Report on Act 51 of 2015

Section C.10: Vermont Career Technical Education

REPORT

December 2015

Report/Recommendations to the House Committees on Education and Commerce and Economic Development

Submitted by Secretary of Education

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in partnership with

VERMONT

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RE: Act 51 of the 2015 Session of the Vermont Legislature

Act 51 requires that the Agency of Education, the Agency of Commerce and Community Development, the Department of Labor, and the Vermont State Colleges "convene, develop suggestions, and report on or before December 1, 2015 to the House Committees on Commerce and Economic Development and on Education and the Senate Committees on Economic Development, Housing and General Affairs and on Education on how Vermont's CTEs can be better utilized to provide training aligned with high-wage, high-skills, high-demand employment opportunities in Vermont…."

The following report summarizes a series of coordinated efforts among state agencies in the interest of both increased technical center utilization and advancing the career pathways/priority programs of study model in Vermont. These activities denote a key strategy to support economic development and economic self-sufficiency for all Vermonters. It concludes with a set of policy recommendations from the working group.

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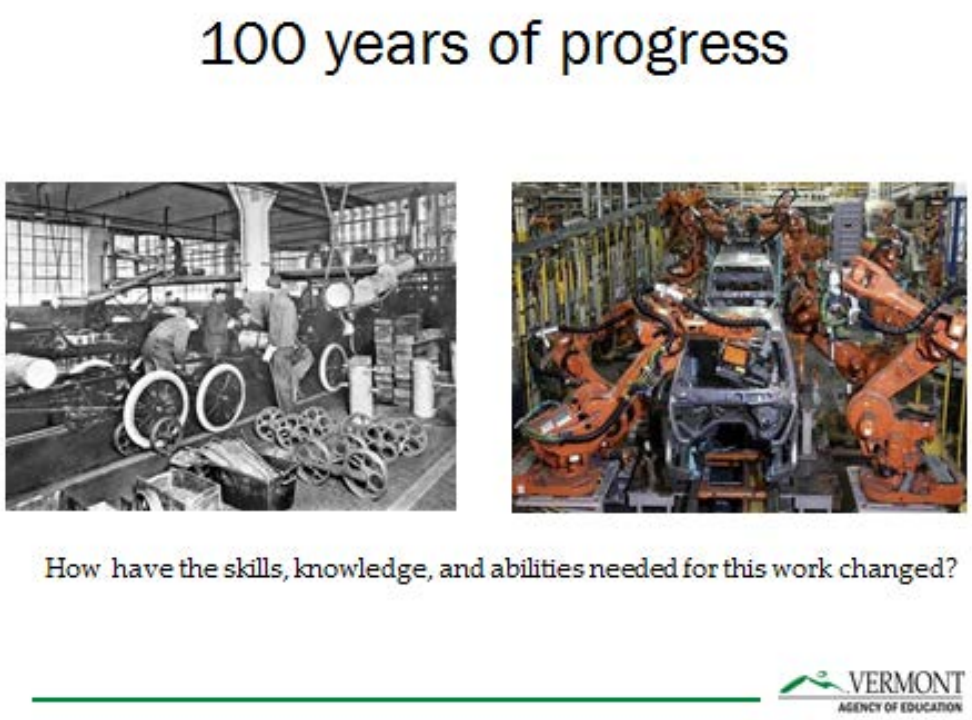
VERMONT PRIORITY CAREER PATHWAYS

Introduction

One of the most critical policy challenges Vermont currently faces is how to create and protect a strong, prosperous middle class in an era of globalization and technological change and innovation. In particular, globalization and advances in computer technology have restructured the workplace, with profound implications for future generations of workers. Many low wage, low skill jobs, and some high-wage/high-skill jobs (e.g., IT, manufacturing), have been outsourced to countries where labor is cheaper. Computers can now complete many routine tasks much more efficiently and with fewer errors than humans, and have thus replaced humans in careers that once provided many Vermonters with a decent wage. In addition, the pace of innovation has increased, such that Vermonters must be able to continue to learn, innovate, and reinvent themselves in order to participate and prosper in an evolving economic landscape.

The implications for education in general and career readiness in particular are profound. As Murnane and Levy (2013) point out *"American schools are not worse than they were in a previous generation. Indeed, the evidence is to the contrary. ... Today's education problem stems from the increased complexity of foundational skills needed in today's economy."* Put simply, work that can be routinized or reduced to a set of logical rules is now done by computers, which can do that work more efficiently and with fewer errors than humans (see Figure 1 below). Evidence of this transformation is all around us in Vermont, from self-service check-out kiosks to automated processes in dairy farms to testing of electronic circuits under a car hood using a digital multimeter. As a result, basic literacy and numeracy skills are no longer sufficient. It used to be enough for a graduate to follow simple written directions; now, she or he may be expected to conduct complicated internet searches to find the information needed to answer a given question.

Figure 1. Changes in the automotive manufacturing sector within the past century.



Quality opportunities for our children will lie instead in work that requires uniquely human flexibility, including "the ability to process and integrate many kinds of information to perform a complex task, [such as] solving problems for which standard operating procedures do not currently exist, and working with new information—acquiring it, making sense of it, communicating it to others (Murnane and Levy, 2013)."

In addition, as computers substitute for people on tasks that can be expressed in deductive rules (standard operating procedures), jobs associated with such tasks decline in numbers. Even if those jobs provided good opportunities to previous generations, they provide poor prospects for our current students. In contrast, national data indicate that jobs involving higher order thinking and complex cognitive skills and analysis, the ability to solve unstructured problems and the ability to communicate effectively are all growing in importance (see Figure 2).

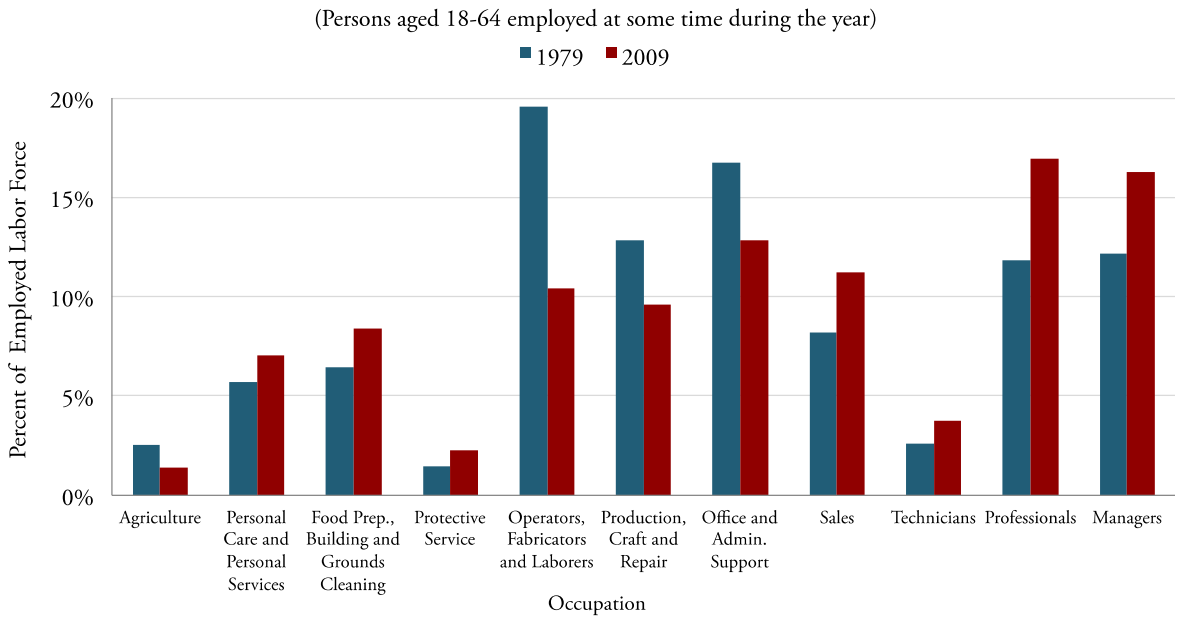


Figure 2: Occupational job distribution, 1919, 2009[1]

As Murnane and Levy (2013) explain, occupations shown in the middle of the figure have grown more slowly in recent decades, because computers have replaced people in executing much of the work of these occupations. In addition, occupations in the figure are arranged in order of increasing average pay, with jobs on the right being higher pay on average. Thus, the figure suggests that not only are computers replacing humans in many middle compensation jobs, but that the greatest growth of opportunity is in occupations that pay either low or high wages. This suggests that we may be looking at a future of greater inequity, in which a greater premium is attached to higher levels of cognitive skill. In VT, we are committed to making sure as many of our graduates as possible have access to opportunities to develop those skills, including those needed to choose and access occupations that are growing and also compensating at reasonable levels.

