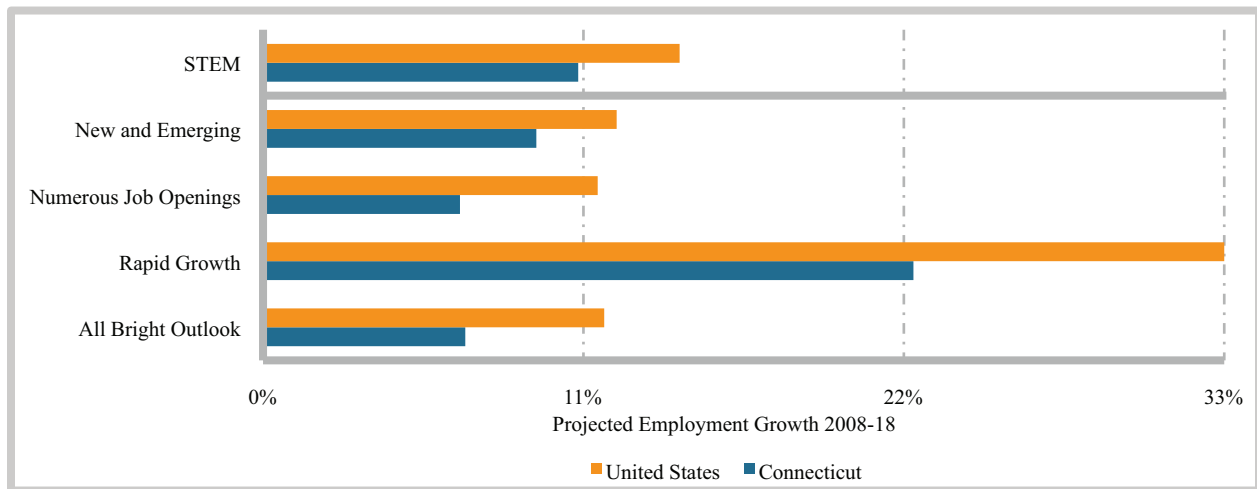


FIGURE 6.9: PROJECTED EMPLOYMENT GROWTH BY OCCUPATIONAL GROUPING, 2008-18
SOURCE: STATE OCCUPATIONAL PROJECTIONS. STATE EMPLOYMENT SECURITY AGENCY. 2008-18

Figure 6.9 shows projected employment growth by occupational grouping for the period of 2008 - 2018. Employment in the aggregate of Bright Outlook occupations is projected to grow by 6.9% in Connecticut compared to 11.7% in the United States. Rapid Growth occupations are projected to grow by 22.3% in Connecticut, significantly below the US rate of 33.2%. The Numerous Job Openings have a projected growth rate of 6.8% in Connecticut and 11.5% in the United States. Projected employment for New & Emerging occupations is expected to grow by 9.4% in Connecticut and 12.2% in the United States. Employment in STEM occupations is projected to grow by 10.8% from 2008 to 2018 in Connecticut and 14.3% in the United States.

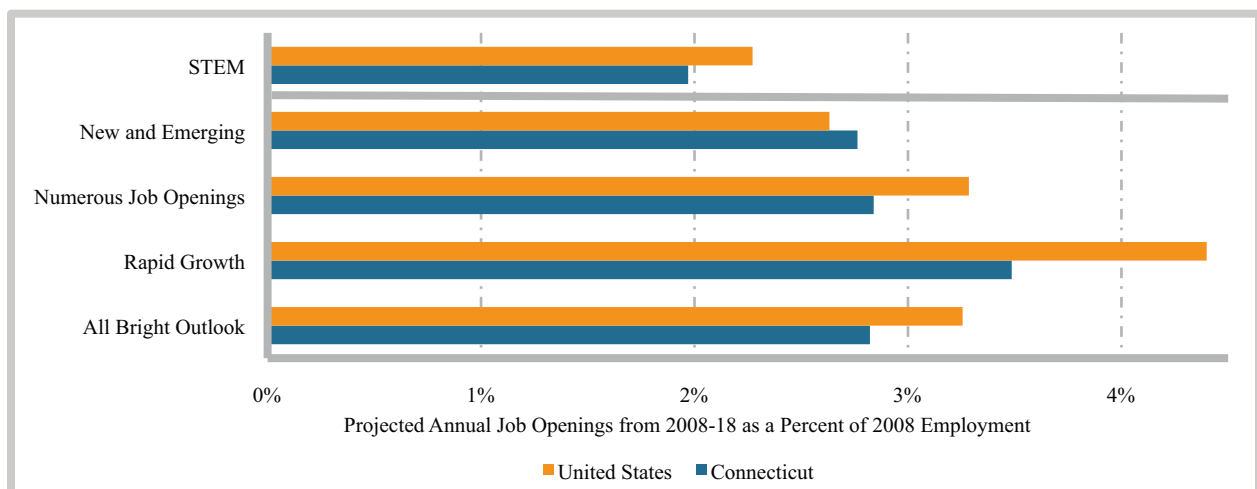


FIGURE 6.10: PROJECTED ANNUAL JOB OPENINGS BY OCCUPATIONAL GROUPING, 2008-18
SOURCE: STATE OCCUPATIONAL PROJECTIONS. STATE EMPLOYMENT SECURITY AGENCY. 2008-18

Figure 6.10 shows the projected annual job openings by occupational grouping for the period of 2008 - 2018. Annual job openings expressed as a percentage of 2008 employment

in the aggregate of Bright Outlook occupations are projected to grow by 2.8% in Connecticut compared to 3.3% in the United States. Job openings in Rapid Growth occupations are projected to grow by 3.5% in Connecticut, but 4.4% in the United States. Similarly, Numerous Job Opening occupations are projected to grow by only 2.8% in Connecticut and 3.3% in the United States. The New & Emerging occupational category was projected to grow by 2.8% in Connecticut and 2.6% in the United States. STEM occupations are expected to grow by 2% in Connecticut during the period as compared to nearly 2.3% in the United States.

TRAINING AND EDUCATION IN STEM OCCUPATIONS

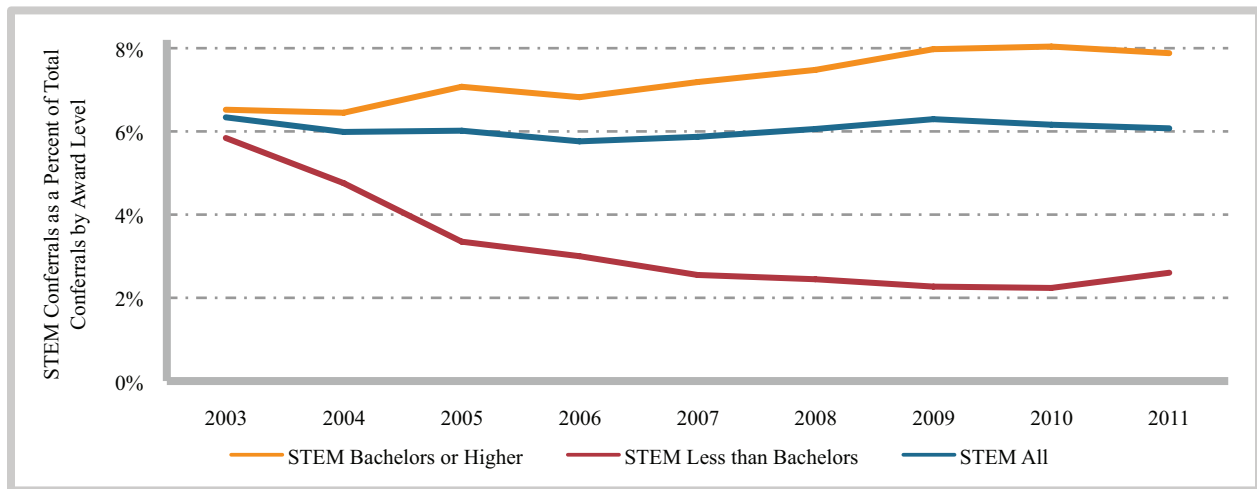


FIGURE 6.11: STEM CONFERRALS BY AWARD LEVEL, 2003-11
SOURCE: INTEGRATED POSTSECONDARY DATA SYSTEM.
NATIONAL CENTER FOR EDUCATION STATISTICS. 2003-11

As shown in Figure 6.11, Connecticut's production of educational credentials from programs in the STEM fields has increased both in real terms and as a percent of all degrees. The total number of STEM bachelor's and graduate degrees expressed as a percentage of the total degrees of this level rose from 6.5% in 2003 to 7.9% in 2011. The total number of STEM postsecondary degrees at a level less than a bachelor's degree declined from 5.8% in 2003 to only 2.6% in 2011. The difference between these degree categories increased substantially between 2003 and 2011, from a relatively equal percentage of degrees being awarded at all levels to a difference of nearly 5.3%, in 2011. This difference can be primarily attributed to a decline in the conferral of less than bachelor's credentials in STEM coupled with some growth in the conferral of STEM bachelor's and graduate degrees, while the total of STEM degrees for all levels that were awarded in the state remained relatively stagnant, only dropping from 6.3% in 2003 to 6.1% in 2011.

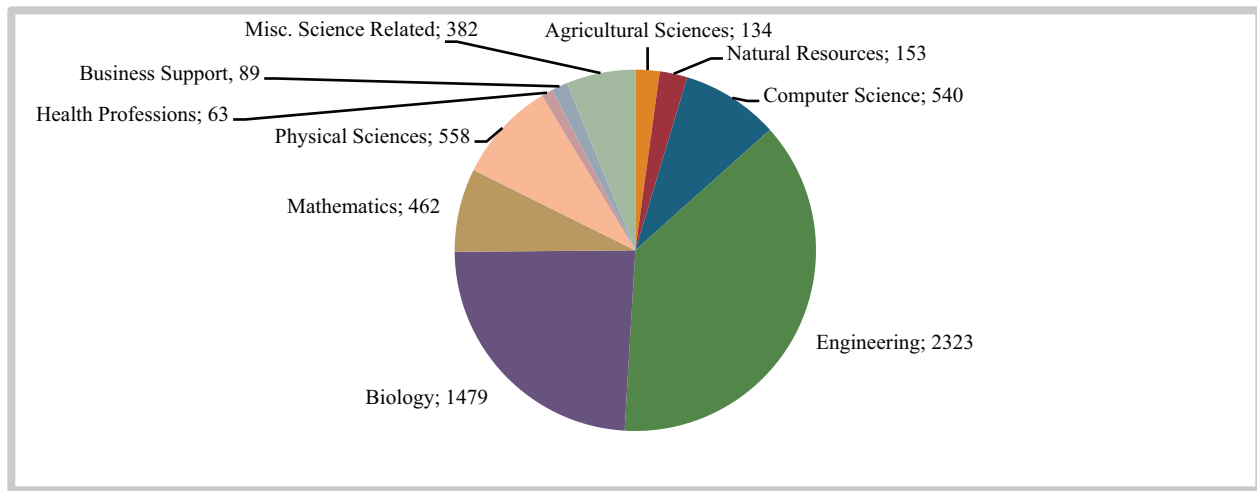


FIGURE 6.12: STEM CONFERRALS BY SUBJECT AREA, 2011
SOURCE: INTEGRATED POSTSECONDARY DATA SYSTEM.
NATIONAL CENTER FOR EDUCATION STATISTICS, 2011

The total postsecondary educational credentials conferred in Connecticut during 2011 (Figure 6.12) were further disaggregated by specific program so as to provide additional granularity to the STEM labor supply. Engineering postsecondary conferrals in 2011 totaled 2,323 and represented the largest proportion of STEM awards, with 37.6% of total degrees. Comparably, biology-related programs produced a total of 1,479 graduates, or about 23.9% of total STEM awards in 2011. The fields of mathematics, physical sciences, and computer sciences awarded a total of 462, 558, and 540 degrees respectively that contributed to a combined 25.2% of total postsecondary STEM awards.

EMPLOYMENT, WAGES, AND GDP IN STEM INDUSTRIES

Total national employment in STEM occupations was calculated for each distinct industry sector. The ten industries with the highest concentration of STEM employment relative to the overall size of the industry were used to assess the labor market from a demand perspective. Indicators such as GDP and payroll are not available by occupation but are readily available by industry. Examining indicators at the industry level helps to better understand the crucial nature that STEM plays in the health of the regional economy.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

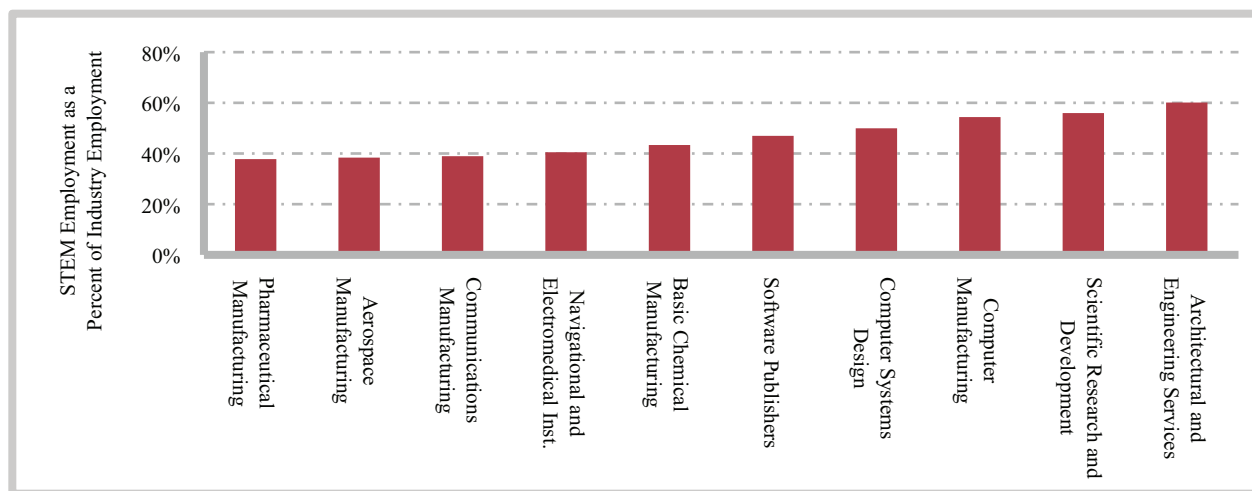


FIGURE 6.13: TEN INDUSTRIES WITH THE HIGHEST CONCENTRATION OF
STEM OCCUPATIONS, 2011

SOURCE: OCCUPATIONAL EMPLOYMENT STATISTICS. BUREAU OF LABOR STATISTICS. 2011

Total employment of STEM occupations expressed as a percentage of total industry employment was computed using the May 2011 National Industry-Occupation Employment Matrix (Figure 6.13). The identification of industries with the largest proportion of overall employment in STEM occupations will aid in understanding the implications of the aforementioned occupational employment transitions in Connecticut. The largest concentration of STEM occupations was found in Architectural and Engineering Services, with 60.1% of industry employment and a total of 775,860 of these occupations employed in 2011.

The next three most concentrated industries were Scientific Research and Development, Computer Manufacturing, and the Computer Systems Design industries with 56%, 54.4%, and 50% of industry employment respectively and a combined total of 1,188,020 of the occupations employed in 2011. The average wage in private establishments across the ten most concentrated STEM industries ranged from a lower bound of \$78,882 in architectural and engineering services to \$141,231 in computer manufacturing with an aggregate average wage of \$101,447 as compared to a cross-industry average wage of \$47,815.

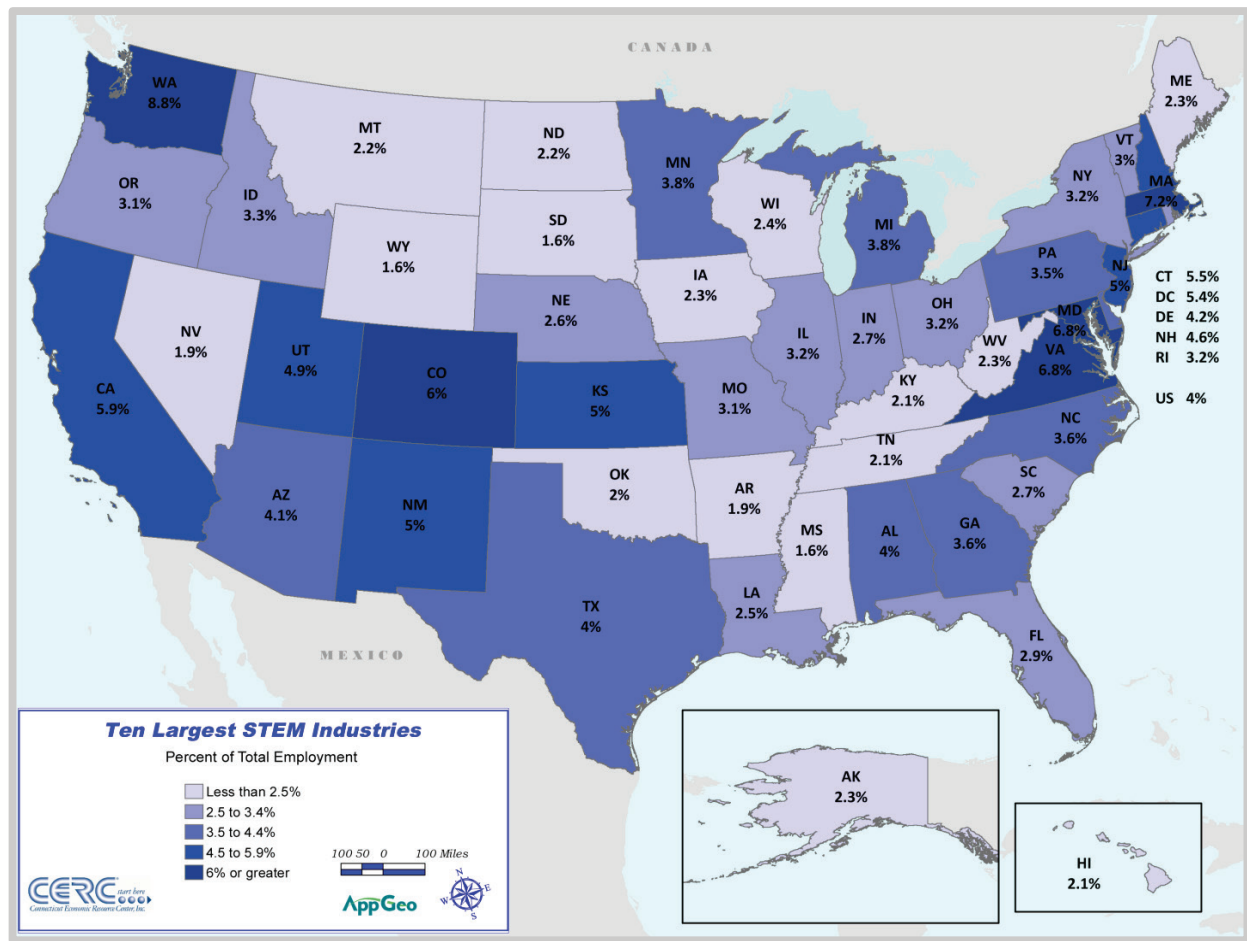


FIGURE 6.14: EMPLOYMENT IN STEM INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT, 2011
SOURCE: MOODY'S ANALYTICS. 2011

The ten industries with the highest concentration of STEM occupations constituted 4% of total US employment in 2011 (Figure 6.14). Connecticut's employment in these industries—5.5% of the state's employment—was significantly higher than the US average. The highest concentration of these industries could be found in Washington, with 8.8% of total employment, while the lowest was found in South Dakota, with 1.6% of employment. The largest concentration of STEM industries in the northeast region could be found in Massachusetts, with 7.2% of overall employment in 2011.

CONNECTICUT'S SKILLED WORKFORCE: STRATEGIES FOR MEETING THE NEEDS OF
BUSINESS AND INDUSTRY TODAY AND IN THE FUTURE
ALIGNMENT PROGRESS IN STEM OCCUPATIONS

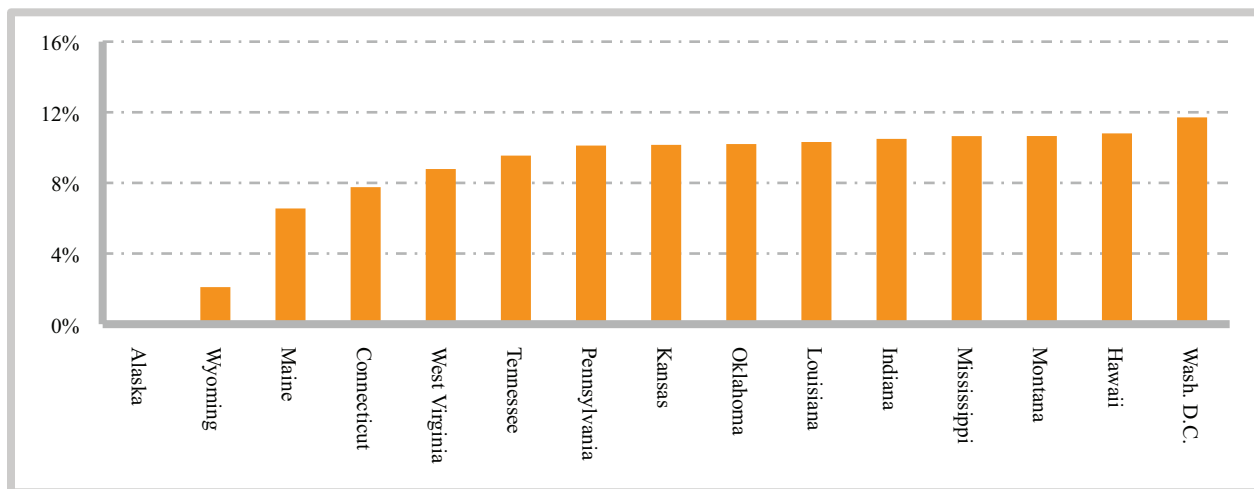


FIGURE 6.15: STATES WITH LOWEST EMPLOYMENT GROWTH IN STEM INDUSTRIES, 2011-21
SOURCE: MOODY'S ANALYTICS. 2011-21

The aggregate employment of the top ten STEM industries in Connecticut was 88,755 in 2011, constituting 5.5% of total employment. Employment in STEM industries is predicted to rise by 6,887, or 7.8%, to a total of 95,642 by 2021 (Figure 6.15). Connecticut had the fourth smallest growth rate as compared to the other states and the District of Columbia but was 26th in net employment growth.

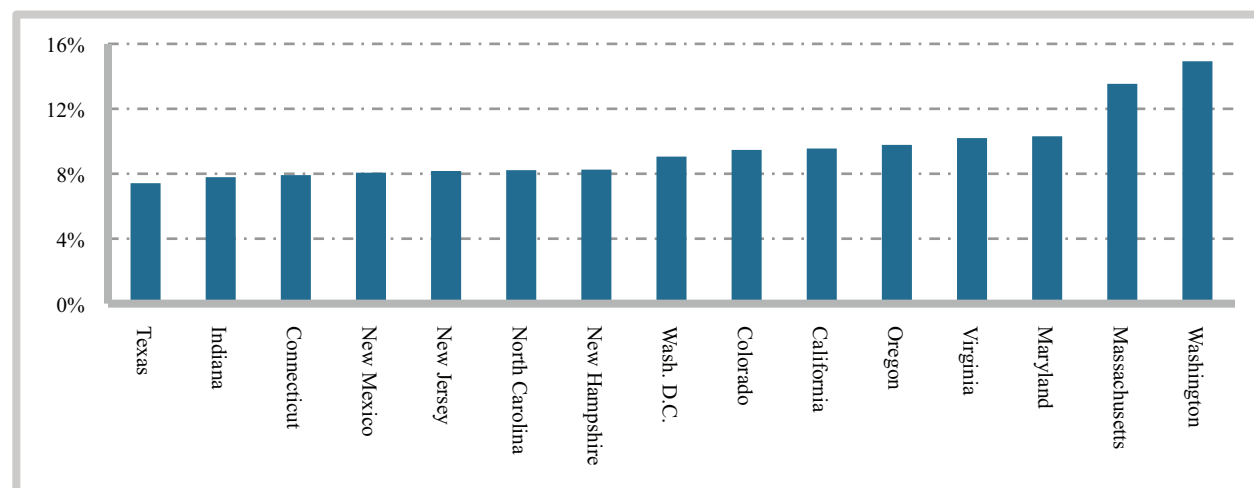


FIGURE 6.16: STATES WITH HIGHEST AGGREGATE GDP IN STEM INDUSTRIES, 2011
SOURCE: MOODY'S ANALYTICS. 2011

The aggregate GDP of the top ten STEM industries in Connecticut was \$18.2 billion in 2011, constituting 7.9% of total GDP (Figure 6.16). Connecticut ranked 13th among the other states and the District of Columbia but had the 19th largest overall GDP in these ten STEM industries. Aggregate GDP for STEM industries is predicted to rise by \$12.2 billion or 67% to a total of \$30.4 billion by 2021. Connecticut had the fourth smallest growth rate as compared to the other states and the District of Columbia but was 22nd in net GDP growth.

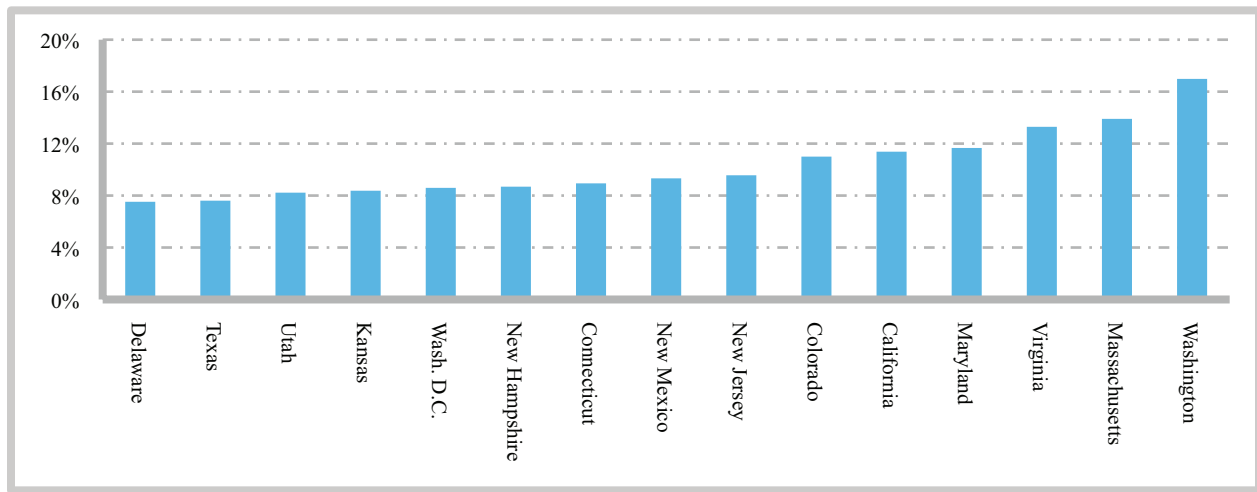


FIGURE 6.17: STATES WITH HIGHEST AGGREGATE PAYROLL IN STEM INDUSTRIES, 2011
SOURCE: MOODY'S ANALYTICS. 2011

The aggregate payroll of the top ten STEM industries in Connecticut was \$9.2 billion in 2011, constituting 8.9% of total payroll (Figure 6.17). Connecticut ranked 9th among the other states and the District of Columbia in the relative proportion of payroll but 18th in overall payroll in 2011. Aggregate payroll in STEM industries is predicted to rise by \$2.6 billion, or 28%, to a total of \$11.8 billion by 2021. Although not shown in the figure, Connecticut had the fifth smallest growth rate as compared to the other states and the District of Columbia but 25th in net payroll growth.

ASSESSING THE STEM LABOR MARKET IN CONNECTICUT

Connecticut's concentration of employment in STEM occupations provides an indicator of the capacity for further economic development in high-tech industries. Total employment in STEM occupations expressed as a percent of overall employment was 9.3% in the United States in 2011. Connecticut's employment in STEM occupations fell just below the US average at 9.2% of total employment. STEM occupations were also fairly consistent with roughly 9% of total employment across the three respective geographies.

The ratio of wages by occupation is an excellent but not definitive indicator to assess labor demand. The average wages in STEM occupations expressed as a ratio of average overall wages was 1.6 in the United States and 1.5 in both the Northeast and Connecticut. Real wages in STEM occupations in Connecticut were \$77,905 compared to \$72,936 in the Northeast and \$71,928 in the United States. Average wages in STEM occupations grew from \$57,354 in 2001 to \$74,806 in 2011, a 30% increase, while the average wages across all occupations rose from \$39,960 in 2001 to \$52,830 in 2011, a 32% increase.

Employment in STEM occupations was extremely high at the onset of the 21st century but has declined significantly over the last decade. STEM occupations grew at a far greater rate of 18.7% in Connecticut from 1999 to 2003 as compared to 5.3% in the Northeast and 4.7% in the United States. These occupations experienced a 2.3% decline in Connecticut from 2004 to 2009 while these same occupations experienced an 8.4% rate of growth in the Northeast and 7% in

the United States as a whole. From 2010 to 2011, STEM occupations declined by 0.8% from 2010 to 2011 in Connecticut while the Northeast experienced growth of 0.4% and the United States grew 1.2%. Projected employment in STEM occupations is expected to continue this declining trend and projected to grow at 10.8% from 2008 to 2018 in Connecticut compared to 14.3% in the United States.

The total number of STEM bachelor's and graduate degrees expressed as a percentage of the total degrees of this level rose from 6.5% in 2003 to 8.9% in 2011. However, the production of credentials necessary to gain employment in peripheral STEM occupations reflected a much more concerning trend. The total number of postsecondary degrees less than a bachelor's degree fell from 5.8% in 2003 to only 2.6% in 2011. The deviation between these degree categories increased substantially to a difference of nearly 5.3% in 2011. It is clear from the data that the decline can be primarily attributed to a lower rate of growth in STEM credentials than the overall growth in degrees. When both levels of awards are analyzed together, the percentage of STEM credentials remained relatively stagnant across the period, having dropped modestly from 6.3% in 2003 to 6.1% in 2011.

Connecticut's employment in the ten largest STEM employing industries was fairly significant at 88,755 in 2011, constituting 5.5% of total employment as compared to 4% in the United States. Employment in STEM industries is predicted to rise by 6,887, or 7.8%, to a total of 95,642 by 2021. The overall trend in growth of STEM industries in Connecticut mirrors that of the occupations they employ. The state had the fourth smallest growth rate as compared to the other states and the District of Columbia but was 26th in net employment growth. The low levels of employment growth for highly concentrated STEM industries further supports the stagnant rates seen in occupational employment projections.

The aggregate GDP of the top ten STEM industries in Connecticut was \$18.2 billion in 2011, constituting 7.9% of total GDP. Connecticut ranked 13th among the other states and the District of Columbia but had the 19th largest overall GDP in these ten STEM industries. Aggregate GDP for STEM industries is predicted to rise by \$12.2 billion, or 67%, to a total of \$30.4 billion by 2021. With such a significant and growing proportion of the state's GDP coming from industries with a high concentrations of STEM workers, it is increasingly important to diagnose and address the low levels of employment growth projected over the next decade.

The analysis of the dynamics at play in Connecticut's labor market for STEM occupations has both positive and negative implications for the future of the state's economic health. Relative wages in STEM occupations in Connecticut indicate that these careers provide substantially better livelihoods than other occupations on average. The concentration of employment in STEM occupations is below the national average and is projected to continue to decline through 2018. The analysis of the largest STEM employing industries reveals that they constitute a large proportion of the state's GDP, payroll, and overall employment picture. The production of higher echelon STEM labor has grown as a proportion of total bachelor's degrees awarded, yet the proportion of lower-tier degrees has fallen significantly.

These statistics seem to indicate that although Connecticut has a thriving concentration of STEM industries, it has an underproduction of STEM occupations as compared to other states. California which has a comparable 5.9% (CT has 5.5%) employment in STEM industries, has a significantly higher 10.7% (CT has 9.2%) employment in STEM occupations and a wage ratio of

1.6 (CT has 1.5). The occupational wage ratio in Connecticut was likely lower than the Northeast and the United States as a result of elevated cross-occupational average wages, a surplus of educated labor, and a higher standard of living. However, the findings seem to indicate that the largest obstacle to fostering growth in STEM industries is attracting businesses to the state and an inadequate production of lower-skill support occupations.

One key observation seen in the falling proportion of lower-tier STEM educational credentials is that Connecticut might be lacking an adequate supply of the support occupations necessary to further high-tech development in STEM industries. In the absence of migration data for graduates who have obtained bachelor's degrees in STEM fields, it is difficult to assess whether Connecticut is retaining graduates. Further investigation and research into the causes of these conflicting pictures of the market for STEM occupations in Connecticut is necessary to properly prescribe targeted economic and workforce development.

CT STEM JOBS PROJECT

The CT STEM Jobs project began in January 2009 and was one of only five federally funded pilot programs chosen throughout the country. The CT STEM jobs sought to achieve five goals:

1. Support regional economic growth.
2. Assess and respond to employer needs.
3. Recruit new workers to STEM fields.
4. Improve the ability of the employment and training system to respond to STEM education and training needs.
5. Coordinate project activities with related initiatives and funding streams.

Despite being implemented during challenging economic times, the project successfully achieved the goals of the initiative by developing innovative solutions and being flexible to respond to changing economic needs. Most importantly, the project management team put in place by the Eastern CT Workforce Investment Board (the grant administrator) implemented several key initiatives that created a strong foundation for the project to be sustained beyond the grant period.

The planning and development of the grant took place during strong economic times. However, this project was initiated at the start of the Great Recession and program implementation continued through the entire recessionary period. The unemployment rate at the inception of the CT STEM Jobs project was 5.9% and in February 2010, it was at 9%. This created a challenge for the project on a number of fronts including the following: jobs were simply not available, the sheer number of potential clients was much higher than anticipated due to high unemployment rates, and the customer was different than initially anticipated. For example, prior to implementation, the project expected to serve recent high school and college graduates, and to see more clients in need of adult education. However, as a result of the recession, the typical client tended to be older, with a higher level of education, and with a successful work history. In fact, half of the clients were over the age of 50 and only 6% were under 30 years of age.

Due to the changing economic dynamics, several programs had to be redesigned and the project had to identify innovative ways to adapt to the realities of the economic situation. Because the

clients of the program tended to be older and had many years of work experience, what many were most in need of was retraining or upgrading skills.

A successful component and valuable asset for clients of the project was the inclusion of online training courses through the Metrix online training tool. More than two out of three clients of the program indicated they used the tool. Further, clients rated the Metrix option highest when compared to the other resources that were available in the grant. In the surveys, many clients wrote that they wanted access to the tool longer than the 90 days provided. Over the life of the grant, 426 clients completed 3,788 technology-based-learning (TBL) courses and 376 of those clients passed 3,426 exit tests (a 90% pass rate). Given that it was a popular and valuable resource for clients, of the three Workforce Investment Boards (WIBs) that had not used TBL prior to the STEM grant, two have already met with representatives from Metrix Learning to discuss plans to budget for TBL and to continue to offer TBL to selected One-Stop clients. This represents a highly successful component of the CT STEM Jobs initiative that will be sustained after the end of the grant period.

Originally the grant had hoped to offer more on-the-job-training (OJT) opportunities. But again, due to the recession, employers were not hiring and therefore did not make available the openings that are required to conduct OJT. Instead, in response to employer needs, the WIBs developed and offered incumbent worker training for employers. A total of 36 employers utilized the services, which proved quite valuable as noted by employers in their survey responses. Employers felt the customized training had the greatest impact on improving the skills of the workforce and increasing productivity.

Another valuable asset of the program was the STEM Coaches initiative. This sentiment came through on the client surveys. When asked about the satisfaction of various aspects of the CT STEM Jobs project, the Coaches ranked second immediately after Metrix online training. Additionally, it is also worth noting that the career exploration workshops conducted by the Coaches were a close third. Given that many of the clients had experienced long periods of unemployment, the personal contact and guidance proved to be an invaluable resource.

A key outcome of the CT STEM Jobs project was the formation of new collaborations and some professional connections that had never before existed. Many organizations, nonprofits, and state agencies were involved in the implementation and coordination of the CT STEM Jobs project. It was through strong collaboration that the program was able to be responsive to the needs of the clients, resulting in a successful implementation; this collaboration also will help sustain elements of the project in the future.

An example of the collaboration involved the redirecting of resources to create three "math academies" based on STEM Coach observations in the field. Inadequate math skills were identified as a primary barrier to college success for Adult Education students. Through collaboration with the State Department of Education's Adult Education Bureau, a program was created to fill this need. Three regional Adult Education sites piloted the "math academies" in 2009. This responsiveness and flexibility was the result of the strong collaboration and partnerships that had been forged as a result of the project, creating the foundation for similar efforts in the future. Further, based on the experience with the STEM grant, STEM activities have been written into the latest Program Improvement Projects (PIP) issued by the SDE for Adult Education centers located throughout the state.

Another initiative of the grant that will have a lasting impact in the state was the development of a new web portal, the CTSTEMJobs.org website, which has had approximately 20,000 unique visitors. These visitors can serve as a resource to disseminate information about the value of this program even though the grant supporting this project has ended and the portal is not officially being promoted. The STEM web portal will be sustained and updated through collaboration with the Connecticut Manufacturing, Energy, and Transportation (CT MET) Initiative. CT Works, high school, and community college counselors and educators continue to utilize the tool with their students and clients as well. The grant provided the initial funding for this resource that will continue to provide benefits to state residents.

There are several key lessons that were learned from the grant that should be applied to future workforce programs. A critical component of the success was that the grant allowed for flexibility in how certain aspects of the funds were utilized. This was critical since the grant proposal was written during strong economic times but the actual implementation occurred during the Great Recession. Another important lesson learned is the need for strong collaboration and coordination among entities that comprise the workforce system. The STEM coaches identified a need, stronger math skills for adult learners, and through a partnership with Adult Education were able to meet this need. Rather than creating a separate program within the state's existing infrastructure, the project addressed a workforce alignment need with efficiency. Further, although the federal funding has expired, the partnerships still exist and several of the more successful programmatic aspects continue.

STEM FOR THE FUTURE: NATIONAL PERSPECTIVE

Why such an emphasis on STEM? There are two compelling reasons – one, STEM jobs can be found in all industries and two, STEM graduates possess skills sought out by employers in all industries and occupations, signaling that STEM skills are in high demand.²⁰

What is not captured in the data for Connecticut but is reported nationally is the fact that there is a chronic shortage in STEM competencies as the demand for STEM talent grows in occupations outside traditional STEM jobs.²¹ Because of the skills a STEM major embodies, more and more employers are hiring STEM majors.

Although Connecticut has seen growth in the number of STEM degrees awarded as a percentage of bachelor degrees, that growth does not necessarily translate into those graduates entering STEM occupations. The importance of STEM goes beyond looking simply at STEM careers. As stated previously, STEM graduates are hired in all fields – meaning students who are STEM majors possess the skills that employers seek; the core knowledge of the major is less of a factor. These skills include analytical thinking and problem solving, which are the skills that anecdotally Connecticut businesses say are hard to find. One reason students do not possess these skills is the fact that STEM majors make up a small percentage of graduating students.

²⁰ There is some variation in how to precisely define which degrees and occupations are considered STEM. In general, STEM includes: life sciences (except medical sciences), physical sciences, mathematics and statistics, computing and engineering. However, the Department of Commerce includes certain STEM-related managerial occupations in its definition, and the Organization for Economic Cooperation and Development (OECD) includes manufacturing and processing, and architecture and building. Although not included in the statistical numbers, this report in its discussion of STEM considers it to include healthcare. This is important because in order to work in healthcare students must take STEM courses, therefore, teaching STEM skills prepares students for a broader array of occupations.

²¹ Georgetown University Center on Education and the Workforce presentation to committee 4/20/2012

STEM majors, regardless of the industry in which they work, will earn more than non-STEM majors. In economics, the measurement of productivity is wages. So this earnings premium indicates that STEM majors are more productive than non-STEM majors and therefore command higher wages. This earnings premium for being a STEM major further leads to a diversion of STEM majors from traditional STEM occupations.

In particular, the demand for STEM competencies continues to grow. STEM is second only to healthcare as the fastest growing occupational category in the economy.²² Further, occupations that poach top STEM talent are also among the fastest growing and highest paid in the economy. However, this poaching or diversion reduces the number of STEM graduates available for employment in STEM-related fields. The challenge for the K-12 and higher education systems is generating an adequate supply of students with STEM skills to meet the demand for workers in STEM fields as well as for workers in other fields where STEM skills are valuable to employers and provide flexibility for workers seeking employment. It is noted that out of 100 students who enter college and obtain a bachelor's degree with a STEM major, 8 remain working in a STEM field after 10 years. For women, only 3 remain working in a STEM field.²³ The data also indicate that there is a premium for having a STEM degree--STEM majors earn more in any field they choose.²⁴

As previously noted, the analysis of the dynamics at play in Connecticut's labor market for STEM occupations has both positive and negative implications for the future of the state's economic health. Although the concentration of employment in STEM occupations is below the national average and is projected to decline, what the data cannot tell us is the demand for STEM majors outside of traditional STEM jobs.

The analysis of the largest STEM-employing industries reveals that they constitute a large proportion of the state's GDP, payroll, and overall employment picture. The production of higher-echelon STEM labor has grown as a proportion of total bachelor's degrees awarded, yet the proportion of lower-tier degrees has fallen significantly.

As previously noted, although Connecticut has a thriving concentration of STEM industries, it has an underproduction of STEM occupations as compared to other states. One key observation seen in the falling proportion of lower-tier STEM educational credentials is that Connecticut might be lacking an adequate supply of the support occupations necessary to further high-tech development. In the absence of migration data for graduates who have obtained bachelor's degrees in STEM fields, it is difficult to assess whether Connecticut is retaining graduates. Further investigation and research into the causes of these conflicting scenarios of the market for STEM occupations in Connecticut is necessary to properly prescribe targeted economic and workforce development initiatives and program investments. This is an example of analysis that can be done utilizing data available nationally, however the data do not paint a comprehensive picture and need to be supplemented with more current and future trend analysis in order to effectively create workforce policies and strategies.

However, given the national statistics that show an earnings premium for STEM majors, indicating they are more productive workers, and the ability of STEM majors to work in a

²² Carnevale, A., Smith, N., Melton, M., "STEM," Georgetown Center on Education and the Workforce, October 20, 2011.

²³ Georgetown University Center on Education and the Workforce presentation to committee 4/20/2012

²⁴ *ibid*

number of fields, the state needs to create a coordinated effort to engage more students in STEM. This is not just about having more scientists in Connecticut. It is also about addressing what businesses are saying anecdotally about the skills gap – that they cannot find workers with the right skills to fill open positions.

Further, there is considerable attention nationally on STEM and more and more resources being committed to encouraging students to enter the field. Ensuring collaboration among all the efforts currently underway in the state would help Connecticut compete for future funding opportunities.

FINDINGS & RECOMMENDATIONS

The economic well-being of the State of Connecticut and its citizens and businesses is dependent on a vibrant and globally competitive state economy. Therefore, preparing the state's workforce for the jobs of today and tomorrow must be a state priority of the highest level. The workforce system in its broadest form spans from an individual's pre-natal care through their retirement. It is a complex system that requires coordination, collaboration, and continuous review and improvement of programs and initiatives provided by many state agencies and others (many with principal missions not specifically focused on workforce issues) in order to meet the changing needs of business and industry, and the state's residents.

The CASE study committee's recommendations focus on several areas for the purpose of achieving an effective aligned workforce system that has the ability to adapt to the changing needs that will be required of the future workforce.