Another implication of technological change has to do with the increasing economic return associated with higher levels of education. In previous generations, high school students had many career options that paid a decent wage upon graduation. These jobs required little, if any, advanced education or training—in fact, many could be held by high school drop outs. Any training that was required typically was provided by the employer. An individual working in the agrarian or industrial age could also expect to remain with the same employer for decades. Only 40 or 50 years ago, most workers did not need—nor have—postsecondary education in order to live comfortably. In 1973, workers with postsecondary education held only 28 percent of jobs. In contrast,

[1] Murnane, R.J. and Levy, F. (2013). Dancing with Robots: Human Skills for Computerized Work . Third Way.Available at http://content.thirdway.org/publications/714/Dancing-With-Robots.pdf . (Data provided to Murnane and Levy by David Autor, Department of Economics at MIT.)

workers with postsecondary education held 59 percent of jobs in 2010 and are projected to hold 65 percent of jobs in 2020. [2]

Not only do the careers of the future place an increasing premium on deeper conceptual understanding and advanced problem solving, but also on a continued capacity to learn. Because of the pace of technological change, many of the jobs our students will take have not yet been invented, so schools can't prepare them for specific jobs. What schools can do is prepare them for life-long learning and continued development of skills. One "signal" of an ability to learn continuously is postsecondary attainment: do students go on to seek some nationally recognized credential or postsecondary degree beyond high school? National data suggest that the returns to higher levels of education have been increasing over recent decades (See Figures 3a, 3b).

[2] Carnevale, A., et.al. (September 2012). Career and Technical Education: Five Ways That Pay Along the Way to the B.A., Georgetown University Center for Education and the Workforce.

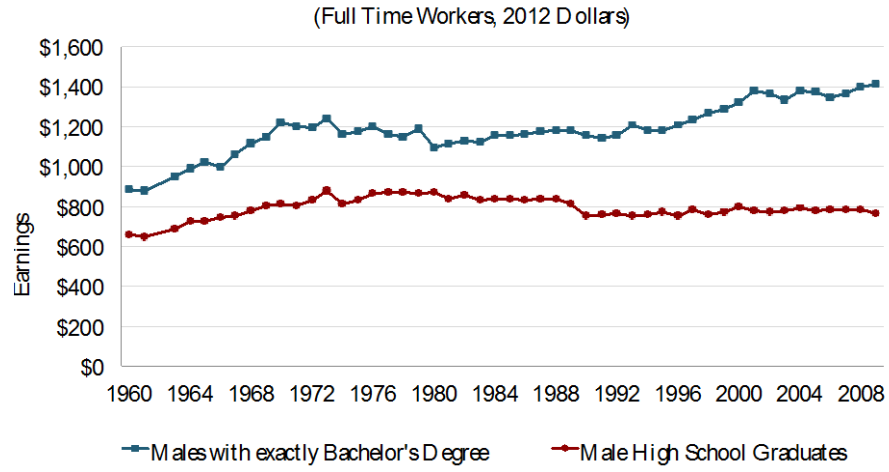


Figure 3a: Median Weekly Earnings of 35-44 Year Old Men (National Data)[3]

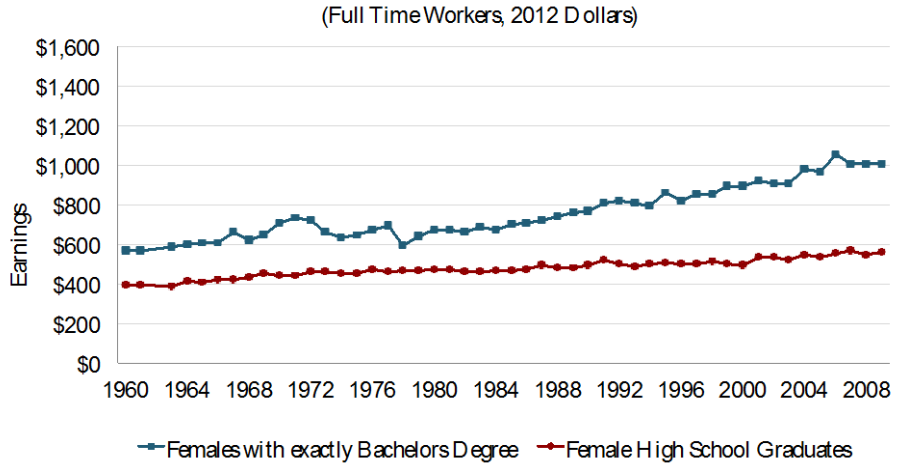


Figure 3b: Median Weekly Earnings of 35-44 Year Old Women[4]

These data suggest not only that education matters-- it matters more now than it did in previous generations. Whether students with more skill pursue more education, or whether more education is a signal that students have an ability to acquire more skill, multiple studies suggest that having more education is associated with a greater ability to obtain and hold a job, or to create a job or business, that provides a worker with enough compensation to thrive. In sum, Vermont's education system must ensure that all students have the foundational skill they need to pursue some kind of nationally recognized credential or postsecondary education, and to encourage them to do so. Focusing on more in-depth and rigorous high school programming will ensure both

[3] Murnane, R.J. and Levy, F. (2013). Dancing with Robots: Human Skills for Computerized Work. Third Way. Available at http://content.thirdway.org/publications/714/Dancing-With-Robots.pdf

Authors' Tabulations of data from the US Census, Current Population Survey. Available at: http://www.censusgov/cps/.

[4] Ibid.

foundational skills that are relevant for immediate jobs as well as higher level skills necessary for further education and training.

The Implications for Career and Technical Education

The implications for Education, and for Career and Technical Education in particular, are profound.

Preparing CTE students with 21st century skills

First, our regional CTE centers and schools need to be preparing our students to do the work that computers cannot do. This means we need to be developing programs of study that deliberately and consistently build student proficiencies not only with respect to specific vocations, but perhaps even more critically with respect to 21st century skills such as:

- Solving unstructured problems (e.g. a mechanic repairing a problem not described in a manual, chef creating a new recipe based on what is locally sourced at a given time)

- Working with and analyzing new information (e.g. managerial and entrepreneurial tasks, patient care, human services)

- Non-routine manual tasks where judgment is needed (e.g. safely operating heavy equipment, carpentry)

Mastering these types of analytic and problem-solving skills, in conjunction with the specific skills necessary to succeed in targeted fields, will best prepare students to consider *multiple* opportunities, including new and innovative options that they may "create" when it comes to charting their own paths after high school.

Targeting of priority sectors

Second, our regional CTE centers need to be preparing students in career pathways in high demand sectors, so that when they leave school, more of our students have connections to sectors that are expanding and generating job opportunities, including opportunities that compensate at levels enabling Vermont families to thrive. The Agency of Education (AOE), in collaboration with the Vermont Department of Labor (DOL) and the Agency of Commerce and Community Development (ACCD), identified 6 priority sectors/clusters for workforce, economic development and education/training. These include:

- Travel/Tourism and Business Systems (Culinary, Hospitality, Accounting, Management, Entrepreneurship);
- Manufacturing/Engineering (STEM);
- Construction/Green Building and Design;
- Local Food Systems, Agriculture, Natural Resources;

- Information Technology (Networking, Software Development, Website Design); and
- Health/Medical

These represent growth sectors in which qualified Vermonters can find or create high quality jobs that enable workers and their families to thrive.

Promoting nationally recognized certifications and postsecondary attainment

Third, our regional CTE centers needed to be supporting our students towards regionally or nationally recognized certifications and postsecondary opportunities, so that they have the capacity to access and pursue continued education and learning throughout their careers. Our regional centers have several powerful tools to do so, in the form of stackable credentials and access to post-secondary opportunities through Act 77 (including personalized learning plans, work-based learning, early college and dual enrollment).

Current State of CTE

Most efforts to enhance career readiness in Vermont build on the work and initiative of our Career and Technical Education programs. This section reviews the current work of these programs, as well as existing evidence of their impact.

Delivery Models

A variety of delivery models comprise the VT CTE system. CTE is offered primarily through locally developed, state-approved CTE programs offered at regional shared-time centers, co-located with a high school within a region. The state is divided into 15 regions and there are 17 technical centers – the Chittenden region and the St. Johnsbury region are both served by two separate centers (see map, Appendix A). There are two exceptions to the regional service model: Missisquoi Valley Union High School operates three state approved agriculture programs and Canaan Memorial High School offers regional "satellite" programs in order to address transportation challenges to and from its CTE center.

Some regional centers operate full-time programs where students attend all day for one school year, whereas others offer part-time programs where the instructional time is split between the junior and senior years and the program only meets for half of a school day.

Participants

Most CTE students attend programming during the 11th and/or 12th grade, with fewer students attending during 9th and 10th grade in pre-tech exploratory or foundation courses (State Board Manual of Rules and Practices, Sections 2370-2398) or "tryout classes" in State Statute (16 V.S.A § 1562). Individuals that do not have a high school

diploma (even if they have a G.E.D.), regardless of their age, are also entitled to participate in CTE programs during the school day.

Program Organization

Vermont's CTE programs at the secondary and post-secondary level are organized according to the National Career Clusters® Framework (http://careertech.org/career-clusters). The framework provides a vital structure for organizing and delivering quality CTE programs through learning and comprehensive programs of study (POS). In total, there are 16 Career Clusters in the National Career Clusters Framework, representing more than 79 Career Pathways to help students navigate their way to greater success in college and career.

The Career Clusters model is an organizing tool for curriculum design and instruction. It also functions as a useful guide in developing POS that bridge secondary and postsecondary curricula and for creating individual student POS with a complete range of career options. As such, it helps students discover their interests and passions, and empowers them to choose the educational pathway that can best lead to their own success in high school, college and career.

Figure 4: Listing of Career Clusters

Career Cluster
Agriculture, Food & Natural Resources
Architecture & Construction
Arts, A/V Technology & Communications
Business Management & Administration, Finance
Education & Training
Health Science
Hospitality & Tourism
Human Services
Information Technology
Law, Public Safety & Security
Manufacturing
Marketing, Sales & Service
Science, Technology, Engineering & Math
Transportation, Distribution & Logistics

CTE Enrollment

The table on the following page represents aggregate program enrollment, reported at the career cluster level rather than program level, for the 2014-15 school year for the entire state. Vermont students who participate in a pre-technical program return in their junior or senior year to a CTE program at a rate of about 14%.

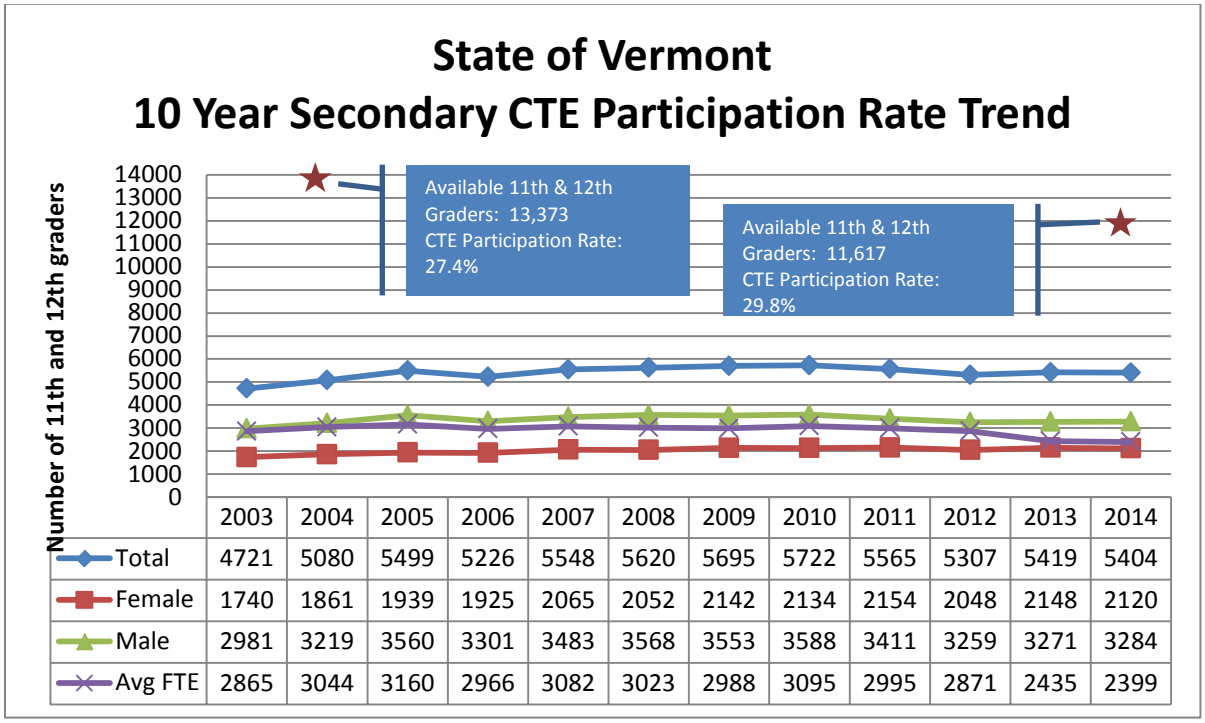
Figure 5: CTE program enrollment by Career Cluster.

Career Cluster* * Enrollment is presented in the aggregate by career cluster. There are numerous programs within each career cluster that develop skills for different types of jobs.	2014-15 Pre-Technical "Tryout" Course Enrollment (primarily 9th & 10th grade)	2014-15 Program Enrollment (11th & 12th grade)
Agriculture, Food & Natural Resources	271	433
Architecture & Construction	242	483
Arts, A/V Technology & Communications	113	442
Business Management & Administration, Finance	145	236
Education & Training	22	25
Health Science	71	414
Hospitality & Tourism	224	347
Human Services	73	468
Information Technology	34	155
Law, Public Safety & Security	121	212
Manufacturing	165	216
Marketing, Sales & Service	45	55
Science, Technology, Engineering & Math	168	99
Transportation, Distribution & Logistics	102	503
Pre-Tech Exploratory	178	**

The number of 11th and 12th grade students participating in CTE each year in Vermont since 2004 has remained fairly consistent – in the range of 5,080 at the lowest and 5,722 at the highest. Given that our entire K-12 population is under 80,000, these numbers are substantial.

Data retrieved through publicly available AOE Education Data Warehouse (EDW) reports reveal that, over the last decade, the number of all 11th and 12th grade students in Vermont dropped by 13.13%. During the same period, there was not a corresponding drop in the proportion of students that participated in CTE. In fact, the CTE participation rate increased 2.4% (see Figure 5, below). These data suggest that even

against a general declining student population rate, a significant number of students (and perhaps even proportionally *more* than in previous years) are interested in and participating in CTE experiences. This is good news as we envision how to improve the CTE system even further.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	4721	5080	5499	5226	5548	5620	5695	5722	5565	5307	5419	5404
Female	1740	1861	1939	1925	2065	2052	2142	2134	2154	2048	2148	2120
Male	2981	3219	3560	3301	3483	3568	3553	3588	3411	3259	3271	3284
Avg FTE	2865	3044	3160	2966	3082	3023	2988	3095	2995	2871	2435	2399

a) Figure 6: CTE participation trend. Available 11th and 12 graders have decreased 13.13% over 10 years while CTE participation has increased 2.4% over the same period. Still only about ¼ of available students participate in CTE.

Participant Outcomes

For those students who do participate in CTE, data suggest that many are able to use their CTE experience to prepare, successfully and purposefully, for a valuable career or some post-secondary program.

Graduation Rate: In the 2013-'14 school year, 99% of CTE students who "concentrated" [completed at least half of the required sequence of instruction] their studies in technical education graduated from high school.

Industry Recognized Credentials: In the same school year (2013-'14), 67% of concentrators left with an industry recognized credential, such as an LNA (Licensed Nurse Assistant), Game of Logging, First Aid/CPR, or Cisco Networking Certification. This is important, as a nationally recognized credential or certification can be a good tool for increased wages and additional levels of training.

Dual Enrollment: In the 2014-'15 school year, 11% of CTE students received at least one transcripted course through dual enrollment. These dual enrollment courses help students gain college credits for learning that takes place in their technical programs while they are still in high school. Completed credits reduce postsecondary costs for those CTE students who continue on in pursuit of a postsecondary credential. They are also a critical tool for demonstrating to CTE students that they are capable of and can benefit from educational opportunities beyond high school. CTE is not just training for a vocation or trade; it is preparing students for a lifetime of learning, skill development, and career advancement.

Placement: Ninety-six percent of CTE program concentrators were enrolled in post-secondary education, employed, or in the military.