- A statewide workforce system should be coordinated to assure that
 - o clear objectives are established and progress is monitored;
 - o education, economic development and workforce program entities are held accountable regarding each entity's responsibilities related to workforce issues;
 - o implementation of strategies related to the workforce system are assessed and outcomes monitored; and
 - o a system is created that can address and adapt to transformations and globally emerging trends.
- Data and information that provide historical and projected future workforce trends are necessary for informed decision making regarding state and federal investments in workforce related programs. A data-informed system will ensure that agencies and others with workforce-related responsibilities are held accountable for results and outcomes.
- The needs of business and industry, and therefore how the education and training system prepares students and adults for workforce opportunities, are paramount. The workforce leadership responsibilities of the Connecticut Office of Workforce Competitiveness (OWC) should include facilitating the development of relationships between and across the education and business and industry communities. Also, education and training initiatives should be integrated with key economic growth strategic initiatives to assure workers have the skills needed to support the business sectors identified by the Department of Economic and Community Development (DECD) as key to Connecticut's future.
- Workforce programs and initiatives are principally supported by state and federal funding. Determining where Connecticut can achieve the greatest impact and outcomes is dependent on program evaluation and analysis of available data. Program investments can be targeted to address short, medium and long term goals. Flexibility in use of funds provided by the state and federal government is necessary to provide

funding to the types of programs necessary to address each of these time horizons and changes in the economy. The state should advocate for the more flexible use of federal funding to better meet the needs and priorities of individual states.

- Therefore, the state's workforce system organizational structure should be changed to provide for focused leadership for the best opportunity to achieve desired outcomes. OWC should be an independent office that reports directly to the governor and is housed for administrative purposes only within the Office of Policy and Management (OPM). This will provide OWC with the authority, on behalf of the governor, to assure accountability of all agencies and organizations with workforce system-related responsibilities.

ORGANIZATIONAL STRUCTURE AND LEADERSHIP

FINDINGS

In order to compete globally, Connecticut needs to raise education and workforce training to the highest strategic priority. Place it adjacent to, and synched with, objectives of business and enterprise development. It is, after all, the goal of the state's economic growth plan to not only create and grow businesses, but to fill the jobs in these new businesses with Connecticut residents.

However, there exists a leadership gap in the state with a lack of accountability by the entities involved in education and workforce training. Many constituents within the workforce system indicate that there is a leadership gap – no one with the authority to coordinate and implement strategy and policy. The current state structure enhances the potential for inefficiencies and merely encourages voluntary coordination among state agencies and entities involved in the workforce continuum. This results in inconsistent levels of coordination and collaboration, frequent duplication of efforts, and an inefficient use of resources.

Although Governor Malloy recently increased his reliance on the CETC to serve an active role as the state's vehicle for the alignment and integration of economic development, education, human services, and workforce development policy, it still remains a board composed predominately of volunteers. Its main objective, as set forth in the federal Workforce Investment Act of 1998 and in Connecticut statute, is to advise the governor and serve as the state's workforce investment board. It recently issued its annual plan as a means of fulfilling its obligations but it does not have the authority to execute or implement the changes recommended in the plan.

OWC, which serves in an administrative function to the CETC board and is under the direction of the Commissioner of Labor, lacks the authority to successfully provide leadership and visibility for state workforce programs and initiatives, and to overcome state agency resistance to system improvement to achieve desired outcomes. Since OWC is an office within DOL, it may appear that it is providing guidance under the direction of DOL as opposed to direction from the governor. This type of structure can create friction among state agencies and does not provide OWC with authority to act on behalf of the governor or to garner the greatest level of cooperation and collaboration among the diverse group of

state agencies and private sector partners comprising the workforce system. Importantly, even if OWC is given additional authority, success will depend on implementation by the individual agencies in the workforce continuum including but not limited to, the SDE, BOR, UConn, DOL, and DECD, and regional workforce investment boards.

The governor, through DECD, has established the priority industry sectors for the state but the next step should be a strategy to prepare the workforce with the skills needed for employment in these sectors and also to engage business in developing effective workforce strategies to meet their needs. This requires all participants in the workforce system to collaborate and consolidate programming and resources. The state does a good job at implementing pilot programs but lacks the organizational structure to bring successful pilots to scale. The lack of coordination also drives the need for focused leadership.

In addition, the workforce investment boards (WIBs), DOL, DECD, and regional educational service centers (RESCs) typically work independently from one another. This approach often results in missed opportunities for collaboration and does not produce a client-centric approach to services – meaning the unemployed or displaced resident is not provided on-site with a holistic array of programs and services available.

Without a central entity coordinating workforce efforts, programs and alignment issues are often addressed separately from public entities via private and philanthropic funders. In 2008, Northeast Utilities and United Illuminating invited the Connecticut Business and Industry Association's (CBIA) Education Foundation to a regional meeting of the Center for Energy Workforce Development (CEWD). At the time, New England was the only region in the country without a consortium dedicated to CEWD's mission of helping to address the expected workforce shortage in the utility industry due to retirements in the coming decades. As a result, the Connecticut Energy Workforce Development Consortium (CEWDC), which is a public-private partnership of individuals from businesses, education and government, was formed. This forum has been helping to address the future workforce shortages in the utility industry but these types of initiatives are often funded by grants, making sustainability an issue. However, there is an opportunity for the state to continue the work if there were a lead entity in the state that could help coordinate the sustainability.

Another example can be found in Public Act 11-133, An Act Concerning Alignment of Postsecondary Education and Employment. OWC is required to report to the BOR concerning industry sectors where workforce shortages exist, the skills needed to fill the shortages, and the career pathways that should be established. However, the BOR only oversees the community colleges and public state universities. It is remiss to not include the University of Connecticut and the independent colleges. These institutions of higher education might already have existing programs that could be customized to fit sector needs rather than trying to establish a new program within the BOR system.

Public Act 12-129 further separated oversight of the University of Connecticut by the BOR by eliminating requirements that UConn submit its mission to BOR for review and approval, and recommend institutional or campus mergers or closures to the BOR. The act eliminates the BOR's authority over UConn with respect to mergers and closures. Also, UConn is now only required to submit a quarterly report on actual expenditures directly to OPM, instead of the prior requirement of submitting these reports to the BOR.

Connecticut, although a small state, offers the future workforce a wide array of higher education opportunities. However, these institutions must collaborate and coordinate resources in order to raise the visibility of the opportunities that exist in the state.

Further, there still is fragmentation that leads to missed opportunities within the education system. The coordination that exists between the K-12 education system and higher education system occurs on a voluntary, pilot program basis rather than through a coordinated approach. This siloing results in an inefficient use of resources.

Executive Order #20 was signed by the governor on October 18, 2012 to revitalize and update the membership of the P-20 Council. The Council now includes all members of the state's educational system, with appointments from state agencies and other organizations. The revitalized Council may help address the fragmentation in the education system. However, based on past history of the Council, it's uncertain whether it will be effective and able to coordinate all entities in the education system for the purpose of ensuring "that Connecticut develops bold initiatives that strengthen all levels of the state's education system so that students are best prepared with the skills needed in today's job market."

Further, since the Council serves in an advisory capacity, it does not have the executive level authority similar to that of an executive branch state agency to implement policy changes and programs with direct accountability to the governor. Therefore, it is worth considering alternative government structures for coordinating early childhood, and K-12 education through higher education. For example, in Massachusetts a secretary of education has responsibility for the departments of early childhood education, elementary and secondary education, and public higher education.

STEM awareness and education is another area that occurs in a piecemeal fashion. The state currently lacks an overall strategy to support the promotion of STEM education and careers and this is partly due to the lack of an entity that is responsible for the coordination. There are many initiatives that seek to increase awareness of STEM careers and to provide experiential learning opportunities. For example, the following are just a few of the over thirty initiatives in the state: Connecticut Innovation Challenge, CPEP, Connecticut Invention Convention, Connecticut State Science Fair, MATH COUNTS, and USA Biology Olympiad. There are also almost 90 informal science and nature centers providing science learning opportunities for youth in the state.

In order to compete for funding opportunities made available by national organizations and the federal government, Connecticut needs a coordinated approach, particularly given the increased focus by the federal government and national organizations on the importance of STEM education. A clearinghouse for STEM activities and initiatives would more easily provide for and promote the dissemination and awareness of programs and information statewide to ensure that the maximum number of students are given the opportunity to participate and benefit from STEM-related programs.

RECOMMENDATIONS

This report recommends a different model to ensure effective oversight of major federal and state workforce funding streams. A new model will support CETC in its policy-making role, increase accountability, and increase coordination and collaboration so funds can be

leveraged, maximized, and serve residents in the most efficient and effective manner. In order to achieve a coordinated and accountable workforce system, each entity within the workforce continuum must be held accountable and directly responsible for the outcomes of its programs.

Figure 7.1 depicts the breadth of data analysis and synthesis that is necessary for monitoring and maintaining an effective workforce alignment system that includes (as represented by the circles in the figure)

- o systematic review and evaluation of workforce programs;
- o ongoing review and evaluation of the workforce system including best practices and benchmarking Connecticut to other states, the nation, and globally;
- o continuous monitoring of the state's performance on economic indicators;
- o review of state laws, policies, and practices to ensure they are flexible and adaptable to the changing economy, and
- o synthesis and analysis of all workforce-related data and information by OWC to inform the workforce investment decision makers.

This would require OWC to oversee the synthesis analysis and recommend policies and programs based on the findings. Therefore, each workforce-related function in the system would report and communicate results and outcomes. These in turn would inform workforce system investment decisions to assure Connecticut has a vibrant, globally competitive economy that achieves economic well-being for its citizens and businesses.

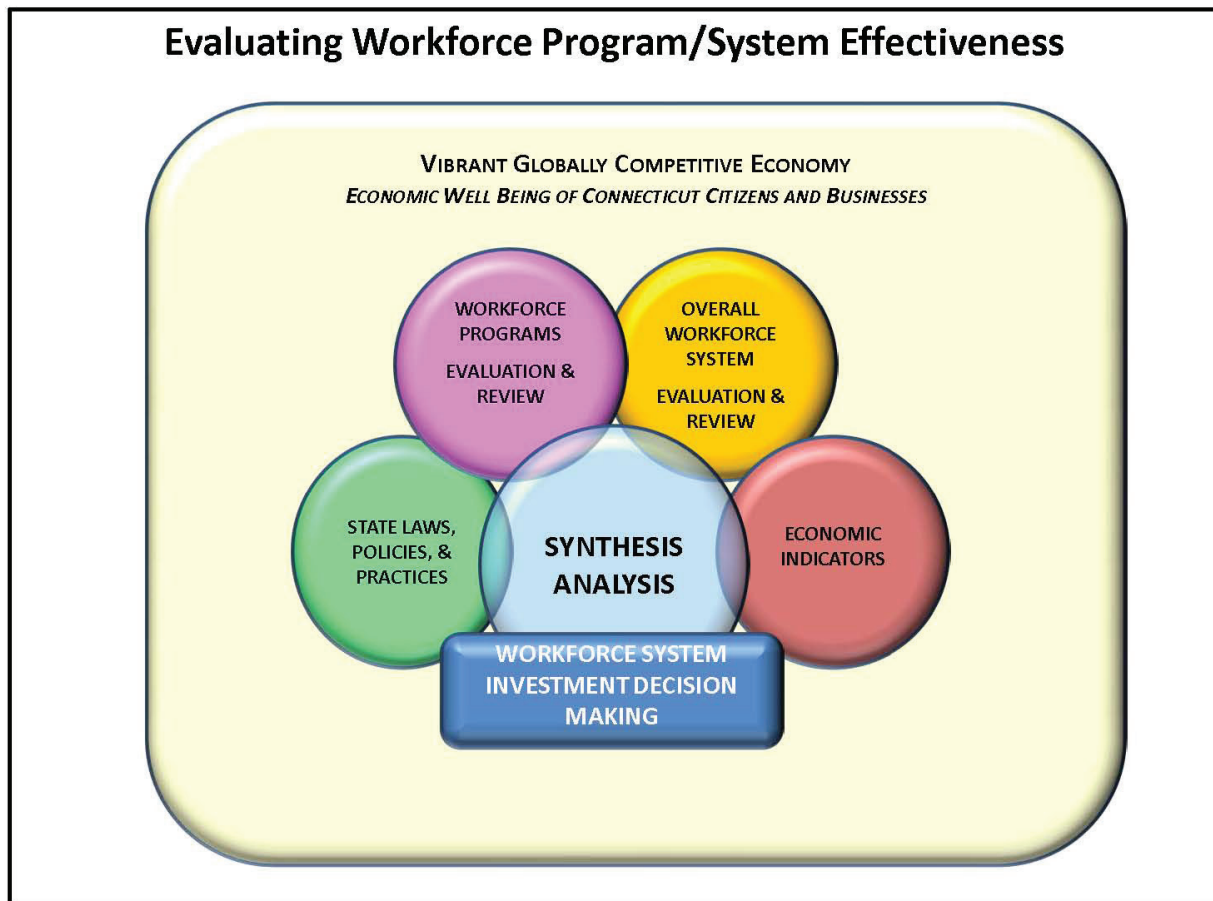


FIGURE 7.1: EVALUATING WORKFORCE PROGRAM/SYSTEM EFFECTIVENESS

A data-informed system with entities held accountable for results and outcomes and a governmental structure that facilitates collaboration and communication are required to prepare the state with a workforce for tomorrow. It is only through successful implementation of these recommendations that the state will be able to better forecast and predict promising jobs for the future as well as the skills and training required for them, and then implement through workforce policy and programmatic reform the changes that need to occur.

1. Several organizational structures were examined and it is recommended that the leadership for the workforce system take the following form:
 - o In order to assure accountability within the workforce system, the first step is to evaluate existing programs' goals and outcomes, then determine what the desired outcomes of workforce development policy for the state should be. OWC should be designated to serve as the entity that has the authority to work directly with the governor to: set objectives, monitor progress, and hold accountable the education, economic development and workforce program entities regarding workforce issues; assess the implementation of the strategies related to workforce; create a system that can address and adapt to transformations and globally

emerging techniques; and manage the comprehensive longitudinal workforce data system (with guidance from CETC's Planning and Performance Committee). Therefore, OWC should work with state agencies and public higher education institutions to evaluate existing programs and establish measurable goals. A key responsibility for OWC is to serve as the "synthesizer and analyzer" of information as shown in Figure 7.1 for the purpose of workforce investment decision making. This means establishing outcome goals that are directly tied to agency funding and memorialized in legislation for the following agencies: BOR, UConn, SDE, DOL, and DECD and others as appropriate and to be determined. Until there is accountability in government and public higher education, the state will not have a workforce system that responds to the needs of businesses and state citizens.

- o OWC should become a stand-alone entity that reports to the governor and is housed within OPM for administrative purposes only. The head of OWC, an individual with workforce development and policy expertise, should report directly to and be appointed by the governor. OWC should be provided with the staff and resources to fulfill its new responsibilities with additional support provided by the state agencies involved.
- o The governor should provide an overall workforce vision for the state to
 - ◇ raise the level of recognition and importance of workforce development;
 - ◇ develop workforce system goals with guidance from OWC/CETC; and
 - ◇ rely on OWC for data and analysis for decision-making and accountability.
- o CETC should provide the strategic guidance related to workforce issues, including a vision for targeting resources and for focusing OWC activities. Further, OWC should develop, in consultation, with CETC a process to provide businesses with information regarding all workforce-related programs. This information should be web-based, easily accessible, user friendly and updated regularly. The process should include a mechanism to provide businesses with an opportunity to receive alerts about updated and new programs.
- o A General Assembly Select Committee on Workforce should be created to receive and review data and metrics for monitoring and policymaking related to workforce alignment. The committee should be structured similar to the Select Committee on Children and include, but not be limited to, chairpersons and ranking members from the committees on education, human services, higher education and employment advancement, commerce, and labor.
- o When a new initiative is launched, (for example, Connecticut's Innovation Ecosystem or Fast Five Program), OWC should be responsible for ensuring that all workforce-related issues are coordinated and funds leveraged to increase the efficient and effective use of public funds.
- o OWC should serve as the convener and facilitator of the various state partners involved in STEM to create collaborations that would make the state be more competitive for federal funds. In addition, OWC should create a clearinghouse

for all the STEM initiatives underway in the state, disseminate information, and create awareness about existing and new programs to reach the maximum number of students possible.

2. Add representation of independent colleges and the University of Connecticut to the CETC board so that all entities involved in workforce development are involved in the development of strategies at the state level.
3. Consider offering and co-locating comprehensive services (including Adult Education, among others) at the One-Stop Centers. This might entail co-locating all offices regionally or having staff work in multiple locations so that they can more easily collaborate on initiatives and jointly compete for federal funding. This will enhance collaboration and result in fewer missed opportunities.

BEST PRACTICE: WORKFORCE INVESTMENT SYSTEM

Craig Follins, president of Olive-Harvey College in Chicago and a member of the CASE study committee, presented his findings on creating an effective workforce alignment system to the committee. He said an effective workforce alignment system can be viewed as a three-legged stool as shown in Figure 7.2.

Essentially, in order to build a strong economy, all three components of the workforce system – workforce programs, economic development, and education – must be working together on equal footing.



FIGURE 7.2: BUILDING STRONG ECONOMIES

SOURCE: CRAIG FOLLINS PRESENTATION TO CASE STUDY COMMITTEE; JUNE 2012

To accomplish this in Connecticut, as suggested by this study's recommendation, it is necessary to have OWC serve in a leadership capacity with the authority to facilitate and implement the following:

- continuous improvement and monitoring
- strategic planning
- leveraging of resources
- resource mapping

BEST PRACTICE: MASSACHUSETTS SECRETARY OF EDUCATION

Created on March 10, 2008, the Executive Office of Education is responsible for the Department of Early Education and Care, Elementary and Secondary Education, Higher Education, and the University of Massachusetts system. In partnership with the individual departments, the office seeks to improve achievement for all students, close the achievement gap, and create a 21st century public education system that prepares students for higher education, work and life in a world economy and global society.

Having each department that is part of a student's educational career integrated into one office more easily allows for collaboration, leveraging of resources, cross-cutting initiatives, and development of creative solutions that span the breadth of a student's career. Also, this model has the secretary reporting directly to and held accountable to the governor. The secretary has the authority to implement and adapt policies and programs throughout the education system to meet the constantly changing needs of the state and its students.

DATA AND INFORMATION

FINDINGS

A common theme mentioned throughout the interviews, focus groups, and from study committee meeting discussions was the lack of adequate data to inform the workforce alignment system.

A particular challenge for many of the workforce programs in the state is gathering outcome data that are necessary to truly understand if programs are effective. Outcome data are not just a count of how many people were served, but involves looking at the results of those who were served by the program, and determining if they found employment or graduated—whatever the ultimate goals of the program might be. There increasingly has been discourse on the importance of sharing data between agencies involved with education and labor to better assess outcomes and worker preparedness. In addition, there is much discussion about how to ascertain which occupations or industries will require more workers in the future. However, these discussions remain at a preliminary stage, while the need for better information to inform decision making and investment continues to grow. Currently, there is no way to understand what might happen in the future in terms of occupational demand by employers. Key information that was identified as missing from the data used to inform the workforce system are employment and occupational projections that look to the future, as opposed to solely relying on historical data. For example, the state currently has no systematic method of collecting data to determine what business needs are in the future so that workforce programs could be developed to meet those future needs.

Right now things occur in a piecemeal, ad hoc fashion and many initiatives occur outside of government through associations, foundations, or nonprofits in the state.

However, given all these current limitations with what is available, there have been several recent successes in addressing the need for greater workforce data:

- *Legislative Report Card*—In 2010, the agreement between the University of Connecticut and DOL was found to not meet federal Family Education and Rights Privacy Act (FERPA) standards and therefore information could not be shared between the two agencies. Federal FERPA regulations protect student information and provide guidelines as to who can see and share personally identifiable student record information. All schools that receive federal funds from the US Department of Education must follow the law. However, the federal Department of Education in December 2011 issued revised FERPA regulations that have enabled UConn and the DOL to create new data-sharing agreements. This sharing of information is only for the purposes of submitting the Legislative Report Card to the General Assembly.
- *The Training and Education Planning System (TEPS)*—DOL developed and maintains TEPS, which is a tool designed to aid in the analysis of the demand and supply of talent in Connecticut's workforce. Data are collected for TEPS analysis from many sources, including the state Department of Labor occupational projections, federal Integrated Postsecondary Education Data System (IPEDS), the Office of Higher Education, and the State Department of Education. Although the program has been in operation for approximately four years, it is still unclear if it is widely used.

STATE LONGITUDINAL DATA SYSTEM

Another initiative underway that will provide outcome data to help inform the workforce system is the State Longitudinal Data System (SLDS). In August 2009, SDE was the recipient of a \$2.9 million SLDS Grant by the National Center for Education Statistics (NCES) in the Institute for Education Sciences at the US Department of Education. This grant is currently in its second phase. Current goals of the project are to create 1) a student/schedule/teacher module to capture information about the courses in which students enroll, and 2) an interoperability framework for data sharing between preK-12, higher education, and labor to provide information based on longitudinal data that can be used to improve policy and practice and to increase student success.

The outcomes of these two projects will be the creation of a data infrastructure system intended to enable the following:

- Monitor and implement secondary school reform to determine if students are indeed enrolling in the classes needed to graduate
- Provide more accurate accountability reporting for the Federal Perkins Program²⁵
- Evaluate whether students have been well prepared by their public school experience by determining the extent to which students need remediation upon entering the postsecondary system

²⁵ <http://www2.ed.gov/programs/fpl/index.html>

- Answer research questions about course-taking patterns and their relationship to student outcome measures
- Evaluate the impact of students' experiences in both secondary and postsecondary education on their experiences in the workforce

In 2010, the Interoperability Systems Council (ISC) was established to develop a plan and pilot a system for linking public K-12 and postsecondary education and labor data together. Today, the ISC consists of a group of stakeholders from state agencies and organizations who are interested in staying involved in developments that pertain to increasing data interoperability across agency lines. Members of this group include representatives from the State Department of Education, BOR, University of Connecticut, Connecticut Conference of Independent Colleges, the Early Childhood Data Workgroup, and the Department of Labor.

Agencies ready to create a shared data system are participating in a cross-agency data governance structure and are actively working to implement the Preschool Through 20 and Workforce Information Network (P20 WIN). A pilot of P20 WIN linking SDE, BOR, and DOL is set to launch in August 2013. Participating agencies are actively working on system implementation and finalizing data sharing agreements and data governance policies to sustain the system beyond the time frame of the grant.

However, this is a pilot and does not include all data necessary to track all students in the state. For example, University of Connecticut student data will not be a part of the pilot and a plan or mechanism to link their data has not been developed. The CCIC is in communication with P20 WIN and is discussing how these institutions will participate in the future. The Office of Early Childhood is also working with the system developer to determine the best way to collect and disseminate early childhood information. Once the pilot system is operational, the system would need to be expanded to include students who attend private high schools in the state, in order to fully capture the pathways of the entire state's population. Further, the sustainability of the system has not been fully worked out. Interagency agreements concerning data sharing and data access are being developed but a long-term plan for financial sustainability and links to all public and private institutions in the state will be key for the future.

CREATING THE LABOR MARKET INFORMATION SYSTEM OF THE FUTURE

As previously stated, Connecticut's existing labor market information system can be harnessed to provide a workforce training pipeline that will guide the state's economy in the 21st century. The availability and proper utilization of public and proprietary data sources is critical to assuring the most efficient and effective use of resources. Targeted economic development requires timely and descriptive labor market indicators that allow for policymakers to assess the state's existing employment dynamics.

For example, there is a substantial lack of publicly available data products that adequately assess labor demand in the regional economy. Employment statistics for occupations and industries are readily available through traditional data sources. However, these statistics rely on historical data to make future predictions. They do not address issues pertaining to current job vacancy and labor demands that are crucial for policymakers when crafting worker reallocation and training programs.

An annual job vacancy survey could help alleviate this data deficiency in the state's labor market system and provide a more detailed and forward-looking portrait of the regional labor market. An employer survey was conducted once by DOL in collaboration with the University of Connecticut. However, due to cost constraints it was not continued.

Currently, the state collects data on occupational employment that is then passed on to the federal Bureau of Labor Statistics and used in the creation of the bureau's Occupational Employment Statistics report. It is, however, quite difficult to ascertain detailed or longitudinal estimates at the state and regional level. The data are constructed by aggregating three years' worth of survey data and are not built to be viewed longitudinally. This survey could be expanded at the state level so that Connecticut's occupational employment could be analyzed longitudinally without fear of data discontinuities. The Bureau of Labor Statistics also creates detailed industry-level estimates of occupational employment at the national level. It would be extremely beneficial to have a similar matrix created at the state level to better assess inter-industry employment at the state level.

The Bureau of Labor Statistics provides state-level industry and occupational employment projections through its Employment Projections program. The projections, however, are provided on a biannual basis and only available at ten-year intervals. Further, the projections assume a full-employment economy and also convert industry-level data into occupational data. Since, these projections use historical data, they cannot be used to predict what new occupations may arise in the future. In general, though, it is difficult to predict the future industries or occupations that will demand workers.

State-level projections of industry and occupational employment levels created annually would be extremely useful for guiding decision making for allocating workforce development funds. Short-term projections in addition to the ten-year projections are needed, as most workforce training initiatives have significantly shorter time horizons. A total of 33 states provide short-term industry projections, while 34 states provide these projections for occupations.²⁶ Some states provide additional short-term projections for smaller geographic jurisdictions such as counties and metro areas. Projections, although often made inaccurate by sudden and unforeseeable paradigm shifts, are extremely useful in forecasting short-term labor market transitions. In addition to short-term employment projections, projections pertaining to job turnover and vacancy are necessary for comprehensive analysis.

The National Center for Education Statistics provides excellent data pertaining to postsecondary education degree conferral rates by subject area and award type. However, the creation of an integrated longitudinal workforce alignment data system would allow researchers to track not only educational attainment but also its effect on an individual's labor market outcomes. An integrated workforce alignment data system could be used to assess the effectiveness of educational funding in the state and allow for the identification of areas that require further development. A system that links unemployment insurance wage records and worker employment characteristics with educational outcomes could provide an excellent tool for informing the state's workforce pipeline of the opportunities available as well providing policymakers with outcome information that could better enable them to direct funding where the greatest return on investment can be realized.

²⁶ <http://www.doleta.gov/business/projections/docs/internetlinks.pdf>

Longitudinal data systems help answer important questions about outcomes in our educational system that cannot be answered today. Tracking students from when they enter school through the workforce system helps policymakers understand the production, stock, and flow of human capital development.

With the current data collection systems, broad-based policy questions can be answered. However, to reorient the focus on educational outcomes and to better target interventions, the state needs more detailed student-level data that document educational participation and outcomes as well as participation in the workforce.

Since most data systems are specific to a particular institution, measures of success tend to focus on process rather than outcomes. For example, a college might achieve its four-year graduation rate goals, but if those students fail to enter the workforce, should the college declare success? With the data currently available, the state does not know how many of the graduates of the colleges and universities in Connecticut work in Connecticut or even what industries they work in.

The following are ways in which each sector could benefit from a longitudinal data system:

- The K-12 system could gain an understanding of how former students are performing in postsecondary education and in the workforce.
- Postsecondary education institutions would be able to access information about workplace earnings and placement – particularly those oriented toward vocational or professional preparation. In addition, information about K-12 student achievement would be useful to both secondary and postsecondary institutions for identifying areas where better secondary school preparation is needed.
- The workforce sector wants to know about prior training to identify and address skill gaps in the workforce. Having access to a more robust data system that tracks individual student outcomes will help the state decide whether to invest in education to address a skill gap or establish incentives to induce more workers to seek employment in the state.

Existing workforce data systems provide an excellent tool for policymakers to assess the regional labor market. The proposed additions to the data depository – including a job vacancy survey, longitudinal data system, improved occupational employment statistics, and reduced horizon projections for both occupations and industries – represent an opportunity for the state to provide policymakers with the most timely and detailed workforce data available. The utilization of existing and emerging data products is crucial in order to maximize the effective use of limited resources for targeted economic development and workforce-related programs and initiatives. In addition to the more efficient allocation of resources, a more detailed labor market information system will provide policymakers with additional insight into the effectiveness of past and present programs.

However, there is no central authority that consolidates, analyzes, and synthesizes all workforce program data, labor market data, and economic development-related data. After the data are analyzed, the results should then be used to either adjust programs, terminate ineffective programs, or implement new programs based on emerging trends or future needs. For example, who is responsible for identifying whether or not there are occupations or job

titles that continually go unfilled and then determining how the state could increase the supply of qualified workers in these areas? There is no formal, systematic, outcome-based program evaluation. Questions that could be addressed by implementing this type of evaluation include:

1. How can programmatic outcomes be measured in a more focused and efficient way?
2. How can the state evaluate the workforce alignment system to ensure public dollars are wisely spent?
3. Is state spending ensuring the outcomes and meeting the workforce needs?

There is also no systematic comparison and benchmarking of Connecticut's performance with progress of other states, the nation, and the world. However, CETC is addressing the need for measures and benchmarks in their most recent annual plan and is working on creating a statewide dashboard to measure Connecticut's progress.

RECOMMENDATIONS:

1. Although it is very difficult to predict the future and what occupations might exist years into the future, for now a hybrid method should be employed to understand in the short and medium term what occupations could arise or be on the decline. Such a method should include incorporation of the best data currently available for predicting future trends, which is real-time job posting data, in addition to the creation and administration of a quarterly employer survey that assesses current vacancy rates and future hiring plans. These two forward-looking data elements would be utilized, in addition to the current DOL occupational projections that use historical data, to anticipate future trends. Forecasting using these three data elements would enable the projections to provide a more robust picture of what is emerging for the future as well as better identify if past trends mirror the current labor market picture. An adequately sized job vacancy survey could provide both industry and occupational vacancies that would allow policymakers to prescribe targeted economic development solutions and maximize the return of existing training resources. The survey would need to be conducted on a quarterly basis in order to provide timely real-time and trend information. This type of survey not only helps job seekers understand where work is available and the types of occupations in demand, but it also helps employment and training services understand the current labor market and provides an indication of how well the labor market is doing.
2. The longitudinal data system must be supported and promoted by the state. All agencies and entities in the state that are part of the workforce system must provide their data and protocols for data use and sharing must be established. OWC should lead the effort by convening an interagency workgroup to determine the future sustainability of the longitudinal data system.
3. OWC should be responsible for creating a central repository for workforce programs that will provide information about workforce programs in the state and inform about the quality of the programs for the purposes of statewide implementation (scale-up). Repository data and analysis should be publicly communicated and monitored so that successful programs can be evaluated for bringing them up to scale or determining sustainability efforts.

4. Enhance DOL's research capacity, since three-quarters or more of their funding is from the federal government, to produce more comprehensive data to inform the workforce system. The following should be incorporated into DOL's research: tracking of self-employment and regular analysis of demand and supply of workers.
5. Have OWC serve as the office that systematically assesses program performance and also analyzes the state's overall performance on key metrics and benchmarks for comparison with other states, the nation, and globally. Several benchmark and best practice states and/or countries should be identified based on an analysis of key selection factors. Relationships should be established with selected benchmark states for periodic joint review and analysis of each state's progress. This would be included in the workforce system evaluation and review, as shown in Figure 7.1.
6. Higher education performance metrics should be tied to meeting the needs of business. This requires that higher education institutions and systems continuously monitor, through surveys, whether or not their programs and graduates are meeting the needs of business. Results should be used to assess performance and adapt and develop programs to meet the current and future needs of business.

BEST PRACTICE: EMPLOYER VACANCY SURVEY

The Massachusetts Department of Workforce Development (DWD) conducts a semi-annual job vacancy survey in an effort to assess the current condition of the state's labor market. The survey has been strategically designed to provide the critical insights necessary for policymakers to craft strategic economic and workforce development initiatives. The consistent metrics used in the survey and the frequency of iteration allow analysts to provide a longitudinal portrait of the labor market in addition to a cross-sectional snapshot.

The goal of the survey is to prevent imbalances in the supply and demand for labor across the state by identifying industries and occupations where elevated vacancy rates are present. In addition, the survey helps to isolate both labor and skill shortages in the marketplace, which is difficult to do in the absence of a formal job vacancy survey. The key indicators of the state's labor dynamics afforded by the investigative nature of the vacancy assessment aid in the alignment of policy initiatives and provide businesses with effective recruiting strategies.

The DWD combines the estimates attained by the job vacancy survey with data on unemployment by occupation and industry collected from state ES202²⁷ filings as well as the Occupational Employment Statistics program. As of the second quarter 2010 survey, a total of 10,011 employers were surveyed and the DWD received a total of 7,836 responses for a 78% response rate. The survey provided data on vacancy by industry, occupation, region, educational attainment, firm size, and a variety of combinations of these overall labor market segmentations.

According to the Bureau of Labor Statistics, there were a total of 219,094 establishments in Massachusetts as of the second quarter of 2010. A rough calculation indicates that the vacancy survey covered approximately 4.57% of total establishments in Massachusetts. A survey with

²⁷ The Covered Employment and Wages Program, commonly referred to as the ES-202 program, produces a comprehensive tabulation of employment and wage information for workers covered by State unemployment insurance (UI) laws and Federal workers covered by the Unemployment Compensation for Federal Employees (UCFE) program.

comparable margins of error for Connecticut would need to cover about 5,053 of the total 110,578 firms located in Connecticut as of the first quarter in 2012. The resulting industry and occupational vacancy rates could be combined with existing DOL data products to produce a granular and statistically valid assessment mechanism to analyze Connecticut's employment dynamics.

BEST PRACTICE: STATE LONGITUDINAL DATA SYSTEM

The initiative for states to develop statewide longitudinal multi-agency data systems (SLDS) began with the authorization of the Educational Technical Assistance Act of 2002. Progress on the development of SLDS accelerated with the passage of the American Recovery and Reinvestment Act in 2009, which provided an additional \$245 million in grants awarded in 2010.

The Data Quality Campaign (DQC), a bipartisan national advocacy group that supports state policymakers in promoting the development and effective use of statewide longitudinal data systems, has been tracking the progress states have made in developing SLDS. The ten state actions necessary to create a successful SLDS identified by the DQC include (with the corresponding number of states that have achieved the goal through 2012):

1. Link data systems (14 states)
2. Create stable, sustained support (35 states)
3. Develop governance structures (40 states)
4. Build state data repositories (45 states)
5. Implement systems to provide timely access to information (5 states)
6. Create progress reports using individual student data to improve student performance (36 states)
7. Create reports using longitudinal statistics to guide system-wide improvement efforts (42 states)
8. Develop a P-20/workforce research agenda (38 states)
9. Promote educator professional development and credentialing (6 states)
10. Promote strategies to raise awareness of available data (26 states)

As of 2012, a total of 49 states have taken steps toward developing a SLDS. Ten states have completed eight or nine of the actions (Arkansas, Delaware, Florida, Indiana, Louisiana, Maine, North Carolina, Ohio, Oregon, and Texas). Delaware and Arkansas have made the most progress, having completed a total of nine actions with Arkansas completing the nine in 2011, a year before Delaware.

The Arkansas Education to Employment report was released in 2011 and marked the culmination of a decade-long commitment to the development of a comprehensive SLDS that includes public educational institutions. The sole shortcoming of the state's data system is that it does not include private universities. The report, however, is extremely successful in evaluating

employment outcomes for graduates of public education from 2002 - 2009. The statistics generated by the Arkansas SLDS afford local policymakers a critical mechanism to evaluate the effectiveness of state education and workforce funding.

A total of 170,000 credentials were examined during the period analyzed with nearly 70% having been awarded to domestic Arkansas students. The report examined wage differentials between degree levels and credentials in addition to industry and employment outcomes. Notably, the report found that the median wages for those who attained a bachelor's degree were highest in the engineering, technologies, and information sciences. It also found that nearly 64% of graduates were concentrated within the health services (23%), education services (22%), retail trade (8%), public administration (6%), and the social services (5%) industries. One key observation from the report was that as degree level rose, graduates were less likely to be employed in Arkansas, which indicates that the state may be experiencing a significant "brain drain." In addition, the report helps to pinpoint key educational strengths and weaknesses in ways that would be unavailable to policymakers in the absence of a system linking tertiary education with workforce outcomes.

The overall governance and structure of the Arkansas SLDS represents a successful model for the delivery and dissemination of the critical educational and workforce indicators generated by such a system. The Arkansas Research Center is governed by the Commission for the Coordination of Educational Efforts and adheres strictly to federal FERPA and HIPPA guidelines. The directors of all affected state agencies, as well as the trustees of various educational institutions, constitute the majority of the seats on the commission. Permission from each individual state agency contributing data must be secured prior to the onset of any research that utilizes the database. The database has a dual architecture that stringently protects the identity of individual records. Specifically, 50% of the database structure contains each individual's identifying information while the balance contains associated data and a random numerical identifier.

An ideal workforce system would provide primary and secondary education statistics that could be linked to tertiary and workforce outcomes. One key impediment to the short-term production of reports that include early educational statistics and outcomes is that in the absence of adequate historical records from existing state data systems, the generation of such indicators must wait until cohorts age into the examined sample. According to the DQC, Delaware, Florida, and Texas have also made significant progress in developing SLDS systems that will, like Arkansas, provide critical policy insight.

EDUCATION AND BUSINESS/INDUSTRY LINK

FINDINGS

Connecticut's education and training capabilities should be at a world leadership level for students across the entire spectrum of diversity and economic standing. Connecticut has a wide diversity of students, educational institutions and school districts. This diversity requires "tailored solutions" that are adaptive and focused on the student's needs and business opportunities. The state should strengthen its funding opportunities to encourage

institutions and school districts to propose unique and innovative approaches that then should be carefully monitored to capitalize on success while also providing for timely intervention to avert failure.

Success should be measured not only by the quality of the student scores/outcomes, but by the affordability, timeliness and adaptability of the educational processes. Do not accept average scores as the only measures of success. Instead, in recognition of the huge diversity of student readiness and economic status, create metrics that both measure and assure the entire population of the state is served. Connecticut needs workers at all levels of educational achievement and also needs to offer career growth paths that move students "up the ladder of success."

In order to have an effective workforce system, there must be a linkage between the state's education system and business and industry. This section of the report examines some of the critical initiatives taking place in the state to reform the education system so that it prepares students to be the state's future workforce, and examines areas that need improvement. It also looks at what other states are doing to improve the linkage between education and business/industry.

STATE ORGANIZATIONAL STRUCTURE

A prepared and educated workforce is the only way the state will be able to compete globally. This means that the state's universities and colleges are critical to the state's economic growth and the prosperity of its citizens. Many of the nation's governors are participating in the National Governors Association Complete to Compete initiative which focuses on helping states improve their students' graduation rates. It is also recognized that higher education cannot help drive economic growth unless students' academic achievement is linked to the needs of the marketplace.

However, there is a longstanding tradition within public higher education institutions to view themselves as preparing an individual for future success as opposed to a particular career. Reorienting or expanding the missions of universities poses a major challenge for policymakers. Another challenge in responding to the needs of industry is addressing the time it takes to get new programs developed, approved and operational versus the immediate needs of business and industry.

Although the state has made progress by consolidating the state's fragmented system of higher education, there is still opportunity to further improve coordination within the entire public education system. The Higher Education Coordinating Council, discussed earlier in this report, includes members from all Connecticut public higher education institutions and the commissioner of the State Department of Education. Its purpose is narrowly defined as implementing ways to simplify and reduce administrative functions as well as developing accountability measures for each public institution of higher education. However, the council does not meet regularly or address broader coordinating efforts, nor does it link in with CETC, except that several members of the council are also members of the CETC.

Currently the coordination that exists between the early childhood, K-12, and higher education systems and other workforce-related training programs, either federally or state funded, generally

occurs on a voluntary, ad hoc basis rather than through a coordinated approach. This “silo” approach results in an inefficient use of resources and often means institutions are competing for federal funding as opposed to collaborating in a more effective and efficient manner. There are also missed opportunities for sharing up-to-date equipment between technical high schools, community colleges, and employers that are located near each other.

However, there are examples of high schools and employers working together. Recently, the Mott Corporation hosted a group of students during the second shift to practice on their equipment at the same time they were conducting digital simulations in the classroom. This enhanced the students' experiences by providing for contextualized learning and the employees also enjoyed mentoring and teaching the next generation of workers. However, these opportunities and partnerships are not coordinated or developed on system-wide basis.

HIGHER EDUCATION PROGRAM APPROVAL

A total of sixteen accredited nonprofit, independent colleges and universities in Connecticut constitute the Connecticut Conference of Independent Colleges (CCIC). The organization represents its constituent institutions through public policy development, research analysis, and coordinated government communications. The CCIC targets four major underlying themes in pursuit of its legislative agenda, with a principal focus on the coordinated articulation of benefits ascertained through independent higher education. The CCIC seeks to inform public policy in an effort to enhance workforce and economic development through the implementation of programs and activities that promote cooperation with the business community. The CCIC promotes the preservation of the autonomy and independence of CCIC member colleges and seeks to facilitate cooperative efforts to improve services and reduce cost.

Under current Connecticut law, the approval of new and revised academic programs at any of the state's degree-granting independent nonprofit colleges, out-of-state higher education institutions, and public universities is reviewed by the Advisory Committee on Accreditation, administered by the Office of Higher Education. Further, in-state and out-of-state independent higher education institutions must get approval from the State Board of Education, whereas public universities obtain approval from the Board of Regents. The state also has approval authority for modification of existing degree-granting programs. During the 2012 legislative session, CCIC supported H.B. No. 5221, “An Act Concerning Changes to Program Approval for Colleges and Universities,” but the bill was not adopted. This bill proposed eliminating the requirement that nonprofit independent institutions of higher education authorized to operate in this state for more than twenty years obtain approval from the State Board of Education to implement new and revised academic programs.²⁸ Currently, depending on the timing of the State Board of Education meeting schedule and an institution's academic calendar, the process can take at least four months and can delay the start of a new program for up to a year.

According to the CCIC, Connecticut's program approval process is significantly more stringent and complex than that of most other states.²⁹ The organization found that 39 states had absolutely no approval process for independent colleges. The report also stated that of the eleven remaining states, four had only a review process rather than a formal approval process. The seven states that require a formal approval process include Connecticut, Illinois, Maryland,

28 www.cga.ct.gov/2012/TOB/H/2012HB-05221-R00-HB.htm

29 [www.ctmirror.org/sites/default/files/documents/Program Approval SAEC Survey NO.pdf](http://www.ctmirror.org/sites/default/files/documents/Program%20Approval%20SAEC%20Survey%20NO.pdf)

Massachusetts, New Hampshire, New York, and Ohio. Similar cross-sectional findings concerning individual state licensure and approval processes can be found in a similar report published by the Education Commission of the States.³⁰

It is the opinion of the CCIC that since its constituent organizations do not receive state support for their programs³¹, their survival depends on the development of fiscally sound programs for which there are marketable labor market outcomes for graduates. The removal of impediments to program approval could afford independent universities improved responsiveness to regional labor market conditions and in doing so improve the dynamics of the state's education pipeline.

The proposal to remove state approval for new or revised academic degree programs of independent universities is not without one important caveat. The quality of an educational program is one important aspect that potential students must consider when selecting where to pursue postsecondary studies. It is often difficult to find independent measures of higher education that report workforce outcomes and wages. This presents a challenge that warrants some level of consumer protection but does not necessarily justify the need for a state program approval process.

An ideal revision of the state statute would address both the concerns regarding the approval process noted by the CCIC and the need to take into consideration the issues regarding consumer protection. One prospective solution would be to require that all independent universities in Connecticut participate in the proposed state longitudinal data system (SLDS). Participation in the proposed SLDS would allow for the creation of publicly available statistics on workforce outcomes and average wages for graduates of each degree program offered by the independent universities.