College Enrollment: Data from the National Student Clearinghouse suggest that for the five-year period between 2009 and 2013, 41% of Vermont students who had participated in CTE were enrolled in post-secondary education.

The data also suggest that Vermont CTE students persist [i.e., are still enrolled after the first 3 semesters] in post-secondary education at a rate of 69%.

Increasing Program Rigor and Relevance

Since 2007, Vermont has focused its efforts on developing CTE *programs of study* (POS) as required under the Carl D. Perkins Career and Technical Education Improvement Act of 2006 – a Federal formula grant program. The goal of these POS is straightforward: to ensure that students can transition seamlessly from a high school CTE program into a related post-secondary program (credential, certificate, or degree) and not have to repeat content or course work they have already mastered. This is accomplished by integrating academic and technical course content; providing opportunities for high school students to earn post-secondary credits; and aligning program content with an industry-recognized credential or certificate at the post-secondary level. Vermont Technical College and the Community College of Vermont are recipients of Perkins funds. Both institutions have been involved in developing these seamless transitions for secondary CTE students as part of various POS.

The VT AOE maintains a systematic, transparent approval process for any new program that a regional center wishes to develop, offer, or make significant changes to. This process is in place to ensure consistency in the design of new programs of study; it is also a control mechanism for accessing student FTEs as part of the funding system. There are over 200 programs throughout the Vermont CTE system offered through a variety of delivery systems (part-time, half-time, full-time – as mentioned above) and resulting in a variety of student outcomes.

See http://education.vermont.gov/career-and-technical-education for more information.

Contextual Factors

State Policy

As recently as 2013 and the passage of Act 77 (Flexible Pathways Initiative), the Vermont Legislature identified several critical elements of flexible learning for Vermont students, including work-based learning, virtual/blended opportunities, college experiences prior to graduating from high school, and increased access to career technical education (CTE) experiences.

CTE is an updated version of decades old vocational education. There is a dual emphasis in Vermont CTE on learning designed to prepare students to be college and career ready. In particular, secondary level CTE should provide:

- career exploration and development for all students;
- programs of study that specify pathways and opportunities all the way from high school/CTE degree completion (e.g., licensed nurse assistant) to a variety of post-secondary opportunities (e.g., registered nurse, bachelors of science in nursing), including educational programs, apprenticeships and employer-based training components; and
- an applied pedagogy that encourages persistence to high school graduation as well as academic development and stronger transitions to potential post-secondary opportunities.

CTE provides students with the academic and technical skills and knowledge necessary to succeed in the workplace and to be used throughout their careers. CTE prepares students for the world of work by introducing them to workplace competencies, and reinforces rigorous academic standards defined in Vermont's Education Quality Standards by integrating these standards in the career context and through experiential and "real world" learning.

Federal Policy

The Carl D. Perkins Career and Technical Education Act of 2006 (P.L. 109-270), which funds CTE programs, requires states to develop programs of study (POS), mentioned previously, to guide students when choosing courses. These POS include career and technical areas that:

- incorporate both secondary and post-secondary education elements;

- engage the business community in the review of quality and the creation of work-based and work-placed learning opportunities;
- include rigorous content, challenging academic standards and relevant career and technical content in a coordinated, non-duplicative series of courses that align secondary and post-secondary education;
- utilize national standards, endorsed by the business sector when available;
- allow high school students to participate in dual enrollment courses prior to graduation; and
- result in an industry-recognized credential or certificate, or associate or baccalaureate degree.

Employer Engagement

Employers typically use academic degrees and diplomas as a proxy to signal a level of attainment of knowledge and skills. Historically, these were designed with dependency on "time in seat" as the measure of attainment of the standards in a course or program. Inconsistent quality across similar programs has confused end users (i.e. business, higher education, students, and community stakeholders). As Vermont implements proficiency-based learning in public education institutions, the need to develop responsive systems has never been greater. Success of the proficiency-based learning initiative depends on the development of new systems of instruction, assessment, and accountability. CTE delivery in Vermont also requires a new system of program design, including adoption of a competency approach to certifications that:

- measures comprehensive knowledge and skills in particular programs of study;
- is informed and valued by the business sector;
- includes stackable certifications, where appropriate, identifying rigorous academic skills, career readiness (transferable) skills, and critical business requirements and competencies; and
- consists of assessment methods which provide public assurance to stakeholders of high quality skill attainment and consistent quality across programs, as well as serving to inform continuous improvement of the programs of study.

The integration of transformation occurring within both CTE and proficiency-based learning contexts (as required by Vermont EQS) is *critical* for successful implementation of Act 77 and the ensuing target outcomes (i.e., college and career ready students, economic progress, etc.).

Current Challenges

As was noted in the "findings and intent" portion (Section C.10) of Act 51, Vermont's CTE centers are a key resource in preparing Vermonters for careers and meeting the workforce needs of Vermont employers (a.7). Our task is to ensure that the CTE system provides rigorous and relevant programs of study aligned with VT economic growth opportunities, so that our high school students are prepared for current and anticipated job openings in high-skill, high-wage, high-demand jobs (a.9).

The intent of the previous sections was to provide some perspective on the inputs (policies and practices) and outcomes (student participation and achievement) of CTE in Vermont and should be considered the "current state." The remainder of this report is intended to answer the primary questions posed in the legislation. Many of the concepts are aspirational in nature and represent a desired "future state."

Primary questions posed in Act 51:

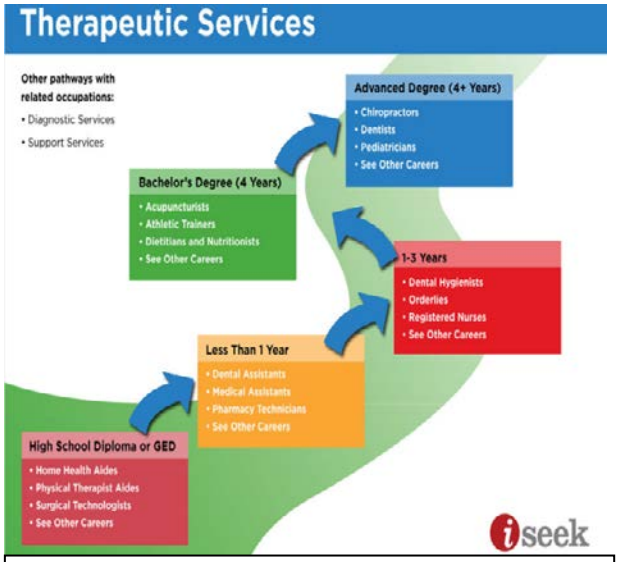
a. How will the Agency of Education develop priority pathway programs of study with regional CTEs in collaboration with the Department of Labor, the Agency of Commerce and Community Development, and the Vermont State Colleges?
b. How can these programs include opportunities for post-secondary enrollment in apprenticeships, internships, approved training programs, sub-baccalaureate programs, and adult technical education programs?
c. How will VT ensure equitable and appropriate access to CTE programs of study developed and implemented in grades 9 through 12?
d. What barriers or challenges exist to the development and implementation of high quality priority pathways as described in the CEDS approved project?
e. What are recommendations to address the financial disincentive for school districts to send students to the CTEs, as created by the current CTE funding model?

Conceptual Models for Change

The AOE and our Career and Technical Centers will draw on several conceptual models to develop relevant Programs of Study. These conceptual models will guide development and evaluation of programs of study, and build on national frameworks for workforce and economic development.