The proposed system would allow independent higher education institutions to quickly respond to regional labor market conditions by removing the need for state approval of degree programs while assuring regulators that consumers would have the information necessary to make informed choices. This solution aligns with the underlying purpose of this report in that it enhances responsiveness of existing workforce training systems while producing additional data that allows for increased transparency.

EDUCATIONAL ATTAINMENT

In many respects, Connecticut is doing well. Connecticut's workforce, compared to that of other states in terms of education and skills, is relatively better than other states. There is a high proportion of good jobs—professional and managerial—and vibrant industry sectors. Furthermore, in general, more educated individuals move into Connecticut; in-migration increases college attainment levels of the state's population.

However, as previously mentioned, although in the aggregate, Connecticut is relatively better off than most other states in terms of education and skills, the state faces challenges with respect

³⁰ mb2.ecs.org/reports/Report.aspx?id=228

³¹ However, independent colleges receive state funding through the Connecticut Independent College Student Grant (CICSG) program. This program allocates funding to each independent college using a statutory allocation formula which distributes funds based on the number of Connecticut residents enrolled at each college.

to the pipeline of workers. Educational attainment imbalances exist, with the widest disparities in income – suburbs are among the top in the state while cities struggle with serious educational and economic challenges. The difference between minorities and whites in terms of educational attainment is shown in Figure 9.1.

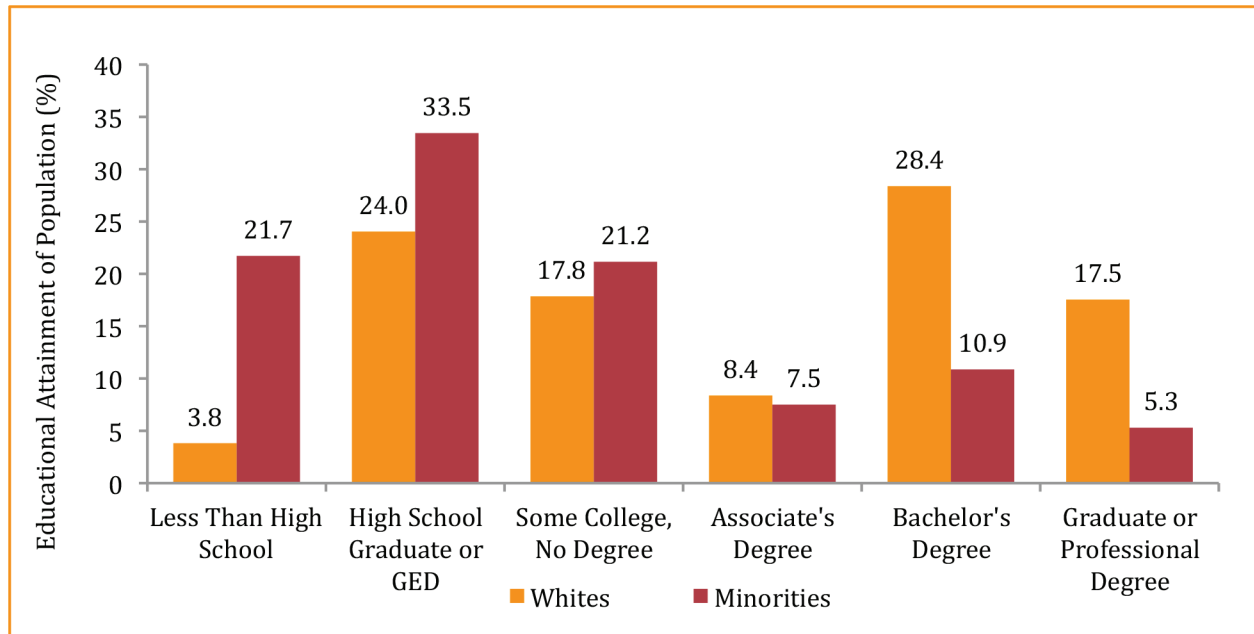


FIGURE 9.1: MINORITIES IN CONNECTICUT ARE, ON AVERAGE, MUCH LESS EDUCATED THAN WHITES. FEWER HAVE COMPLETED HIGH SCHOOL, AND FEWER HAVE COMPLETED COLLEGE DEGREES.

SOURCE: U.S. CENSUS BUREAU, 2009 AMERICAN COMMUNITY SURVEY

Postsecondary education provides access to occupations across the economy, while workers with a high school diploma or less are largely limited to three occupational clusters – food and personal services; sales and office support; blue collar – that are either declining or pay low wages.³² Further, the Education Commission on the States found that postsecondary institutions in Connecticut produce far fewer certificates and far more bachelor's degrees than the national rates for those credential types.³³ To remain globally competitive, it is estimated that each state must ensure that at least 60% of its adults ages 25 to 64 have an associate's or bachelor's degree by 2025. In Connecticut, the current rate is 45.8%, which means the state will need to produce an additional 115,713 degrees by 2025.³⁴

In a recent Brookings report, two of Connecticut's metro areas (Bridgeport-Stamford-Norwalk and Hartford-West Hartford-East Hartford) rank in the top 10 in the nation for the level of demand for workers with a bachelor's degree or higher.³⁵ For example, in the Hartford

32 Georgetown University Center on Education and the Workforce, "Projects of education demand for the future workforce," April 20, 2012 presentation to the CASE committee.

33 The Education Commission of the States presentation at February 7, 2012 CASE committee meeting

34 "Connecticut: The Return on Investment to Increasing Postsecondary Credential Attainment," CLASP Center for Postsecondary and Economic Success, April 2012.

35 Rothwell, Jonathan, "Education, Job Openings, and Unemployment in Metropolitan America," Brookings Institution, August 29, 2012.

Metropolitan Statistical Area, 45% of all job openings in 2012 required a bachelor's degree or higher, yet the bachelor's degree or higher educational attainment rate in 2010 was 35%. Another way to monitor the value of education is by looking at the education premium, which is the value of a college education relative to a high school education. Historically, an individual with a college degree could expect to earn 40% more in his or her lifetime than someone with a high school degree. That percentage has risen to 80% and within five years may increase to 100%.

A real gap exists that needs to be addressed in terms of the degrees and credentials conferred in the state and ensuring they are meeting the needs of employers. This finding is further supported by information provided by many of this study's focus group participants. Employer participants noted that it is difficult to fill open positions. It can also be difficult to connect with secondary and postsecondary institutions of education. There was also discussion in the focus group sessions that often teachers, who have a significant influence on students, are unaware of the types of job opportunities available for students and the skills required for those jobs.

This disconnect in the state's educational system is evident in several large projects underway in the state. In September 2012, a consortium of colleges that are a part of the Connecticut State Colleges & Universities was awarded a \$12 million federal grant from the Department of Labor to focus on providing targeted certifications, industry-recognized credentials, and associate degrees to dislocated workers, veterans and other underemployed workers for careers in the growing health and life science fields. The collaboration among these colleges and universities is commendable, but there are also many private colleges in the state that already have programs that could be leveraged and federal dollars used more efficiently. There needs to be greater linkage for higher education across the state, regardless of whether institutions are private or public.

EFFORTS IN CONNECTICUT

There is widespread recognition that Connecticut needs to raise the level of education for all students in the state. The demographics of the state are changing and this poses challenges for the development of the state's future workforce. There have been several initiatives designed to raise the skill level of students and also to make the transition from high school to college successful. The next section of the report describes a few of the efforts underway in the state.

COMMON CORE STATE STANDARDS (CCSS)

In the spring of 2009, governors and state commissioners of education from 48 states, two territories and the District of Columbia committed to developing a Common Core State Standards (CCSS) for K-12 English and mathematics. The CCSS were designed to consist of fewer, clearer and higher-level standards that would be aligned with college and work expectations, include rigorous content and application of knowledge through higher-order thinking skills, build upon the strengths and lessons of current state standards, be internationally benchmarked so that all students will be prepared to succeed in our global economy; and be based on evidence and research.

On July 7, 2010, the State Board of Education adopted the new national academic standards. In the fall of 2010, a task force of Connecticut content experts in English language arts (ELA) and mathematics worked to determine matches between the CCSS and the Connecticut standards.

In English language arts, 80% of the CC ELA standards matched Connecticut's ELA standards, making about 200 of the 1,019 CC ELA standards "new" for Connecticut. In mathematics, 92% of the CC Math standards matched Connecticut Math standards, which translates into 40 "new" standards for Connecticut.

The CCSS-based curriculum began with the 2011-2012 school year for selected levels and courses. All K-12 district curricula based on CCSS will be implemented by 2013-2014 and assessments based on the new standards will begin in 2014-2015.

COMMON CAREER TECHNICAL CORE (CCTC)

In June 2012, The National Association of State Directors of Career Technical Education Consortium (NASDCTEc) unveiled a core of career technical education standards required for students to become career ready called the Common Career Technical Core (CCTC). Input from business and industry, administrators, and educators nationwide, including participants from Connecticut, helped to establish high-quality state and industry standards to become part of the CCTC.

The CCTC, which are presently being aligned to the CCSS, include a set of standards for each of the nationally recognized 16 Career Clusters which define what student should know and be able to do after completing a CTE program of study. They include a set of Career Ready Practices and knowledge and skills that apply across all career clusters areas. More information can be found at www.careertech.org.

STUDENT SUCCESS PLAN (SSP)

The Student Success Plan (SSP), which was legislated by P.A. 11-135, began for all students in public education grades 6-12 statewide on July 1, 2012. The legislation requires all students to develop an academic and career plan. However, the SDE recommends the development of a personalized student learning plan consisting of academic development; career development; and social, emotional and physical development.

Overall, the SSP is designed to

1. keep students engaged in school;
2. help students establish goals and make better decisions for academic, personal, and career pursuits;
3. facilitate transition to post secondary education or employment; and
4. provide students with an understanding of the relevancy of what they learn in school to the requirements for workplace success in a global economy.

Students in the middle school will begin by exploring self-interests and establishing personal and academic goals that may lead to future study and careers. The flexible student-centered plan may be developed based on a particular career cluster/pathway or area of interest. While in high school, students may participate in courses and activities such as CTE to provide

foundational skills which will transition to postsecondary education and careers. The SSP should include experiences outside the classroom such as internships and opportunities to participate in college or on-line courses while in high school. The plan, comprising academic and career experiences “in and out” of the classroom, should equip students with skills required to become college and career ready, sometimes referred to as the “21st century skills” or “soft skills.” The student may demonstrate college and career readiness skills by completing a Capstone or Senior project. The Capstone Project is a culminating activity which stretches a student’s knowledge in a topic of choice such as a career aspiration or other area of interest such as the arts. Adult mentors/advisors and parents provide support to the development and management of the SSP.

Over the last year, as a result of extensive professional development provided by the SDE, the Connecticut Association of Schools, State Education Resource Center, the Regional Education Service Centers, and the Connecticut School Counselor’s Association, the state-established SSP toolkit was distributed and demonstrated through best practice.

A recent survey was conducted by the SDE to determine the status of SSP implementation in local school districts, the results of which are currently being evaluated.

COLLEGE CAREER PATHWAYS

The College Career Pathway Program (CCP), formerly known as Tech Prep authorized under the Carl D. Perkins Act, is offered to students participating in CTE programs in Connecticut public high schools. The CCP program promotes greater student achievement, postsecondary preparation and high accountability through articulation agreements that support seamless career pathways between high school and postsecondary educational opportunities. High school students formally enroll in a community college and register for articulated academic and career and technical courses at no cost and upon successful completion, are able to earn both high school and college credits. In 2011-12, 6,272 secondary students earned college credits through the CCP Program. The credits can transfer within Connecticut’s Community College system as well as to other universities and colleges within Connecticut and other states. Currently, revisions are underway to expand the CCP program to increase opportunities for students to earn college credit.

Fifty-five comprehensive high schools participate in the College Career Pathways and the University of Connecticut Early College Experience Program Partnership with UConn’s Department of Human Development and Family Studies. The program enables Family and Consumer Sciences high school students to take the Individual and Family Development college level course in their high school and receive both high school and college credit from UConn. It requires a minimum of 40 hours of internship, reflective of specific periods in the life span of individuals and families. The course is a prerequisite at UConn for all students pursuing Education, Allied Health and Family Studies majors

I-BEST MODEL

The Integrated Basic Education and Skills Training (I-BEST) model is an accelerated educational attainment program tailored to the needs of adult and English second language (ESL)

populations. The I-BEST program advances students to occupational training programs and helps them to progress to postsecondary credentials in high-growth fields that have livable wages. The program was organized by the Washington State Board for Community and Technical Colleges in partnership with the state's 34 community colleges and technical schools, and was developed in an effort to provide a solution to the problem of adult and ESL attrition in tertiary education. In addition to seeking to attenuate the attrition rates of these populations, the program also seeks to increase enrollment of these unique but growing student populations.

Washington State's I-BEST program requires that all participants have scored below a minimum threshold on the state's college qualifying examination. Many of the program's applicants fall below the poverty line and as a result cannot afford the cost of the program without additional assistance. In an effort to alleviate this problem, the state also offers Opportunity Grants to qualifying students. The program is funded through the state, but many colleges find additional support through outside funding sources.

According to a report by the Community College Research Center, the I-BEST model offers a total of 137 unique programs fields such as healthcare, construction, transportation, manufacturing, education, business, STEM, and protective services.³⁶ The same report found that the highest median wage of all the resulting occupations offered by the I-BEST programs was in language translation services at \$20 per hour while the lowest was found in education at \$9.62 per hour.

The I-BEST model requires that each course offered in the program have both a basic skill and technical skill instructor. This dual approach was developed in an effort to boost retention rates and provide students with vocational skills as well as crucial "soft" skills such as a strong work ethic, a positive attitude, and good communication skills. The unique contextualized learning plan offered by I-BEST is an excellent model for providing a ladder out of poverty for individuals of some of the most socio-economically disadvantaged groups.

Targeting these groups using workforce development strategy is critical to the well-being of the overall regional economy. However, this particular population requires a different approach than that taken with the typical postsecondary student. The I-BEST model provides an opportunity for individuals of disadvantaged groups to find a pathway out of poverty in a context that allows for direct vocational enrichment while at the same enhancing the soft skills that are often a more subtle barrier to employment.

In Connecticut, three adult education providers in the state ran programs using aspects of the I-BEST model. These pilot programs included CNC Machinery Operator at Waterbury Adult Education, a Certified Nursing Assistant program, and Pharmacy Technician program at New London Adult Education. All programs were aimed at English as Second Language learners (ESL) and provided contextualized learning as well as basic skills training. Of the 23 learners who attended the program regularly, 100% completed the coursework, 87% made progress on Comprehensive Adult Student Assessments Systems (CASAS) pre- and post-tests, and 87% attained the industry certification credential.³⁷ Over the past two years, \$150,000 in federal

³⁶ Wachen, J., & Jenkins, D., & Van Noy, M., & Kulongoski, K., & Kurien, S., & Richards, A., & Sipes, L., & Weiss, M., & Zeidenberg, M., "How I-Best Works: Findings from a Field Study of Washington State's Integrated Basic Education and Skills Training Program," Community College Resource Center, September 2010.

³⁷ Adult Education Statewide Policy Forum, January 20, 2012 presentation by the Connecticut State Department of Education (http://www.sde.ct.gov/sde/lib/sde/pdf/deps/adult/meeting_handouts/policy_forum_january_2012_handout.pdf)

incentive funds has been invested by the SDE to support these pilots and an additional \$270,000 in WIA Title II funds have been awarded to nine programs in the state, which will expand the program statewide.³⁸ Sustained support of these pilot programs would have far-reaching positive externalities and a multitude of positive effects on disadvantaged groups in the state.

Low-skill workers often lack both adequate human capital and the soft skills necessary to attain secure employment at livable wages. The I-BEST model provides low-skill workers the opportunity to progress into higher wage occupations and foster development across the state's economy.

Communities suffering from prolonged economic distress often lack adequate levels of human capital to attract employers. The feedback loop of inadequate human capital in the labor market creates a trap for these communities where disadvantaged populations are not able to develop to their full potential and are essentially prevented from fully participating in the economy. A contextualized learning program similar to I-BEST would be an excellent model to implement in economically distressed communities. This particular workforce development model would be further enhanced if developed in partnership with local employers. Catering specific occupational training programs to the needs of the business community would effectively tie this unique workforce training initiative to local economic development.

NATIONAL EFFORTS

Recognizing that the jobs of the future will continue to demand higher levels of education than those of the past, the National Governors Association has compiled best practices from pioneering states that have undertaken strategies to align postsecondary education with the state's economic goals.

States have taken the following steps to strengthen universities and colleges as agents of workforce preparation and sources of more opportunity, more economic growth, and increased competitive advantage:

1. *Set clear expectations for higher education's role in economic development:* articulate the expectation that higher education in the state will contribute to the success of industry in the state by preparing a 21st century workforce.
2. *Emphasize rigorous use of labor market data and other sources to define goals and priorities:* ask institutions to use data on global, state, and regional labor market needs to develop courses and degree programs that prepare students for high-paying, high-demand jobs.
3. *Encourage employers' input into higher education:* incentivize institutions of higher education to seek regional employers' input about how best to ensure that students have the skills required by employers.
4. *Require public higher education institutions to collect and publicly report impacts:* track higher education institutions' impact on students' employment outcomes, workforce gaps, employer satisfaction, and state economic growth.

³⁸ Strategic Five-Year State Workforce Investment Plan For Title I of WIA of 1998 and the Wagner-Peyser Act, State of Connecticut, for the period July 1, 2012 to July 30, 2017.

5. *Emphasize performance as an essential factor in funding:* use performance-based funding for institutions of higher education to get – and reward – outcomes aligned with strategic goals. Award funds on a competitive basis to develop industry-oriented curricula and create new efforts to meet the workforce needs of the future.³⁹

During the 2011 legislative session, Connecticut made legislative changes that incorporated concepts of the NGA Best Practices recommendations. Public Act 11-70 restates existing requirements in the higher education strategic master plan concerning degree attainment, the number of people entering the workforce, and the achievement gap. It requires the plan to establish numerical goals for 2015 and 2020 that 1) eliminate the postsecondary achievement gap between minority students and the general student population, and 2) increase the number of people who (a) earn a bachelor degree, associate degree, or certificate; (b) complete coursework at community colleges; and (c) enter the state's workforce. The plan must also provide specific strategies for meeting these goals and consider the impact of education trends on higher education in Connecticut.

SKILLS GAPS

Increasingly there is discussion about a skills gap – students are not prepared for the jobs available and employers cannot fill positions that are open. However, there is conflicting evidence on whether or not the data supports the anecdotes. In a recent New York Times article,⁴⁰ Mark Price, a labor economist at Keystone Research Center, reported that “if there's a skills shortage, there has to be a rise in wages. It's basic economics” in referring to manufacturers' complaints that they cannot fill open positions; however, there has not been an increase in wages.

Further, a Boston Consulting Group (BCG) report indicated that the skills gap is less pervasive than anecdotes indicate. BCG estimates that the United States is short 80,000 to 100,000 highly skilled manufacturing workers. To identify where the shortages exist, BCG – using wage data and manufacturing job-vacancy rates – looked at localities where wage growth exceeded inflation by at least 3 percentage points annually for five years, which occurred in only five of the nation's largest 50 manufacturing centers, with Connecticut localities not in the top 5.

In a presentation to the CASE study committee on the issues facing the workforce and solutions to address the problem, Dr. Peter Cappelli, professor of management at the University of Pennsylvania's Wharton School and author of *Why Good People Can't Get Jobs: The Skills Gap and What Companies Can Do About It*, argued that part of the problem with companies not being able to fill positions is in part due to companies offering low salary ranges for applicants and relying on software for hiring that weed out applicants whose resumes lack targeted key words. Another problem is a shortfall in the kinds of skills that are best learned on the job. In order to make training and skill development pay off for employees, Cappelli argues that what is really needed are more in-house training programs, apprenticeships, and employer and employee shared training programs.

Another concern expressed by the business community that is difficult to measure is the need to prepare students for our global society. As workplaces, schools, and communities become

³⁹ NGA Center for Best Practices, “Degrees For What Jobs? Raising Expectations for Universities and Colleges in a Global Economy.” March 2011.

⁴⁰ Davidson, Adam, “Skills Don't Pay the Bills,” New York Times, November 20, 2012.

increasingly diverse, the education system must be strengthened to increase the foreign language skills and cultural awareness of students. America's continued global leadership will depend on students' ability to interact with the world community.⁴¹

RECOMMENDATIONS:

1. As recommended by the National Governors Association, strengthen universities and colleges as agents of workforce preparation and sources of more opportunity, economic growth, and increased competitive advantage. Therefore, create an education system (both public and private) that is accountable to the state's workforce system by creating metrics tied to performance evaluation and funding. Metrics for consideration could include, but not be limited to, the following: increasing the number of students graduating and increasing the pipeline of workers to meet future demand; shortening the time frame in which students earn a degree; and achieving and maintaining affordable education opportunities. The development of the longitudinal data system will help provide the information to inform this endeavor.
2. Education and training initiatives, through OWC's leadership and in coordination with education and training institutions (as noted in the Organization Structure and Leadership section), should be integrated into the key economic growth strategic initiatives, such as:
 - o Business sectors identified by the DECD as key to Connecticut's future should each be analyzed regarding key worker skills required to provide guidance to education and training initiatives.
 - o The Fast Five companies should each be assisted in clarifying the skills required for successful workers (at all levels) in their company and business area, which will provide additional guidance to education and training initiatives.
 - o State endeavors such as the Innovation Ecosystem and the planned UConn Technology Park should be tasked with providing continuous guidance as to the workforce skills required for workers who will eventually fill the jobs in the companies and technologies that will emanate from the growth of the companies utilizing these resources.
3. Workforce development partnerships and collaborations that involve the private and public sectors, including philanthropic funders, can be utilized for meeting workforce needs to collaborate with education and training providers. One example that should be considered is creating a collaborative initiative between the technical high school system, community college system, and employers so that equipment and digital simulations can be shared and students can benefit from learning on cutting-edge, technically relevant machinery, tools and other equipment and simulations to reduce, wherever possible, the inefficiencies that exist by having expensive training equipment at multiple facilities.
4. Create a visible marketing campaign to make students, residents and workers aware of the commitment to excellence in education and to attract talent to Connecticut with a theme of "Come work and grow in Connecticut. Together we can change the world."

41 "Education for Global Leadership. The Importance of International Studies and Foreign Language Education for U.S. Economic and National Security.," Committee for Economic Development, 2006.

5. Support the elimination of the statutory requirement that academic programs for all independent colleges be approved by the State Board of Education. The program approval process should be determined by the individual institution's governance process. This change will help streamline the process for colleges and universities to respond to market and employer needs while reflecting the recent reorganization in state government.
6. The SDE and State Board of Education should encourage and provide guidance to school districts to infuse existing K-12 curricula with cross-cultural experiences and learning opportunities to better prepare students to participate in a global workforce.

BEST PRACTICE: BUSINESS AND EDUCATION LINK

Prosperity 2020 is a business-led initiative developed in Utah to promote investment in education and innovation within the state. The initiative consists of 18 chambers of commerce, several economic development agencies, and related trade associations. The initiative is based on the premise that investment in human capital and an educated workforce will make the state's economy the strongest in the country.

The goals of Prosperity 2020 are centered on developing a competitive workforce that will aggressively thrust the Utah economy into the knowledge economy:

- to ensure that 90% of third graders and sixth graders are proficient in reading and math.
- to certify that two-thirds of the workforce has skilled trade certificates or academic degrees.

Throughout 2012, Prosperity 2020 made progress in achieving its goals by implementing several key initiatives mandated by legislative action, including the development of tools to better assess student performance and allow teachers to give additional attention to students who most need it. The legislature also broadly provided additional sources of support for public primary, secondary, and tertiary education. New evaluation metrics were developed in consultation with stakeholders from the education community to provide improved assessment mechanisms for teacher and administrator evaluations. Additional resources were allocated to educational institutions for growth, improved technical focus, and increased research initiatives.

The initiative seeks to further the advancement of its main policy goals in 2013 through aggressive support of legislative action that promotes further development through five key channels:

- early starts to success
- early college and career preparation
- STEM training
- evaluation and performance pay
- linkages between tertiary education and economic development

WHERE CAN CONNECTICUT ACHIEVE THE GREATEST RETURN ON TAXPAYER INVESTMENT?

One of the goals of this study is to provide guidance to the General Assembly regarding methods for evaluating workforce system-related programs for the purpose of determining return on the investment of public funds in such programs. However, there is very little data that assesses program outcomes and looks at the programmatic effects longitudinally. As previously mentioned, there is an effort to collect longitudinal data on students from secondary education through the workforce and a great deal of work has gone into creating the partnerships and laying the groundwork for implementation. However, the project is at the beginning phase, with a pilot set to launch in 2013.

Many programs collect and report the number of individuals served or programmatic measures, but these measures do not answer the "return on investment" question. Therefore, this section of the report takes a broader look, examining which programs nationally have been identified as having the greatest return on public investment in the short, medium, and long term.

FINDINGS: SHORT TERM

According to the latest Census figures, more than one-third of Connecticut adults have only a high school degree or less and among minorities in Connecticut, that figure is about 55%. Therefore, it is important to recognize that many individuals whose skills and education need to be upgraded to compete are already adults and in the labor force. It is the workforce development system and their employers that are key resources for these people.

Short-term programs are effective for those people who need skill upgrades in order to obtain a job (if unemployed), to keep an existing job (if an incumbent worker), or to change a job (if a dislocated worker), as well as for meeting current business needs. These programs are necessary to enable the current workforce to meet the changing demands of employers, to integrate technology enhancements into their base of knowledge, and to remain competitive in the face of economic downturns and recessions.

The programs need flexible funding sources that can supply resources as needs arise, and the ability to adapt to the changing needs of whomever they are serving. For example, the CT STEM Jobs project was successful because it was able to adapt to the changing needs of the customer. The client who was seeking services was much different than originally anticipated due to the recession. Since many businesses, especially small ones (fewer than 100 employees), generally cannot project long-term future employee needs, it is critical to be able to respond to employers as quickly as possible so that they have the workers needed to be productive and competitive. During economic recessions, these needs tend to become greater as more layoffs occur and people are out of work for longer periods of time, when their skills can tend to become obsolete.

It is important to understand data about the current labor pool so that when business needs occur, available workers can be effectively matched with employers. However, skill upgrades that can be advanced within a short period of time (weeks or months) are also important, including training for unemployed residents, as well as for dislocated and incumbent workers.

ON-SITE WORKER TRAINING

One of the programs that is frequently administered by the state's five workforce investment boards involves "on-the-job" training (OJT) for unemployed residents who need skill upgrades, dislocated workers who need skill upgrades to change jobs or continue in a job that has changed as a result of technology or economic factors, as well as for incumbent workers, people who are employed and need skill upgrades in order to avoid layoffs. This type of customized job training can be used for worker attraction as well as retention purposes. The program subsidizes on-site job training implemented by companies.

The Upjohn Institute for Employment Research⁴² conducted a survey of Massachusetts businesses that utilized OJT funds and found that the overwhelming majority of companies found that the training increased productivity and business profits, while adding to worker wages. Funding for OJT programs varies from year to year, and typically more funds are dispersed when significant events occur such as mass layoffs or economic recessions. The programs are intended to quickly enable people to acquire skills needed to fill current job openings.

One new program that has achieved some positive results is the Subsidized Training and Employment Program (Step-Up), an initiative of the DOL and the state's five Workforce Investment Boards that was started in February 2012. Step-Up offers a Wage Subsidy Program and a Small Manufacturer Training Grant Program. Each program offers incentives to eligible employers with fewer than 100 employees to hire new workers and create jobs. The program was expanded in June 2012 to include the Unemployed Armed Forces Member Subsidized Training and Employment Program, and is available to eligible employers of any size that hire an unemployed veteran.⁴³

The incentive for the Subsidized Wage Program includes a wage subsidy for new hires (up to \$20 per hour with reimbursement up to \$12,000 per new hire – excludes benefits) is provided over a 180-day period (Month 1 - 100%, Month 2 - 75%, Month 3 - 75%, Month 4 - 50%, Month 5 - 50%, Month 6 - 25%).

The incentive for the Small Manufacturer Training Grant Program includes training grants up to \$12,500 for a new hire for six months. The training must be held on-site and the grant can also be used to subsidize wages, but cannot exceed the salary (Month 1 - up to \$2,500, Month 2 - up to \$2,400, Month 3 - up to \$2,200, Month 4 - up to \$2,000, Month 5 - up to \$1,800, Month 6 - up to \$1,600).

Early results of Step-Up program are promising. As of November 15, 2012, 844 employees had been hired by 333 Connecticut employers with an average hourly wage of \$15.50 and an 83% retention rate.⁴⁴

RECOMMENDATION:

1. Pending further evaluation of program outcomes, the early results for the Step-Up program present an opportunity for the state to scale a program beyond the pilot period and sustain it to obtain measurable results.

⁴² Kevin Hollenbeck, *The Return on Investment to Training Programs for Incumbent Workers*, Upjohn Institute for Employment Research, 2007.

⁴³ Connecticut Department of Labor, Step Up Fact Sheet, www.ctdol.state.ct.us/OWC/StepUp/FactSheet.htm

⁴⁴ Office of Workforce Competitiveness

2. The state should advocate for more flexible federal guidelines for federally funded programs so that appropriate services can be offered with a more “client-centric” approach customized for the needs of individual states and their businesses and workers. State agencies should be aware where federal waivers can be granted and seek out more efficient ways to use the funding. This issue is worthy of consideration and advocacy by the National Governors Association. However, at the state level this also means having up-to-date data and information so that programs and policies can adapt to the changing demands of the workforce and employers and so evaluation metrics are utilized to determine program outcomes and success.

FINDINGS: MEDIUM TERM

Certificates

The postsecondary certificate serves as a cost-effective tool for increasing postsecondary educational attainment and gainful employment. Two out of every three workers who have a certificate and a college degree earned the certificate first, indicating that the certificate serves as a stepping stone to further educational attainment. Certificates with economic value are cost-effective, provide a path to college education and middle class jobs for low-income, minority and immigrant Americans who are the first in the family to attend college. For incumbent workers, they can be an effective way to rapidly gain skills and credentials to keep up or get ahead in a field. Certificates also serve as a mechanism for the unemployed to jumpstart into the labor market. The importance of focusing on incumbent worker training programs as an effective vehicle to align the workforce as well as improve the economic competitiveness of the state was a recurring and resounding theme heard from this study's focus group participants.

Although there are over one million certificates awarded annually in the United States, there are few studies or reports, and only one government survey, that focus on this training option. In 1980, certificates represented 6% of postsecondary awards and today represent about 22%.⁴⁵

The benefits of certification programs were recently examined in a study by the Georgetown University Center on Education and the Workforce. This study found that there is an earnings premium associated with earning a certificate. For example, a certificate with an associate's degree resulted in a 6% earnings premium and a certificate with a bachelor's degree resulted in a 3% earnings premium. Further, many certificate holders earn more than workers with an associate's degree and some earn more than workers with a bachelor's degree. Some examples of the fields in which these earnings premiums exist are computer and information services, electronics, and business/office work. It is noted that the earnings premium depends on the certificate holder working in their field of study.

However, the Education Commission on the States found that postsecondary institutions in Connecticut produce far fewer certificates and far more bachelor's degrees than the national rates for those credential types.⁴⁶ Yet, by 2020, 65% of all jobs in the United States

⁴⁵ Georgetown University Center on Education and the Workforce, “Certificates: Gateway to Gainful Employment and College Degrees,” June 2012.

⁴⁶ The Education Commission of the States presentation at February 7, 2012 CASE committee meeting

will require postsecondary education and training — education beyond high school.⁴⁷ A real gap that needs to be addressed exists between the degrees and credentials conferred in the state and the needs of employers. Certificates also provide a cost-effective mechanism for students to reach gainful employment; this is particularly true for minority students and those from low-income households.

Apprenticeship Practices

Unlike technical training, which is held in a school setting, apprenticeships are based solely on an employer-employee relationship. Most programs are associated with trade work such as automotive trades, building and construction, and manufacturing. In Connecticut, oversight of the statewide system of registered apprenticeships is the responsibility of the Connecticut State Apprenticeship Council, supported by the DOL's Office of Apprenticeship Training. The governor appoints all members to the council. Governor Malloy reconstituted the council, added new membership, and charged it to expand its scope of focus on selected occupations in targeted industry sectors critical to state economic growth, consistent with the state's economic development strategies and job growth priorities. Further, the 2012 CETC plan includes a recommendation to work with OWC, CETC, SDE, and the Board of Regents to expand the apprenticeship program, showing a conscious effort to align industry and education.

The apprenticeship program provides supervised, structured on-the-job training supplemented by classroom instruction. Participants of the program must be at least 16 years of age and the following requirements must be met for apprenticeship program completion: a required number of both years and hours based on specific program requirements; hours of related classroom instruction; and for some trades, passing a licensing exam.

According to DOL, in fiscal year 2010 there were over 5,000 apprenticeships occurring in the state with approximately 1,400 employer sponsors. The program is supported mostly by state funding, with a small percentage provided by federal dollars. In fiscal year 2010 the program cost was approximately \$1 million.

Certain manufacturing corporations that participate in apprenticeship programs are eligible for a tax credit of up to \$4,800 per apprenticeship. The amount of the credit is calculated by multiplying the total number of apprentice work hours by \$4. The credit may not exceed 50% of the wages paid or \$4,800, whichever is less. Construction companies can also receive a credit of up to \$4,000 per apprenticeship completed. The credit for construction apprenticeships is calculated by multiplying \$2 by the number of hours worked. For both manufacturing and construction, the credits are applied only to the first half of the apprentice's period (or the first three-fourths for those in a four-year program).

Table 10.1 shows the utilization of the tax credit for the most recent six years of available data. However, as the table indicates, only a small fraction of the firms who have apprenticeship programs actually apply for the tax credit.

⁴⁷ Georgetown University Center on Education and the Workforce, "Projects of education demand for the future workforce," April 20, 2012 presentation to the CASE committee.

TABLE 10.1: UTILIZATION OF APPRENTICESHIP TAX CREDITS, 2004-2009

SOURCE: CT DEPARTMENT OF REVENUE SERVICES, ANNUAL REPORTS

Tax Year	# of Credits	Amount Claimed	Min/Max # of apprenticeships*
2009	9	\$668,425	139/167
2008	6	\$21,071	4/5
2007	8	\$106,757	22/26
2006	12	\$295,076	61/73
2005	14	\$1,187,501	296/247
2004	14	\$86,370	17/21
*Assumes maximum amount of credit requested (\$4,000 or \$4,800)			

During the focus group sessions, many companies, including a few larger-sized manufacturers, indicated they were unaware of the state's apprenticeship program. Participants who were aware also remarked on the small scale of the program. However, based on the participation levels reported by DOL, it does not seem to be a question of small scale, but of a lack of awareness about the program.

Since there are often many separate initiatives created in the state by community colleges, technical high schools, trade associations, and others, businesses are not always aware of the programs and resources available. Currently, small businesses do not have the resources and often the expertise to create their own in-house programs. There is a need among small businesses to learn how to run a successful apprenticeship program and how to effectively teach the apprentices. An apprenticeship program that is overseen by the coordinating entity of the workforce system, as recommended in this study, would provide the framework and support to assist more individuals and companies, both large and small.

Apprenticeship programs are an effective way to create pathways for students to become employed. A recent study by Mathematica Policy Research estimated that the social benefits of the Registered Apprenticeship program, administered by the Employment and Training Administration's Office of Apprenticeship at the US Department of Labor, exceed the social costs by more than \$49,000 over an entire career; an apprentice who completes the program earns almost \$250K more than similar non-participants.⁴⁸ Furthermore, it is a way for companies to ensure they have a skilled and trained workforce. To create an effective, expanded statewide program, the current structure of the program should be examined and modified, if necessary, to assure growth and success.

As previously mentioned, CETC's 2012 annual plan recommends that the Apprenticeship Council work with CETC's Industry Sectors Committee, OWC, SDE, and the Board of Regents to develop a plan for expansion of the program, to include occupations in manufacturing, allied health, early childhood education, and green industries. While this effort is moving the state in the right direction, based on feedback from businesses in the focus groups, a different approach should be taken.

⁴⁸ Reed, Yung-Hsu Liu, et al, "An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States," Mathematica Policy Research, July 25, 2012.

RECOMMENDATION:

First, a framework should be developed for how an apprenticeship program could be organized in the state. This entails creating a workgroup of businesses—small, medium, and large manufacturers—to design the necessary components of an apprenticeship program that could have universal appeal to many businesses. For example, the business participants would work out the number of hours that would be spent in on-the-job training versus in the classroom setting. Once the businesses develop an appropriate framework, a meeting of state agencies—DOL, technical high schools, DECD, BO—could determine the appropriate implementation of the framework and funding. This approach is fundamentally different from how programs are currently developed and operated.

Currently the state has dedicated funding from WIA for apprenticeships and decides how to distribute the resources. This results in the funding driving program development as opposed to designing programs to meet the needs of business and then determining where the funding could come from. This recommended approach should inventory what is currently being offered and determine how to consolidate programs into a statewide effort. This new model should extend beyond the traditional trades that are typically involved in an apprenticeship program, and should also include internship opportunities, certificate programs, and other appropriate creative solutions to hands-on learning.

FINDINGS: LONG TERM

Pre-Natal through Early Childhood Education

There is increasing evidence of the importance of early brain development and the implications it has for long-term success. Policymakers have started to listen to the neuroscientists and academics who have been espousing the importance of early-childhood intervention starting before birth and the long-term benefits that can be reaped. The longer society waits to intervene in the life cycle of a disadvantaged child, the more costly it will be to remediate, and the less likely to achieve results.

Research by Jack P. Shonkoff, director of the Center for the Developing Child at Harvard University, indicates that age four may already be too late in a child's development to fully realize the benefit of a public investment. Dr. Shonkoff's research shows that 80% of a child's brain is developed by age five. If a child experiences a stressful environment, e.g., poverty, the physical brain will be smaller than the average child's brain at age three. In one study Shonkoff conducted with Romanian children living in a stressful environment, the brains of those children were a third smaller than an average child's brain at age three.

Nobel laureate James Heckman, professor of economics at the University of Chicago, shows that on average, a child who is behind in kindergarten never has a chance to catch up. He also shows (see Figure 10.1) that investments focused on birth to age 5 produce a higher per-dollar return than K-12 schooling and later job training. Further such investments reduce the need for special education, and cut juvenile delinquency, teenage pregnancy and dropout rates.

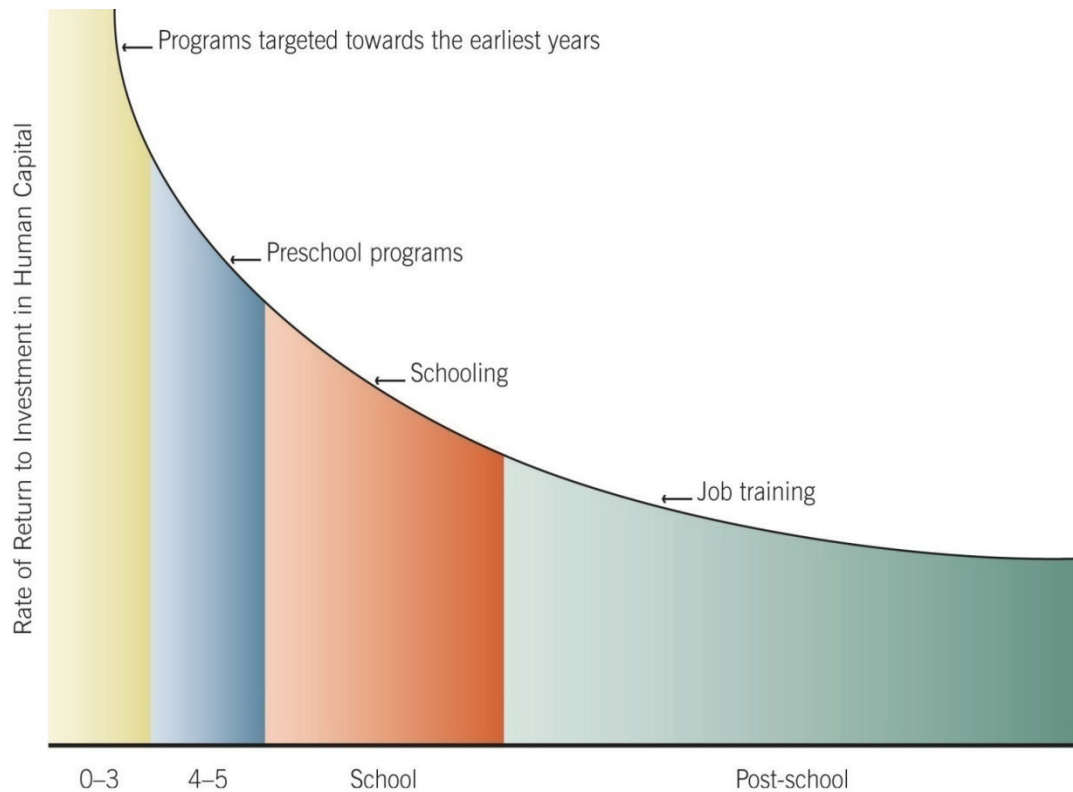


FIGURE 10.1: RETURNS TO A UNIT DOLLAR INVESTED
SOURCE: HECKMAN & LAFONTAINE (2007)

The Perry preschool study was a longitudinal study that started in the 1960s in Michigan. The study looked at 123 at-risk children and their parents who were enrolled and randomly divided into two groups—a control and program group. The children were enrolled in a preschool program five days a week for 2.5 hours a day for two years. The program also included home visits. In today's dollars, the cost of the program was \$22,000 per child. The researchers found that the benefits of the program were the following: the children were less likely to be retained in first grade; less likely to need special education; more likely to be literate by sixth grade, graduate high school, get a job, pay taxes, and stay off welfare. The largest benefit was a decrease in the crime rate by 50% relative to the control group. Therefore, the study found that the benefits minus the costs yielded an annual rate of return, inflation adjusted, of 16%. The post World War II average annual rate of inflation-adjusted return of private investments is 5.8%.⁴⁹

Several longitudinal evaluations all reach essentially the same conclusion: the return on investment in early-childhood-development programs that focus on at-risk families far exceed the return on investment of other economic development funded initiatives; meaning the benefits to society exceed the public dollars spent. (This can also be seen in Figure 10.1 above.) Cost-benefit analyses of the Perry Preschool Program, the Abecedarian Project, the Chicago Child-Parent Centers, and the Elmira Prenatal/Early Infancy Project

⁴⁹ Heckmanequation.org "Presenting Heckman Equation" accessed 8/30/12

showed returns ranging from \$3 to \$17 for every dollar invested. This implies an annual rate of return, adjusted for inflation, of between 7% and 18%.

Minneapolis Example

Based on the research of Dr. Shonkoff and Art Rolnick, senior fellow at the University of Minnesota Humphrey School of Public Affairs, regarding an examination of the longitudinal study results from the preschool programs, several large Minneapolis-based businesses piloted a pre-natal to early learning initiative. The program raised \$20 million privately and was sunset after five years. Key components of the program included rating early education programs throughout the state; customizing mentoring support for parents beginning at the pre-natal stage of development; and empowering parents by allowing them to choose among high-quality rated programs. To be eligible for the program, families had to have incomes of 185% below the federal poverty level. Based on the success of the program, it is now being expanded statewide with the help of federal Race to the Top funds. Minnesota was one of only nine states to receive Race to the Top funds. Minnesota took a different approach than what is often seen in Connecticut, where the founders of the initiative first developed partnerships and collaborated on an initiative, next proving success, and then obtaining federal funds to sustain and grow the initiative.