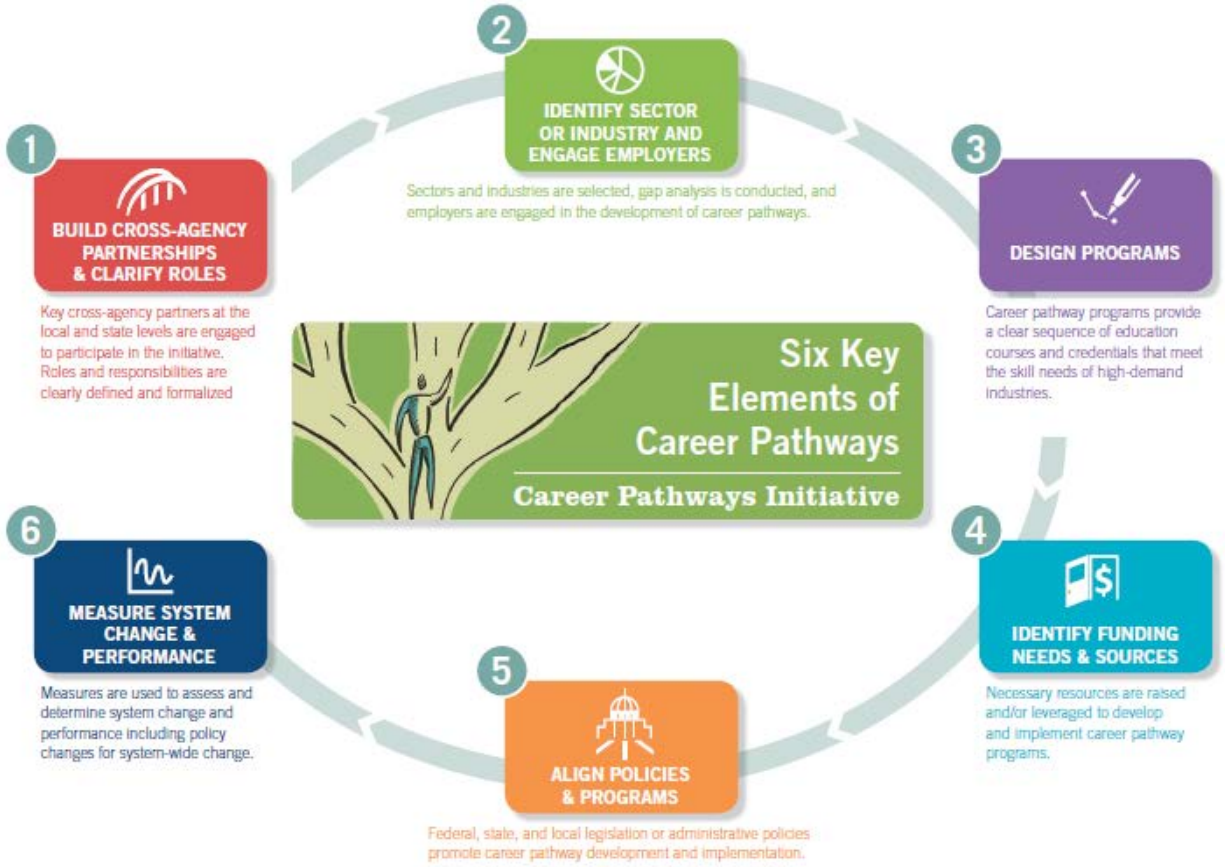
Career Pathways

Numerous definitions of career pathways exist, but the term generally refers to a series of interconnected education and training strategies, and support services, that enable individuals to (1) secure industry relevant certification, (2) obtain employment within an occupational area, and (3) advance to higher levels of future education and employment in that area. For instance, the Therapeutic Services sample pathway depicted below helps us understand the types of jobs available, and the education and training needed to obtain employment along the path.

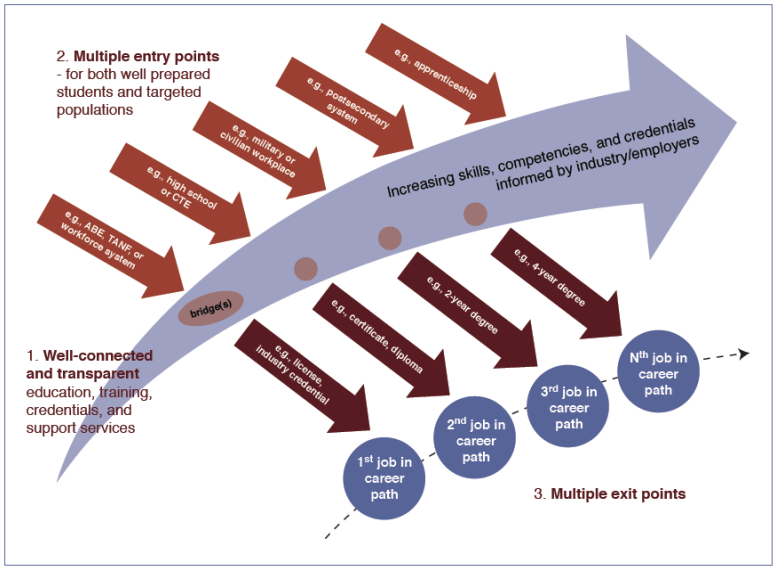


This exemple of a healthcare-related career pathway in therapeutic services will help guide the program development process. These models also help educators, students, and parents/guardians understand the types of jobs in a path as well as what is required to enter and advance along that path.

Extending this concept, the federal **career pathways development** model (depicted on the following page; U. S. Department of Labor – Employment & Training Administration, 2011) is the primary framework that will guide the strategic coordination of priority pathways across Vermont. This cohesive model will allow for the type of collaboration and planning between state agencies and other partners that leads to a variety of advancement opportunities for students of all ages and positive outcomes for employers.



The career pathways model encourages policy and practice for *all* learners, not just those enrolled in secondary school (e.g. students in programs leading to jobs not traditionally filled by their gender, out of school youth, adult basic education, adults with and without post-secondary credentials, veterans, employed and under/unemployed, diverse populations, those seeking a career change). The model also helps policy makers, educators, and support service providers to design policy and programs that consider how and when those learners might be entering and exiting the broadly defined educational system. It also urges employer engagement in order to inform entry and exit mechanisms – from quick turn-around training models to longer-term education models (CLASP – Alliance for Quality Career Pathways, 2014).



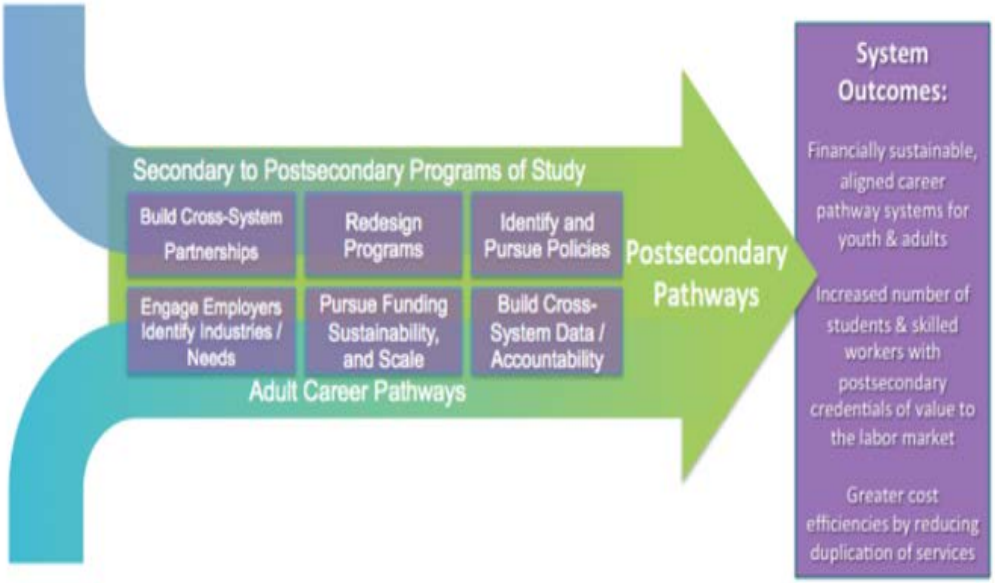
Programs of Study

The US Department of Education defines Programs of Study (POS) as sequences of courses (or experiences) covering grades 9 through 14, including non-college post-secondary opportunities. The secondary level courses/experiences must include post-secondary elements of learning. The VT AOE and our regional CTE centers propose to draw on the Career Pathways model to develop Vermont's programs of study (POS).

In addition to the previously described elements of the Career Pathways Development model the POS design framework includes:

1. *Legislation and Policies* - State legislation and local administrative policies promote POS development and implementation.
2. *Professional Development* - Sustained, intensive, and focused opportunities for administrators and faculty to foster POS design, implementation, and maintenance.
3. *Evaluation Systems* - Systems and strategies to gather quantitative and qualitative data on both POS components and student outcomes are crucial for ongoing efforts to develop and implement POS.
4. *Career Readiness Standards* - Content standards that define what students are expected to know and be able to do to enter and advance in college and/or their careers (Common Career Technical Core) comprise the foundation of a POS.
5. *Articulation Agreements and Dual Enrollment* - Credit transfer agreements and dual enrollment provide opportunities for secondary students to be awarded transcripted post-secondary credit, supported with formal agreements among secondary and post-secondary education systems.
6. *Career Guidance and Academic Planning* - Guidance counseling and academic advisement help students to make informed decisions about which POS to pursue. These decisions should be documented within a student's personalized learning plan.
7. *Teaching and Learning Strategies* - Innovative and creative instructional approaches enable teachers to integrate academic and technical instruction, and students to apply academic and technical learning in their POS coursework.
8. *Technical Skill Assessments* - National, state, and/or local assessments provide ongoing information on the extent to which students are attaining the necessary knowledge and skills for entry into and advancement in post-secondary education and careers in their chosen POS.