Pre-natal to Prekindergarten in Connecticut

Currently in Connecticut, there is a myriad of programs both publicly and privately funded that are run by private organizations or through state agencies. For example, Head Start is a federally funded, national program that promotes school readiness through the provision of educational, health, nutritional, social, and other services to qualified children and families. There is also an Early Head Start program that focuses on services for infants and toddlers, pregnant women and their families. Further, the SDE contracts with private providers in the community for approximately 4,200 child care slots at more than 100 locations in 36 municipalities throughout the state. These centers provide infant/toddler, preschool, and school-age services to families earning 75% of the state median income level.⁵⁰

In January 2010, the Early Childhood Education Cabinet was reformed and designated by then Governor Rell to be the State Advisory Council specified in the Head Start Act 2007. The purpose of the Cabinet is to develop a high-quality, comprehensive system of early childhood education among the wide array of early childhood programs in the state (including Head Start, child care and School Readiness). The Cabinet must also annually submit a statewide strategic report to the governor and General Assembly, pursuant to the Head Start Act, addressing the progress state agencies made toward meeting federal goals. During the 2011 legislative session, the cabinet membership was expanded and changed. The 20-member cabinet comprises the heads of or representatives from SDE, DSS, DCF, OPM, and DPH, plus legislators and representatives of prekindergarten programs.

In 2011, P.A. 11-181, "An Act Concerning Early Childhood Education and the Establishment of a Coordinated System of Early Care and Education and Child Development," was adopted. The act made some organizational changes and also appointed a planning director within the Office of Policy and Management to develop a plan for the system that

⁵⁰ www.ctearlychildhood.org accessed October 31, 2012

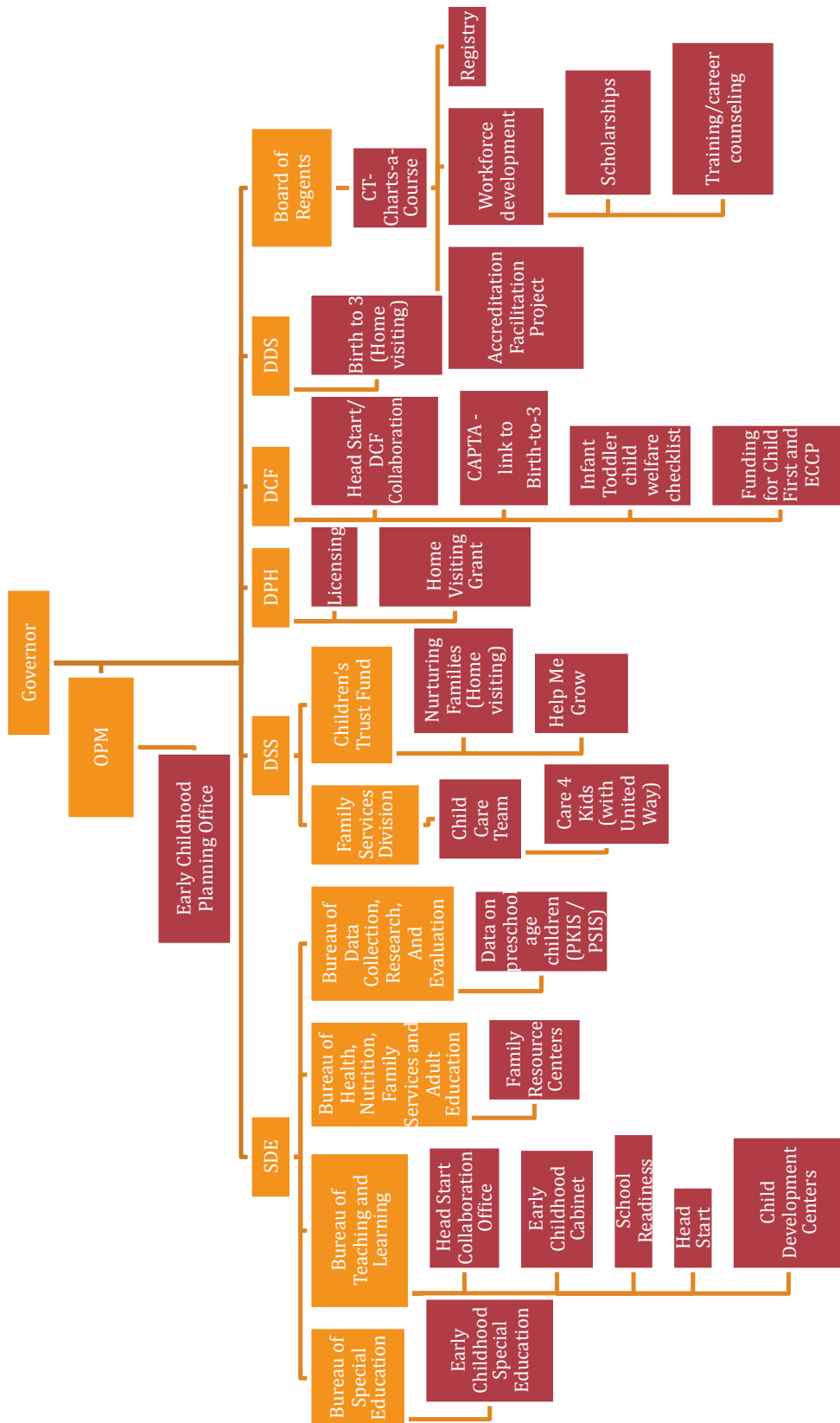


FIGURE 10.2: CONNECTICUT EXECUTIVE STRUCTURE FOR DELIVERY OF EARLY CHILDHOOD PROGRAMS
SOURCE: PRESENTATION TO THE EARLY CHILDHOOD CABINET BY MYRA JONES-TAYLOR, EARLY CHILDHOOD
PLANNING DIRECTOR, SEPTEMBER 27, 2012

consolidates existing early childhood education and child care programs and services for children from birth to age eight into a coordinated system. Some of the goals of the new system set forth in the legislation are to: reduce the achievement gap, increase parent engagement, increase participation in early childhood education programs, and decrease special education placements. According to the legislation, the new plan must be issued by July 2013. However, there was a delay in hiring the new planning director, which will likely delay the development and release of the plan.

Figure 10.2, taken from a September 2012 presentation made by the Early Childhood Planning Director of the Office of Early Childhood, shows the early childhood programs in the state and how they are dispersed throughout state government. As clearly depicted, an inefficiency that is inherent in this complex program delivery system are the administrative costs that flow through multiple agencies before reaching the program that touches the child. However, the Office of Early Childhood that was established by Governor Malloy will be making recommendations to improve the efficiency of the system in early 2013 and will seek to consolidate programs and system delivery.

Connecticut School Readiness Program (CSRP)

A state-funded initiative administered by the SDE, created in 1997 under P.A. 97-259, was designed to increase the availability and accessibility of high quality full-day, full-year child care programs for low-income families and to improve the school readiness of Connecticut's youngest, most vulnerable children. The program serves children 3 and 4 years of age and children age 5 who are not yet eligible for kindergarten. The grant program provides spaces in accredited or approved school readiness programs for eligible children in priority school districts and competitive grant municipalities.

Programs must either be accredited by the National Association for the Education of Young Children (NAEYC) or must complete that process within three years of being awarded funds, or be approved by Head Start. Programs receive funding based on the number of children enrolled and based on the number of hours during the day and months in the year in which they operate. In fiscal year 2012, approximately \$75 million in funds were distributed. During the 2012 legislative session, the Education Reform package included additional funding for 1,000 new school readiness spaces (student seats), and allocated funding up to \$80,000 of any funds not spent for these spaces to conduct a study on the amount of space and facilities needed to provide universal early childhood education for all three- and four-year-olds in the state.

Recently, the Connecticut School Readiness Program was compared to 41 state-funded prekindergarten programs (excluding state-funded Head Start) across the nation. The report found that Connecticut's program offers families the largest proportion of both extended-day and extended-year classes in the nation and also leads the nation in the amount of services provided. In terms of quality of the programs, Connecticut's student-teacher ratios ranked third-lowest in the nation, which is one indicator of quality, but another indicator, teacher education, was relatively lower in Connecticut when compared to other states. There were also other areas where Connecticut lagged behind other programs. For example, the report found many access barriers (i.e., inability to pay tuition, language barriers, and

transportation difficulties) limiting attendance by those who would benefit the most; poor teacher compensation; and limited access to on-site special education services.⁵¹

States continue to use public resources to lure companies to their states, though ultimately one state's gain is another state's loss, creating essentially a zero-sum game without the generation of new jobs. Having an educated and talented workforce of the future with cross-cultural competencies will enable businesses to grow, innovate and be globally competitive, and will create a state where businesses want to locate. Therefore, early pre-natal intervention through parent mentoring and coaching continuing through early childhood education is critical to the long-term future of the state's workforce and will help mitigate the challenges the state faces with the demographic shifts that are occurring now and that are expected to continue in the future. In addition, a greater emphasis needs to be placed on recognizing the importance of the need for the state's workforce to have a global perspective. The growing diversity of the state's residents is a strength that should be harnessed and the state should seek to attract and retain immigrant students and workers.

Since benefits are not reaped in the short-term but rather are realized beyond the time horizon of investors, society tends to under-invest in youth human capital in general and early childhood education in particular. However, there are gains in the intermediary years, such as fewer children in special education, that should yield reduced school spending, classrooms that will be more settled and teachers that will be more productive with children who have good social-emotional skills and are ready to learn with outcomes that improve student achievement and reduce the performance gap. The challenge for policymakers is to determine how to increase investment in early childhood education and capitalize on the short-term gains.

Social Impact Bonds (SIB) are an idea that has entered policy discourse by businesses and foundations in the past several years as local and state budgets are strained and the federal government continues to seek ways to reduce funding. SIB is a new approach for expanding social programs. It is a partnership in which philanthropic funders and social-impact investors – not government – take on the financial risk of scaling up programs. Nonprofit organizations deliver the programs and government pays if the program succeeds.

Under this model, investors buy bonds, the money received from the bonds pays for pre-school, and the returns investors receive are the savings from reduced costs for special education and remediation (probably the shortest ROI time period). Long-term savings would be a reduction in cost for operating correctional facilities, and possibly related law enforcement and judicial system operating expenses.

In early 2010, the Kauffman Foundation, in partnership with ReadyNation, created a working group to explore development of early child care and education social impact finance methods. In April 2012 they issued a progress report, "Early Childhood 'Pay-for-Success' Social Impact Finance: A PKSE Bond Example to Increase School Readiness and Reduce Special Education Costs," that explains the elements required to establish SIBs and

51 Gilliam, Walter and Sherin Stahl, "The Connecticut School Readiness Program: Comparative Strengths and Challenges in Relation to State Prekindergarten Systems Across the Nation," The Edward Zigler Center in Child Development and Social Policy Child Study Center, Yale University, August 2008.

the challenges that may arise. Further, in May 2012 McKinsey & Company issued a report, "From Potential to Action: Bringing Social Impact Bonds to the U.S.," that examines using SIBs to expand programs that reduce homelessness and criminal justice costs.⁵² Major think tanks and policy foundations are examining creative opportunities for addressing social problems as government funding levels to support programs decrease. Connecticut could be a leader in piloting a SIB and could work in partnership with national foundations that are seeking opportunities to assist localities and regions increase human capital, resulting in a more competitive workforce for the future.

RECOMMENDATION:

At a minimum, the state should create a scholarship program so that all historically underrepresented children in the state can attend a high-quality preschool program. This is a market-based approach where programs are not funded, but instead, parents receive scholarship money to choose the best high-quality program for their family. Good early childhood programs generate public sector gains through reduced expenditures and increased revenues by having more citizens contributing taxes as opposed to being recipients of public benefits. To that end, the state should consider Social Impact Bonds as a means for paying for universal early intervention and preschool for at-risk children.⁵³

⁵² http://mckinseysociety.com/downloads/reports/Social-Innovation/McKinsey_Social_Impact_Bonds_Report.pdf

⁵³ http://www.readynation.org/uploads/db_files/Kauffman-ReadyNation%20PKSE%20Report%2012041922.pdf

CONCLUDING REMARKS

Evaluating the effectiveness of workforce programs and the workforce system requires ongoing analysis of data and information and outcomes with the principal goal of assuring that Connecticut's workforce is prepared to meet the needs of business and industry today and in the future. This requires involvement of many state agencies and others, many of which do not include workforce as their central mission.

The development of an effective workforce system requires system-wide leadership and expertise to conduct comprehensive synthesis analysis for the purpose of continually adapting programs and initiatives and allocating funding to those priorities that will have the greatest impact in meeting the needs of business and industry and the state's residents to maintain a vibrant state economy.

Connecticut should benchmark its workforce programs and initiatives with other similar states/regions on an ongoing basis both to learn from other states and to ensure that Connecticut remains competitive. Also, best practices from other states, regions and countries should be continually identified for consideration for piloting or implementation in Connecticut.

To accomplish this, it is important to have effective and sustainable leadership in place with the authority to guide and cause communication, collaboration, and cooperation among and with many state agencies and others with workforce-related responsibilities.

Results and progress should be reported quarterly to CETC, the governor and the General Assembly. The General Assembly should form a Select Committee on Workforce comprising the leadership of the committees of cognizance for workforce-related issues. This would provide a mechanism by which all key committees could be informed about the status of workforce-related programs and initiatives, and would help to assure that both the executive and legislative branches of government maintain a keen awareness of the importance of workforce development to the economic well-being of the state and its citizens.

APPENDIX A: FOCUS GROUP SUMMARY

Four focus group sessions were held in different regions of the state: one in Bridgeport, one in Norwich, and two in Rocky Hill. Three of the four focus group sessions included representation from secondary and higher education, state agencies, labor and trade associations, the regional workforce investment boards, and industry representatives from small to large manufacturers, health care, the nonprofit sector, and technology firms. The remaining session focused specifically on the topic of data and included representatives of state agencies that either generate or analyze workforce data, representatives from public and private colleges and universities responsible for data collection and/or analysis at their respective institutions, representatives from the nonprofit community, and a small company in Connecticut that produces and synthesizes real-time workforce data. Below is a summary of the major themes that arose out of these discussions.

GENERAL FOCUS GROUPS

Each participant in the focus group was asked initially to describe their ideal system. Below is a summary of what the ideal workforce system in the state would look like:

- Academics and employers exchanging information freely
- Strong reliable feedback loops between employers/educators/students/workers
- Expansion of the apprenticeship model, with apprenticeships a more attractive option for students
- Flexible funding streams
- Contextualized learning
- Customized job training
- More information on industry's real-time needs and projected needs (3 to 5 years out so education can respond)
- Closer ties between technical high schools and community colleges, including sharing and more efficient use of resources and students trained on the newest equipment
- More opportunities for students to be exposed to industry by strengthening K-12/Higher Education connections and partnerships with industry
- Employers articulate their workforce needs and the educational and training system responds to those needs
- Guidance counselors advising students about careers, some of which may not require college
- Cross-cultural competencies among students in order to be competitive in a global workforce

System challenges:

- Teachers are a significant influence on students but often are unaware of the opportunities that exist in industry. Create teacher externships during the summer with employers.
- Most programs that are implemented are done on a small scale, not statewide, and cease when grant funding ends.
- DOL child labor laws are a barrier for manufacturing companies; can drive a car at 16 but cannot operate machinery; difficult for manufacturing to provide on-site training.
- Software training at the community colleges is not with the software being used by the manufacturing industry – disconnect between education and industry.
- There is no mechanism to work with community colleges. If you are a small employer who do you turn to?
- For education to be responsive to a business need, they require 3-5 years to get a program up and running and maybe more to actually produce graduates.
- One-Stop vision where employees and employers have one place to go to be served has not been realized. Need more entities at the One-Stop centers such as DSS and Adult Education. The state has not owned the system, just relies on federal funding.

State organizational structure and leadership challenges:

- CETC – members appointed by the governor, it's the governor's vehicle so will not report bad numbers to the governor.
- Education silos: Board of Regents, University of Connecticut, Office of Higher Education; Massachusetts has a Secretary of Education that covers secondary through postsecondary education.
- Need a vision for targeting resources, for example, if target health care, green industries, or manufacturing then put all resources towards that vision.

Future workforce issues:

- Student loan money may be exhausted by remediation before the student has any college-level courses.
- Disconnect between high school and career.
- Need better education to manufacturing link.

Predicting future needs:

- Hard for manufacturing to project needs because the industry is dependent on federal funding, which may not be available.
- Cannot predict future needs but can train people on transferrable skills.

If you had \$100 million to invest for five years what programs would you invest in?

- Incumbent worker training, contextualized learning and customized job training
- Public awareness campaign aimed at high school students to inform them about what jobs are available
- iBest program at all community colleges
- Loan forgiveness if go to Connecticut college and work in the state
- Invest in pre-K through college
- Business and industry research institutes in the state's cluster industries
- Create a campus that combines education and industry
- More internships

DATA FOCUS GROUP

Challenges/gaps:

- Hard to get post-program individual outcomes such as academic achievement, social success, or employment success – longitudinal data.
- Need all higher education institutions to be a part of the longitudinal data system project, especially University of Connecticut.
- DOL has no way to collect self-employment data from the Department of Revenue Services.
- If a company wants to hire, no data exists as to who is available for job openings
- Hard to obtain net new business creations.
- Outcome data across multiple state agencies – very hard to track clients through different agency systems.
- Job posting data does not necessarily translate into an actual job opening.
- Outcomes not available on students who are employed out-of-state but may have attended a CT institution.
- Outcome data not available on high school students who do not go to college or drop out.
- Need program evaluation – standardized test results do not always pick up nuances of programs.
- Difficult to take what businesses tell you and translate it into actionable education programs.
- Data collected by state agencies should be made public.
- Silos in education are a barrier.
- Need to determine who will own, manage, and sustain the longitudinal data system

Employers' future workforce needs:

- Cannot predict what occupations might exist in the future if they do not exist today.
- Companies are hesitant to share their plans – not sure where the data will go and if it will be shared with competitor.
- Real-time job posting data cannot predict the future but it can provide insight into future possibilities or at a minimum provide awareness of occupations that may be arising or are in greater demand.

Recommendation:

- Establish a Data Governance Committee that could address some of the concerns with data sharing; outcome research; and use of longitudinal data system across all state agencies.

APPENDIX B: SUMMARY OF RESEARCH INTERVIEWS

Over the course of the study period, the research team interviewed representatives from the following agencies and organizations: OWC, DOL, CETC, P-20 Council, University of Connecticut, Board of Regents, CCIC, DECD, Connecticut Business and Industry Association, and Office of Early Childhood Education. The following section summarizes the major themes that were raised in the interviews.

CURRENT WORKFORCE SYSTEM

- There is no system – only coordination and collaboration when people desire
- Having the OWC within the DOL could result in it becoming just a function of the department as opposed to an office responding to the workforce system
- Need cross-agency teams to meet to discuss state workforce issues
- There are fundamental competencies that allow people to move in and out of different careers – we need to ensure these are a part of education's curricula

IDEAL SYSTEM

- Governor has to empower someone to be in charge

CETC

- Not enough representation from business
- Does not have any authority
- Critical to have agency staff committed and attending the meetings
- Gap: University of Connecticut and the independent colleges and universities are not a part of the board

DATA/INFORMATION

- Demand-side information difficult to obtain
- No one owns the data; no accountability
- Which state agency is responsible for business intelligence?
- Would be good to create a group of key state agency data people that deal with workforce data who would meet quarterly and discuss cross agency collaboration, analysis, and system challenges
- Need to engage businesses – find out what keeps them up at night in terms of workforce issues
- Need to determine a way to regularly incorporate the business voice in the workforce system.

GAPS/CHALLENGES

- Federal resources inflexible, categorical and shrinking
- State would benefit from STEM person at OWC
- No one in K-12 system who is the STEM point person
- No sustainability on federal grants (example, CT STEM Jobs project)
- Nobody looks forward
- If we look at the population areas that are growing in the state and the educational achievement levels – the state is facing serious pipeline challenges
- Many programs are pilot programs that, although effective, never get scaled-up for use statewide

OWC

- Currently has a great deal of responsibility but little authority to call agency people together or to request information. Without real authority it can only make recommendations.

PROGRAMS

- Apprenticeships – it's a great model but not enough. Need more programs across more industries. Many businesses are not even aware of the program. Should convene a group of businesses and have them develop the program to suit their needs. Then determine how the state will execute and fund the program – business driven as opposed to state driven.

APPENDIX C: DETAILED FINDINGS FROM PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE 2009 STUDY “ALIGNMENT OF POSTSECONDARY EDUCATION AND EMPLOYMENT”

FINDINGS REGARDING: ARE SUPPLY AND DEMAND ALIGNED?

The relationship between educational programs and occupations is not always straightforward. For example, more than one educational path can lead to a single occupation and there are many bachelor's degree programs that are not directly related to an occupation.

With these limitations in mind, the PRI committee looked at the projected demand for certain occupations and the number of students graduating to determine if there was an oversupply or undersupply.

Several occupations appeared to be fairly well aligned (e.g., substance abuse and behavioral disorder counselors, and accountants and auditors). There were other occupations, however, that stood out as having an *oversupply* or overproduction of graduates. These included: licensed practical and licensed vocational nurses, radiation therapists, elementary school teachers, mechanical engineers, architects, forensic scientists, real estate agents, and lawyers.

The *undersupply* of emergency medical technicians (EMTs) and surgical technologists and the *oversupply* of licensed practical nurses (LPNs) and radiation therapists showed a misalignment among some health care occupations. Other health care fields, however, such as registered nurses and occupational therapists, had a fairly good match between supply and demand.

The PRI committee found that 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 numbers of graduates produced based on 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 those fields (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 degrees

and certificates — especially at the community college level — will better meet overall employer demand for a skilled and knowledgeable workforce.

FACTORS AFFECTING SUPPLY OF WORKERS:

- between 2004 and 2008, the percent of Connecticut high school graduates planning to attend college has fluctuated narrowly between 78-80% each year;
- many high school graduates, particularly at the community colleges, are unprepared for college-level work and need remedial English and math courses;
- 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
- college 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.