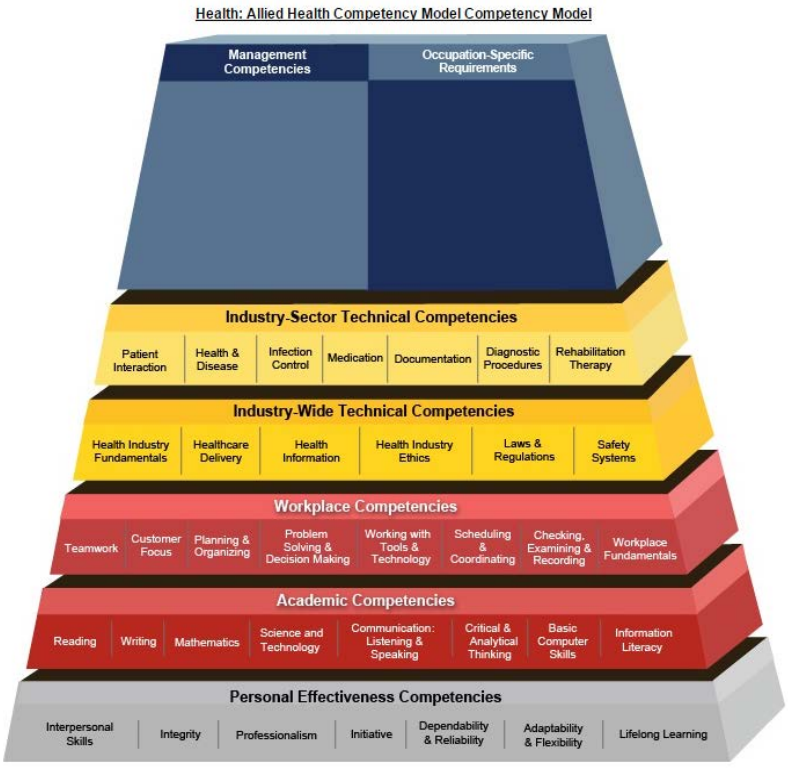
The career pathways and POS models mentioned above complement one another. The graphic below (Jobs for the Future, "Advancing CTE in State and Local Career Pathways Systems," 2014) provides a conceptual framework for integrating the two models into a comprehensive career pathways system.



Adopting this system in Vermont will ensure that the AOE addresses the concerns raised in Act 51: working in collaboration with other state agencies and ensuring that priority sector POS include a variety of post-secondary educational and training opportunities.

Competency

We will utilize a database of existing knowledge and skill standards developed by industry and housed at the US Department of Labor. This database of competency models includes industry and education skill verification worksheets to help assure alignment between industry needs and CTE/education program outcomes.



For example, the Employment and Training Administration (ETA) has worked with technical and subject matter experts from education, business, and industry to develop a comprehensive

competency model for the Allied Health industry sector (below). While the model identifies the knowledge, skills, and abilities needed for workers to perform successfully in the field of Allied Health, it is not intended that Allied Health workers possess all of the competencies listed. The model is, rather, a compilation of competencies that can be included as a basis for preparation in an Allied Health occupation. The Health Professionals Network (HPN) and the National Network of Health Career Programs (NN2) provided input and will ensure that the model evolves to accommodate changing skill requirements.

Bulding from Exisiting Work

For the last five years, the AOE has been targeting activities and supporting local initiatives in the priority sectors. The following summary demonstrates the work that has already been done in order to set the stage for further statewide development of POS in the priority sectors.

Current AOE/CTE Initiatives

The AOE and our regional CTE centers have coordinated efforts on a number of initiatives related to the development of programs of study within the priority sectors. These include both state-driven initiatives and locally-driven initiatives funded by state grants. Table 1 (below) lists state-driven efforts related to the development of POS within the priority sectors:

Table 1: State-driven initiatives to develop POS in the priority sectors

- Travel/Tourism and Business Systems (Culinary, Hospitality, Accounting, Management, Entrepreneurship)
    - Culinary programs discussing digital badges and performance assessments

- Manufacturing/Engineering (STEM)
    - Supporting development of Mechatronics program at North Country Career Center (2014) and at Center for Technology, Essex (2015)
    - Supporting Robotics/STEM program development at Stafford Technical Center
    - Supporting development of transferable skills and interest in STEM programs:
        - Supporting implementation of mini-maker spaces in five centers (2014)
        - Supporting development and implementation of robotics teams in five centers (2013-2014)
        - Supporting developing relationship between UVM and technical centers

- Construction/Green Building and Design
    - Providing jointly offered professional development for CTE construction teachers and high school math teachers so they may collaboratively improve mathematics instruction that is integrated with CTE curriculum and standards

- Agriculture, Local Food Systems, & Natural Resources
    - Piloted in 2014-15, with Farm to Plate, a community of practice among 30 CTE, high school, and middle school teachers to collaborate, develop working relationships, and learn about the Next Generation Science Standards

- Health/Medical
    - Participation in the Vermont Healthcare Innovation Project: Health Care Workforce Work Group

In addition, the AOE has been indirectly involved in a number of local or regional efforts to develop POS aligned to the priority pathways. Specifically, the AOE provided innovation grants to CTEs to support design and development work related to the POS. See Table 2 (below) for examples of local and regional initiatives related to the Priority Programs of Study.

Table 2: Program Innovation Grants FY14, 15, and 16

FY14		FY15		FY16	
Center	**Program**	**Center**	**Program**	**Center**	**Program**
Essex	Health Sciences	Essex	Health Sciences	Essex	Manufacturing
				Hartford	STEM
Lyndon	STEM Innovative Engineering Academy	Lyndon	Diversified Agriculture	Lyndon	Diversified Agriculture
				Lyndon	Maintenance & Operations
North Country	Mechatronics & Robotics	North Country	Mechatronics & Robotics		
North Country	Hospitality & Tourism				
				Randolph	Pre-Tech
				Randolph	Global Business Management
River Bend	Health & Biomedical Sciences	River Bend	Health & Biomedical Sciences	River Bend	Construction Tech & Residential Energy
Rutland	STEM Product Design & Robotics				
		Southwest	Sustainable Ag & Food Systems	Southwest	Sustainable Ag & Food Systems
Windham	Biomedical Science	Windham	Biomedical Science		

In addition, the VT AOE has worked to strengthen and align the policy context in which these Programs of Study are developed. For example, general initiatives in support of the Programs of Study include:

State-wide Articulation Agreements: During the 2013-14 school year, the Agency was involved in the development of a state-wide articulation agreement between Vermont Technical College, the Agency of Education, and all of the CTE programs across the state that led to programs at VTC. During the 2014-15 school year, the Agency has been working with Community College of Vermont to implement a similar agreement. These successfully models will be critical for building the postsecondary components of the statewide POS system.

Alignment Index: In 2013-14 the Agency of Education contracted with Global Skills Exchange to develop an Alignment Index that would assist the Agency and CTE centers in assessing their programmatic alignment with post-secondary education and with business and industry. The project was piloted at North Country Career Center in Newport. The initiative was developed and funded in anticipation of larger scale deployment as part of the priority sector program of study development projects.

STEM Equity Pipeline: In 2013, the Agency of Education was the lead organization in Vermont to coordinate the efforts of the STEM Equity Pipeline project. The goal of the project is to provide professional development and action planning for a select group of CTE centers to assist them in increasing the number of young women that participate in and complete CTE programs in STEM. The project closed in the spring of 2015, and three of the four pilot sites have clear strategies they are implementing. The pilot sites also developed and implemented recommendations for policy and practice change for the purpose of attracting and retaining young women in STEM studies. Tracking outcomes from this work and ensuring equitable opportunities for minority and underrepresented populations will continue to be critical elements to CTE in Vermont. In particular, equity must be a critical aspect of priority sector POS development.

Professional Learning Communities: In partnership with the CTE directors association, the AOE is supporting the development of professional learning communities for teachers of common program areas. Last year the project piloted with Automotive teachers. The AOE has been working for the last three years to bring teachers of common program areas together in a structured way so that they can learn from each other. Many experienced teachers are retiring and

are being replaced by inexperienced CTE teachers. The connection to their more experienced colleagues is imperative to student success.

Unified State Plan: The VT Department of Labor, AOE, State Workforce Investment Board and Voc Rehab under AHS are working together on the unified state plan under the federal Workforce Investment Opportunity Act. This work models a structure for collaborative thought development, communication standards across different stakeholder groups, and process for developing jointly defined priorities. Key aspects of this work will accordingly inform the POS development phase, given that key players/agencies are shared across these the WIOA and POS initiatives. In addition, it is clear that CTEs have an important role to play in the WIOA state plan.

Next Steps

Program Design: Development of programs of study (POS) in priority sectors

In order to fully support Program Design aligned with priority sectors, we propose the following next steps.

1. ESTABLISHMENT OF SECTOR CONSORTIA

   a. Corresponding to each of the six identified priority sectors, a series of statewide consortia will be created to formulate the development of career pathways and POS within each sector. Consortia membership will include k-12 education, higher education, business/industry representatives, and representation from other state agencies such as Creative Workforce Solutions. AOE, DOL, AHS, and CTEs will jointly invite stakeholders to a convening meeting that lays out the consortium framework, assigns responsibilities moving forward, and sets up a mutually agreed upon accountability system. We have committed to hiring a new staff member at the AOE to lead this work.

   b. The charge/mission of each cluster/sector statewide consortium will be to: (1) provide input to the development of POS covering grades 9 through 14 (including non-college post-secondary opportunities), (2) endorse a single, high quality POS for each priority cluster/sector, (3) recommend industry certifications and other outcomes required in each program, (4) manage and update the program competency model and standards as needed, and (5) monitor POS quality outcomes. In keeping with the federal POS framework,

secondary level courses/experiences will also include post-secondary elements of learning.

c. Consortia will advocate and provide a strong statewide effort toward comparable quality of programming, spanning middle school through apprenticeship, career and college, as well as lifelong learning.

d. Consortia will identify challenges and/or barriers to effective implementation and access to high priority programs, and advocate for change as needed.

2. REQUIRED POS ELEMENTS

a. Sector/cluster-based student apprenticeships and pre-apprenticeships (and other relevant experiences) will provide high quality work-based learning opportunities for secondary students in order to develop transferable skills, such as those identified in the Vermont Education Quality Standards.

b. Standards that align to rigorous national frameworks of standards.

c. Comprehensive career development programs will be essential as well as personalized learning plans for each student beginning in middle school. Opportunities for flexible learning opportunities that ensure high quality, rigorous integrated academics must be accessible to all students.

d. Opportunities for students to develop 21st century skills will require statewide investment in pedagogical and curricular professional development as well as valid, reliable performance assessments.

e. Priority cluster/sector initiatives will reflect policy expectations established in Act 77 (Flexible Pathways Initiative) and the Education Quality Standards.

f. Students will be provided multiple opportunities to demonstrate attainment of standards and career readiness, including college readiness without the need for remediation. Learning opportunities will include work-based/placed learning, virtual/blended learning and early college/dual enrollment experiences.

g. POS will be developed for high-wage, high-skill, and/or high-demand jobs in the economy.

3. SELECTION & FUNDING

a. Define the sector/cluster in detail through the identification of education, training, occupational/career advancement pathways, and competency model outcomes.

b. Priority areas will provide a way to focus some funding from Perkins and potentially from other state and federal funds on a limited number of high priority programs and serve as a catalyst for innovation and change in the workforce and economy.

4. OVERSIGHT AND ACCOUNTABILITY

h. Final recommendations for each program of study will be made by an Operational Team (Ops Team) made up of industry experts and teachers/curriculum experts. The Ops Team will identify and agree on a common curriculum, identify and participate in professional development opportunities within the industry/field, identify teaching and learning strategies, and be able to teach dual enrollment courses as well as highly valued credential programs.

i. A Career Pathways Advisory Committee (CPAC) will work to develop and implement smooth transitions from secondary school into the workforce and post-secondary education/apprenticeships. They will identify entry and exit knowledge and skill requirements, determine equipment requirements, assessments and credentials, and work within established standards.

The CPAC will work to ensure the system is able to respond to broader needs across the spectrum of potential beneficiaries - including those students studying in a field that is non-traditional for their gender - as outlined in the Career Pathways framework.

Collaboration

The state agencies charged with the development of this report have collaborated in the context of Career and Technical Education prior to this convening and will continue to do so as part of implementation of the career pathways model. The opportunity to highlight issues related to this effort is greatly appreciated and will serve as a catalyst for enhanced collaboration.

The **Agency of Commerce and Community Development (ACCD)** has published the "State of Vermont Comprehensive Economic Development Strategy 2014 – 2020" (CEDS) which establishes a vision closely aligned with that described here. There will

continue to be close communication between the ACCD and the other agencies in this context, including:

- guidance regarding existing and emergent priority sectors;
- identification of employers willing to:
    - provide workplace tours, open houses;
    - disseminate information to about CTE opportunities;
    - initiate "School of Tech" programs with area high schools;
    - host CTE student internships;
    - provide instructional and/or financial support to tech centers;
    - participate on Regional Advisory Boards and/or program advisory boards;
- undertaking a workforce needs assessment in collaboration with DOL;
- encouraging employers to use tech centers for staff training; and
- providing funding support for employer training through tech centers.

The VT **Department of Labor (VDOL)** currently supports and participates in the activities of Vermont's CTE centers. This effort will continue and will be enhanced by a focus on:

- working with employers to identify workplace skills needs and the skills gaps of potential employees, including participating on CTE Regional Advisory Boards;
- providing detailed current and projected occupational outlook information, labor market trends, and workforce utilization for Vermont and sub-state regions through its Economic and Labor Market Information Division;
- providing career and job counseling (e.g. resume writing, job interviewing) to students at tech centers and at VDOL offices;
- providing relevant training to CTE staff regarding career development and job opportunities;
- providing support for work-based learning (e.g. pre-apprenticeships, apprenticeships, internships, job shadowing, career exploration);
- assisting tech centers in building relationships with employers;
- providing legal and regulatory guidance to tech centers and work-based learning employer-sponsors;
- supporting eligible in-school and out-of-school youth in relevant activities (e.g. work-based learning, mentorying, counseling, leadership training, Summer Youth Employment); and
- supporting eligible students transitioning from high school to continuing education, job training, and/or employment.

The **Vermont State Colleges (VSC)** have contributed to technical education in several ways. Vermont Technical College (VTC) and the Community College of Vermont (CCV) are both post-secondary recipients of Perkins funding, which supports technical programs within those institutions. VTC and Castleton University have provided educator training and licensure preparation for tech center staff. In addition, the VSC is committed to:

- continuing dialogue for the purpose of articulating clear educational pathways leading to high-wage, high-skill, high-demand employment opportunities;
- supporting Vermont's Dual Enrollment Program and Early College Program; and
- communication with higher education providers within and beyond the VSC system with the goal of eliminating duplication and competitive redundancy.

Governance of CTEs

The governance of the CTE takes shape in several different ways:

1. Three regions are served by independent technical center school districts. The center director is also the superintendent. The electorate of the region votes on the budget every year. The center has its own school board. This also affords the regional center the opportunity to participate in agreement on regional school calendars as required in 16 V.S.A. 25 § 1071(e).

   [Patricia A. Hannaford Career Center, *Middlebury;* River Valley Technical Center, *Springfield;* Southwest VT Career Development Center, *Bennington*]

2. One region is served by two independent schools. These schools function as comprehensive high schools and serve the region's public high school students. CTE is generally treated as a department of the school and the Director of the center is generally the department head. The Boards of Trustees and the Headmasters of the schools set the policy for the schools and centers. The Regional Advisory Board in this region has more authority than the other Regional Advisory Boards.

   [Lyndon Institute, *Lyndon Center;* St. Johnsbury Academy, *St. Johnsbury*]

3. The remaining 12 centers, while regional in nature, are the primary responsibility of the district or supervisory union where they are physically located. The center director reports to the superintendent. The school board for the attached high school is the school board for the regional technical center.

Recommendation: *The legislature support a comprehensive study on CTE Center governance that includes, but is not limited to, the three existing governance models.*

> ***Considerations:*** *The three independent technical center districts; local control; independent high schools serving as technical centers; outcomes based; regional provision of service; budget approval process; regional calendar approval process; scheduling; bussing/transportation; equity; cost; access; transitions between high school and CTEs; etc…*

ENTITLEMENT: CTE programs can be found in Vermont at regional CTE centers. Community colleges, technical institutes, and skill centers also offer career technical education at the post-secondary level. Programs are offered in a "shared-time system" with limited duration and entitlement. Students are entitled to courses in the 11th and/or 12th grades. Courses in an exploratory or cluster foundation may be offered in the 9th and 10th grades, but are not an entitlement.