FACTORS AFFECTING DEMAND OF WORKERS:

- economic cycles;
- 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.

FINDINGS REGARDING: CONNECTICUT'S HIGHER EDUCATION SYSTEM

The PRI committee found that in general Connecticut's public higher education system is decentralized. Decisions are made at the individual college or constituent unit level. In addition to the Board of Governors for Higher Education and Department of Higher Education, the public system of higher education is organized into four constituent units, each with its own board 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), online learning and distance education.

FINDINGS REGARDING: CONNECTICUT'S GREEN COLLAR JOBS

The PRI committee found that as new certificate programs were developed, there was a lack of standardization across the community college system, making it difficult to assess the supply of graduates and their credentials. In addition, the committee found that although the Connecticut Employment and Training Commission (CETC) and the Connecticut Energy Sector Partnership are charged with developing and coordinating green collar job opportunities, neither was a central repository for the many initiatives emerging across higher education. Further, sometimes institutions within colleges in different higher education systems were unaware of green efforts that were occurring. Lastly, the committee recommended sustaining the efforts that were started as a result of the federal funding from the American Recovery and Reinvestment Act of 2009 and ensure career ladders and lattices were developed particularly for workers who gained entry into the green collar fields through this temporary funding.

FINDINGS REGARDING: STATE EFFORTS TO ADDRESS WORKFORCE SHORTAGE OF NURSES

In the late 1990s there was wide recognition that the state could face a serious nursing shortage due to a number of factors including a decrease in the number of postsecondary students choosing nursing as a career and those who had high program attrition rates; many licensed nurses only worked part-time or were working in other fields; and the average age of licensed nurses was believed to be high (over 45 years old in Connecticut). The executive and legislative branches of government, the education and higher education departments, the four higher education constituent units, independent colleges and universities, and the state's hospitals and other health care facilities became actively involved in developing solutions. The PRI committee found these following strategies contributed to the success of increasing graduates of nursing programs to meet employer demand:

- public advertising campaigns to increase awareness of nursing as a career;
- initiatives at the high school level to interest students in health careers, including nursing;
- aggressive pursuit of funding by colleges and universities, to provide tuition assistance, student advising, and targeted tutoring with the aim of improved student retention;
- federal and state scholarships and loan forgiveness programs;
- grants to colleges and universities to establish or expand their nursing programs;
- collaborative partnerships between colleges and universities with nursing programs and area hospitals; and
- a formal mechanism, the Allied Health Workforce Policy Board, was legislatively established in 2005 and it allowed for members to communicate and share strategies, and propose solutions as a unified body.

APPENDIX D: STRATEGIC DOCUMENT REVIEW

The following pages show a review of strategic plans for different organizations that are considered part of the workforce alignment system in the state. The table does indicate that there appear to be real gaps in measuring programmatic outcomes. The next phase of the CASE study will identify where the gaps exist and recommend ways data can be integrated into policy planning.

<i>Strategic Document</i>	<i>Target population</i>	<i>Overall Goal Workforce Strategies</i>	<i>Program Groupings</i>	<i>Program Metrics</i>	<i>Data used to inform program development if noted</i>
Capital Workforce 2011-12 Budget & Business Plan	37 municipalities	Leverage public and private resources to produce skilled workers for a competitive regional economy Same as overall goal	-Adult -Youth -Green construction/ technology -Allied Health -Advanced Manufacturing	-Numbers served -Number entered employment -Job placement rate -Completion rates	
Eastern CT Workforce Strategic Plan 2010-2012	41 municipalities	Support industry targets through the development of "Clusters of Knowledge and Competency" around higher wage, knowledge-driven occupations	-On-the-job training -Job seeker training accounts -Incumbent worker training -Specialized career guidance -Technology workshops		DOL data

FIGURE D-1
STRATEGIC DOCUMENTS

Northwest Strategic Plan 2006-2011	41 municipalities	<ul style="list-style-type: none"> -support school-to-career initiatives -promote programs for out of school youth -facilitate collaboration with economic development agencies -become an active participant in regional efforts -design programs for high growth industries -provide funding to area companies for incumbent worker education and training -pursue funding for regional economic development strategies 		<ul style="list-style-type: none"> -Number of trainings completed -Number of new companies recruited for incumbent training 	
South Central WIB 2011	30 municipalities	<ul style="list-style-type: none"> -Develop effective communications regarding programs and services the workforce development system offers -provide job readiness standards -create an integrated client management system 	This strategic document is more global and does not get into specific programs but rather sets goals for all the programs it administers		<ul style="list-style-type: none"> -Monster Inc. real time labor information -Census demographic data -DOL data -focus groups
Southwestern CT WIB, The WorkPlace, Inc. Community Audit & Needs Assessment 2006	20 municipalities	To guide the region's workforce development systems	<ul style="list-style-type: none"> Recommends workforce readiness skills training; computer literacy training; ESL classes; and build a K-12 partnership to upgrade basic skills and STEM skills 		<ul style="list-style-type: none"> -Census demographic data -DOL data focus groups -Interviews

FIGURE D-1
STRATEGIC DOCUMENTS - PAGE 2

CT-NY Talent for Growth Plan 2009	Southwestern Connecticut; Westchester and Putnam counties	<p>Goal: Promoting regional talent growth</p> <ul style="list-style-type: none"> -Retaining young, highly-educated professionals - Re-deploying baby boomer talent that might otherwise be lost to retirement or relocation - Addressing both language and skill barriers of new immigrants - Lowering high school dropout rates, and re-engaging dropouts in educational paths - Creating multiple pathways for all residents to connect to higher education that they will need as an entry credential for middle class incomes - Accelerating occupational skills training in areas of immediate needs identified by the employer survey and scan of job board job postings 	<p>-Talent Transition Initiative</p> <ul style="list-style-type: none"> -Sustainable regional planning and action platform -Regional talent retention network -Expand educational capacity in key occupational areas -Establish College Access for Everyone (CAFE) initiative 	<ul style="list-style-type: none"> -Real time Monster.com labor data -Employer surveys -K-12 school district survey -Stakeholder interviews -DOL data -Census data
--------------------------------------	---	--	---	--

FIGURE D-1
STRATEGIC DOCUMENTS - PAGE 3

DECD 2009 Strategic Plan – section that focused on the workforce (http://www.ct.gov/ecd/lib/ecd/connecticut_esp-final.pdf)	Statewide	Connecticut will attract and retain businesses by maintaining its highly productive and competitive workforce. With lifelong and enriching educational opportunities for all our citizens, Connecticut will nurture a diverse and well-educated population, sustaining a dynamic workforce that is adaptable to an evolving world economy. Apprenticeship and internship programs, as well as postsecondary curricula that emphasize the needs of local enterprises and Connecticut's core competencies, will give students reason to stay in Connecticut.	10 Initiatives (not all listed here): -Establish a workforce and education cabinet -Establish a central, integrated research capacity for workforce analysis and planning to guide cabinet -Implement provisions of the Early Childhood Investment Framework and Connecticut Career Choices -Implement SDE high school redesign -Expand Connecticut Jobs Funnel program -Create \$100 million public-private partnership student loan pool -Implement Middle College Initiative	-Increased adult literacy, improved CMT and CAP scores, higher completion rates in the state's urban public high schools and less grade retention in public K-12. - Increased employer satisfaction with workforce quality and availability determined via an annual survey - Decreased outmigration of postsecondary graduates	-CBIA surveys
DOL/OWC/CETC	Statewide	WIA plan is under development which will integrate the CETC plan and is scheduled to be released September 2012			
Board of Regents for Higher Education	Statewide	Newly established – strategic plan due by June 2012			
P20 Council	Statewide	The Council is more a convener of leaders and not necessarily a formal entity that must develop a strategic plan; Due to legislative and executive changes the council has not met since Sept 2011 but it was recently reconstituted in October 2012 by Governor Malloy			
SDE	Statewide	New strategic plan under development			

FIGURE D-1
STRATEGIC DOCUMENTS - PAGE 4

CETC - 2012 Report Card	Statewide	<p>CETC believes that all workforce-related policies, investments, strategies and programs should contribute, measurably, to achieving one or more of four broad quality-of-life results:</p> <ol style="list-style-type: none"> 1. A competitive 21st century Connecticut economy 2. A highly skilled, competitive, 21st century Connecticut workforce 3. Connecticut adults who are financially self-sufficient <p>Connecticut students ready for work and post-secondary education following high school graduation</p>	<p>To move these RBA indicators in a positive direction and achieve the results identified earlier, the CETC has identified eight strategies that the state should pursue:</p> <ol style="list-style-type: none"> 1. Advance skills of incumbent workers. 2. Make basic skill training accessible to all. 3. Ensure college and workforce readiness through promotion of STEM learning and better articulation between high school graduation and college admission expectations and requirements. 4. Foster economic growth through collaboration with business and entrepreneurs. 5. Improve career pathways through lifelong learning. 6. Integrate work and career experience into K-16 education. 7. Strengthen data collection and reporting for program improvement and policy development. 8. Pursue opportunities for collaboration, linkages, and leveraging or blending of resources. 	<ul style="list-style-type: none"> • Demographic information concerning individuals served • Number served • Entered employment. • Wages at start of employment • Wage increase after six months. 	<p>6 indicators are used to track progress using RBA method:</p> <ol style="list-style-type: none"> 1. Connecticut Gross Domestic Product (GDP) 2. Percent of state residents living at or above 200 percent of the official poverty level. 3. Percent of Connecticut 9th graders who graduate "on-time" in four years. 4. Number of college degrees, including certificates, awarded by colleges and universities in STEM related disciplines. 5. Percent of openings for Connecticut jobs paying at least \$25,000. 6. Percent of Connecticut jobs in technology fields.
-------------------------	-----------	---	--	--	---

FIGURE D-1
STRATEGIC DOCUMENTS - PAGE 5

Adult Literacy Leadership Board (standing committee of CETC) – August 2009	Statewide	<p>Vision: All Connecticut residents 18 and older will possess the 21st century skills to participate productively in the state's workforce, compete in the global economy, support their families, and contribute to the larger community.</p> <p>Mission: To prepare Connecticut residents 16 or older who are not enrolled in secondary school or higher education, and/or who lack basic skills, with the knowledge and competence necessary to succeed in their work and personal lives by strategically coordinating available resources and facilitating pathways to lifelong education and training.</p>		Recommends a working group on adult literacy performance and standards	<ul style="list-style-type: none"> • Estimated the number of adults in Connecticut who need basic education services • All programs that receive state/federal funds must report through CT Adult Reporting System (CARS) which contains outcome information on programs
Allied Health Workforce Policy Board (January 2012)	Statewide	Long-term strategic planning process to align health care workforce with supply and demand			<ul style="list-style-type: none"> • Planning sessions with employers, advocates, and educators • DOL and U.S. Census employment data by industry

FIGURE D-1
STRATEGIC DOCUMENTS - PAGE 6

APPENDIX E: STUDY COMMITTEE MEETINGS AND GUEST SPEAKERS

The following is a list of study committee meetings, including presentations given to the CASE study committee by guest speakers and the CASE Research Team. In the electronic version of this report, links to recordings of presentations and meeting proceedings are provided. (Internet Explorer is required to view videos.)

FEBRUARY 8, 2012 – MEETING 1

- Introductory Remarks

Richard H. Strauss, Executive Director, CASE

- College Completion in Connecticut: The Impact on the Workforce and Economy

Bruce Vandal, Director, Postsecondary Education and Workforce Development, Education Commission of the States

- Discussion - Vandal Presentation

Study Committee Questions and Answers

- Study Research Team

- Study Manager Overview

Alissa DeJonge, CASE Study Manager and Director of Research, CERC

- Overview of Alignment of Post Secondary Education and Employment (PRI, 2009)

Michelle Riordan-Nold, CASE Research Consultant and Consultant, CERC

- Discussion - Riordan-Nold Presentation

Study Committee Questions and Answers

- Study Committee - Discussion to Identify Resources for Research

Alissa DeJonge, CASE Study Manager and Director of Research, CERC

Richard H. Strauss, Executive Director, CASE

- Closing Remarks and Next Meeting

- Richard H. Strauss, Executive Director, CASE

MARCH 14, 2012 – MEETING 2

- Introductory Remarks

Richard H. Strauss, Executive Director, CASE

- Connecticut's Economic Strategy & Education's Role

William J. Holstein, Author, *The Next American Economy*

- Discussion - Holstein Presentation

Study Committee Questions and Answers

- Workforce Alignment: Challenges and Opportunities for Connecticut

Richard Kazis, Vice President, Jobs for the Future

- Discussion - Kazis Presentation

Study Committee Questions and Answers

- Comments Concerning Proposed Connecticut Legislation

- Richard H. Strauss, Executive Director, CASE

- **Study Research Team**
 - [Overview – Research Method](#)
Alissa DeJonge, CASE Study Manager and Director of Research, CERC
Bruce Carlson, CASE Associate Project Director
 - [Workforce Alignment Definition DRAFT – Study Committee Discussion](#)
Bruce Carlson, CASE Associate Project Director, Facilitator
- [Closing Remarks and Next Meeting](#)
Richard H. Strauss, Executive Director, CASE

[APRIL 20, 2012 – MEETING 3](#)

- [Introductory Remarks](#)
Richard H. Strauss, Executive Director, CASE
- [Projects of Education Demand for the Future Workforce](#)
Nicole Smith, Senior Economist, Georgetown University Center on Education and the Workforce
 - [Discussion – Smith Presentation](#)
Study Committee Questions and Answers
- [State of Connecticut Discussion Guide, Labor Analysis And Workforce Planning: What Are Employers Looking At When Evaluating Locations And Planning For The Future?](#)
Helen M. Friedman, Workforce Analytics and Planning, U.S. East Practice Leader, Towers Watson
 - [Discussion – Friedman Presentation](#)
Study Committee Questions and Answers
- [Workforce Recruitment and Retention Philosophy](#)
Michael Scala, President, Lex Products
 - [Discussion – Scala Presentation](#)
- **Study Research Team**
 - [CASE Study – Research Update](#)
Alissa DeJonge, CASE Study Manager and Director of Research, CERC
 - [Workforce Alignment Definition – Finalize Definition](#)
Bruce Carlson, CASE Associate Project Director
- [Closing Remarks and Next Meeting](#)
Richard H. Strauss, Executive Director, CASE

[MAY 10, 2012 – MEETING 4](#)

- [Introductory Remarks](#)
Richard H. Strauss, Executive Director, CASE
- **Agency Overviews of Workforce Activities - Panel**
 - [Rina Bakalar](#) Executive Director, Office of Workforce Competitiveness
 - [Adam Goldfarb](#) Chief of Staff, CT Department of Education

- [Robert Kennedy](#) President, CT Board of Regents for Higher Education
- [Glenn Marshall](#) Commissioner, CT Department of Labor
- [Catherine Smith](#) Commissioner, CT Department of Economic and Community Development
- [Discussion – Panel Overviews](#)
Study Committee Questions and Answers
- **Perspectives on Global Competitiveness**
World Affairs Council of Connecticut
 - [Global Competitiveness Video](#)
 - [Discussion – Global Competitiveness Video](#)
Study Committee Questions and Answers
 - [World Affairs Council of Connecticut – Overview](#)
Felicity Harley, Executive Director, World Affairs Council of Connecticut
 - [Global Education Making Connecticut's Future Workforce Globally Competent and Competitive](#)
Eve Pech, Director of Educational Programs, World Affairs Council of Connecticut
 - [Global Competitiveness Programming for K-12](#)
Salvatore Menzo, Superintendent, Wallingford Public Schools
 - [Discussion – World Affairs Council Presentation](#)
Study Committee Questions and Answers
- **Study Research Team**
 - [CASE Research Update](#)
Alissa DeJonge, CASE Study Manager and Director of Research, CERC
 - [Workforce Definition - Final](#)
Bruce Carlson, CASE Associate Project Director
- [Closing Remarks and Next Meeting](#)
Richard H. Strauss, Executive Director, CASE

JUNE 13, 2012 – MEETING 5

- [Introductory Remarks](#)
Richard H. Strauss, Executive Director, CASE
- [Did You Know? - video](#)
- [Workforce Alignment](#)
Craig T. Follins, President, Olive-Harvey College, City Colleges of Chicago
- [Real-Time Skills In Demand Analysis: What Job Postings Can Tell Us](#)
Henning Seip, President and Chief Executive Officer, SkillPROOF Inc.
- **Study Research Team**
 - [Recommendations – Study Committee Discussion](#)
Bruce Carlson, CASE Associate Project Director
- [Closing Remarks and Next Meeting](#)
Richard H. Strauss, Executive Director, CASE

JULY 18, 2012 – MEETING 6

- Introductory Remarks

Richard H. Strauss, Executive Director, CASE

- Early Childhood Investment: Minnesota Experience

Arthur Rolnick, Senior Fellow, Humphrey School of Public Affairs, University of Minnesota

- Taking a Regional View of Human Capital Development in Addressing State Workforce Needs

Brian Prescott, Director, Policy Research, Western Interstate Commission for Higher Education

- **Study Research Team**

- Interviews and Focus Group Session Overview

Bruce Carlson, CASE Associate Project Director

Alissa DeJonge, CASE Study Manager and Director of Research, CERC

- Discussion - Interviews and Focus Group Session

Study Committee Suggestions

- Closing Remarks and Next Meeting

Richard H. Strauss, Executive Director, CASE

AUGUST 8, 2012 – MEETING 7

- Introductory Remarks

Richard H. Strauss, Executive Director, CASE

- Why Good People Can't Get Jobs

Peter Cappelli, George W. Taylor Professor of Management and Director of the Center for Human Resources, Wharton School, University of Pennsylvania

- Study Research Team

- CASE Research Update

Alissa DeJonge, CASE Study Manager and Director of Research, CERC

- Connecticut Labor Market for "Bright Outlook" Occupations

Matt Ross, CERC Research Associate

- Discussion – Research Team Updates

Bruce Carlson, CASE Associate Project Director

- Closing Remarks and Next Meeting

Richard H. Strauss, Executive Director, CASE

OCTOBER 23, 2012 – MEETING 8

- Introductory Remarks

Richard H. Strauss, Executive Director, CASE

- Connecticut Employment and Training Commission: 2012 Annual Plan

Rina Bakalar, Executive Director, Office of Workforce Competitiveness

- Study Committee Questions and Answers

MAJOR STUDIES OF THE ACADEMY

2012

- Benchmarking Connecticut's Transportation Infrastructure Capital Program with Other States
- Alternative Methods for Safety Analysis and Intervention for Contracting Commercial Vehicles and Drivers in Connecticut

2011

- Advances in Nuclear Power Technology
- Guidelines for the Development of a Strategic Plan for Accessibility to and Adoption of Broadband Services in Connecticut

2010

- Environmental Mitigation Alternatives for Transportation Projects in Connecticut
- The Design-Build Contracting Methodology for Transportation Projects: A Review of Practice and Evaluation for Connecticut Applications
- Peer Review of an Evaluation of the Health and Environmental Impacts Associated with Synthetic Turf Playing Fields

2009

- A Study of the Feasibility of Utilizing Waste Heat from Central Electric Power Generating Stations and Potential Applications
- Independent Monitor Report: Implementation of the UCHC Study Recommendations

2008

- Preparing for Connecticut's Energy Future
- Applying Transportation Asset Management in Connecticut
- A Study of Weigh and Inspection Station Technologies
- A Needs-Based Analysis of the University of Connecticut Health Center Facilities Plan

2007

- A Study of the Feasibility of Utilizing Fuel Cells to Generate Power for the New Haven Rail Line

- Guidelines for Developing a Strategic Plan for Connecticut's Stem Cell Research Program

2006

- Energy Alternatives and Conservation
- Evaluating the Impact of Supplementary Science, Technology, Engineering and Mathematics Educational Programs
- Advanced Communications Technologies
- Preparing for the Hydrogen Economy: Transportation
- Improving Winter Highway Maintenance: Case Studies for Connecticut's Consideration
- Information Technology Systems for Use in Incident Management and Work Zones
- An Evaluation of the Geotechnical Engineering and Limited Environmental Assessment of the Beverly Hills Development, New Haven, Connecticut

2005

- Assessment of a Connecticut Technology Seed Capital Fund/Program
- Demonstration and Evaluation of Hybrid Diesel-Electric Transit Buses
- An Evaluation of Asbestos Exposures in Occupied Spaces

2004

- Long Island Sound Symposium: A Study of Benthic Habitats
- A Study of Railcar Lavatories and Waste Management Systems

2003

- An Analysis of Energy Available from Agricultural Byproducts, Phase II: Assessing the Energy Production Processes
- Study Update: Bus Propulsion Technologies Available in Connecticut

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING
805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067-3405
Phone: 860-571-7143 • e-mail: acad@ctcase.org
web: www.ctcase.org

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING

The Connecticut Academy is a non-profit institution patterned after the National Academy of Sciences to identify and study issues and technological advancements that are or should be of concern to the state of Connecticut. It was founded in 1976 by Special Act of the Connecticut General Assembly.

VISION

The Connecticut Academy will foster an environment in Connecticut where scientific and technological creativity can thrive and contribute to Connecticut becoming a leading place in the country to live, work and produce for all its citizens, who will continue to enjoy economic well-being and a high quality of life.

MISSION STATEMENT

The Connecticut Academy will provide expert guidance on science and technology to the people and to the State of Connecticut, and promote its application to human welfare and economic well-being.

GOALS

- Provide information and advice on science and technology to the government, industry and people of Connecticut.
- Initiate activities that foster science and engineering education of the highest quality, and promote interest in science and engineering on the part of the public, especially young people.
- Provide opportunities for both specialized and interdisciplinary discourse among its own members, members of the broader technical community, and the community at large.

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING
805 Brook Street, Building 4-CERC, Rocky Hill, CT 06067-3405
Phone: 860-571-7143 • e-mail: acad@ctcase.org
web: www.ctcase.org