This entitlement limits students to a relatively short time/focus in an area of interest. While CTE provides innovative approaches to engaged and personalized learning, the limited duration and the exposure late in secondary education limits the positive impact CTE could provide to a greater number of learners. Additionally, the short duration of access does not provide a learning environment of significant scope, further limiting a number of key elements of a high quality CTE program of study. These include work-based and work-placed learning, duration and depth of programs of study, high quality certification attainment, and comprehensive career-ready skills.

Recommendation: ***Particularly for programs of study in priority sectors, consider options for collaborating with regular high school programs to extend applied learning into grades 9 and 10, use personalized learning plans to extend work-based learning into grades 9 and 10, pilot satellite CTE programs in grades 9 and 10, or expand CTE access for students in grades 9-12 with the option for students in grades 7 & 8 to participate in introductory ("try-out") courses. Note: under Act 77, regular high schools are required to offer all students opportunities for work-based learning. In addition, many regular high schools have developed design technology programs onsite to engage learners earlier in applied learning. These offer an initial opportunity for collaboration and coordination between regular high schools and CTE programs, in ways that are cost effective and mutually beneficial.***

> *Considerations: virtual course offerings; incentives for decentralized offering of technical center programs; use of apprenticeships; reduction of stigma in CTE; intentional collaboration between academic and CTE teachers; cross-supervisory union boundaries and staff sharing; regional coordination of CTE experiences/offerings & work-based learning and co-op experiences; salary assistance for outreach positions; costs of transportation and time associated with transitioning between sites; quality and consistency of proficiency based pathways*

FUNDING: CTE is funded in large part through state appropriations. Statute (T.16 § 1561) requires payment to a CTE center at the rate of 87% of the base education amount for each full-time equivalent student from a sending district. An equivalent amount is subtracted from the amount due to the sending district. This model is, essentially, a usage based model. The funds follow students in a way that creates a perceived disincentive for sending schools to encourage student participation in CTE. This cost pressure is aggravated by declining enrollments statewide: CTEs and regular high schools are in "competition" for students to remain viable.

Recommendation: ***Evaluate policy opportunities to support greater collaboration between CTEs and regular high schools, through coordinated planning and reduction of financial incentives for school districts to reduce or limit utilization of the CTE centers.***

> *Consideration: Previous studies conducted on behalf of the Legislature; U.S. Department of Education CTE financing study; Agency of Education staffing; state funding to support program development; local control; limitation of participation based on budgets; effective models from other states.*

CONCLUSION

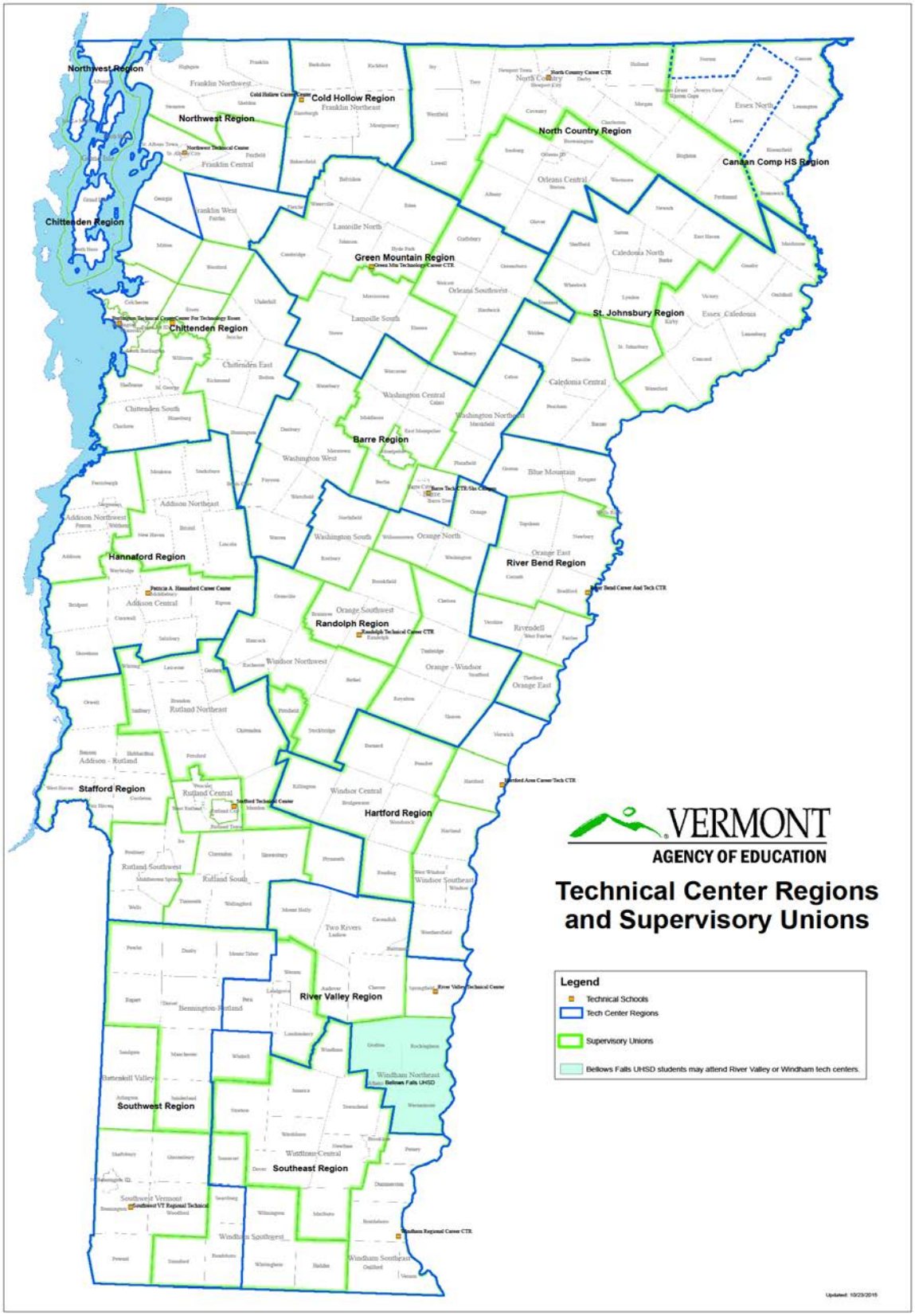
Vermont's Career and Technical Education centers are a key resource in preparing Vermonters for careers and meeting the workforce needs of Vermont employers. Morevoer, our regional CTE centers are a critical equity tool: a disproportionate number of CTE students come from more limited means and family backgrounds, and are eager to use the CTE programs and dual enrollment opportunties to ensure a better economic future than that of their parents. The applied nature of learning in CTEs, as well as the close linking of CTE pathways with post-secondary opportunities makes CTE a uniquely powerful tool for improving the circumstances of many of our students, and in particular, students who represent the first generation in their family to pursue some kind of post-secondary opportunity. Although we certainly support high-quality CTE experiences for *all* students, we want to ensure the potential of statewide CTE priority programs of study to "level the playing field" in terms of ultimate job attainment, wages, and life success, no matter the economic background of the student.

There are obstacles to the full realization of the potential of this resource. Some of these obstacles can be overcome through a renewed commitment to collaboration among the state agencies submitting this report, as expected by the Legislature. The conversations that led to this report have clarified for the various state partners how they can move forward on a shared agenda.

Other obstacles may be the result of statute and rule governing the operation of our CTE system. Given the acute fiscal circumstances of the state at present, as well as the complexity and interconnectedness of current governance and fiscal structures, we recommend careful analysis of both intended and potential unintended consequences before making any statutory change to the funding mechanism for CTE. In addition, given the changes underway in response to Act 46, which should result in more streamlined and efficient school governance statewide, we are also cognizant of the fact that those Act 46 changes, if successful, may free resources and enable better coordination in the long run to support better utilization of our CTEs in advancing career readiness and postsecondary attainment.

APPENDIX

A. Map of Technical Center Regions



B. RE: Act 51 "Additional Issues"

In addition to charging the working group with the report addressing improved utilization of Vermont's Career and Technical Education (CTE) system, we were asked to address the issues below. The responses represent input from CTE Directors and the consideration of the working group.

"Over the course of refining Sec. C.10 and further discussions within our committees, we have identified the following additional issues that we respectfully request you address in the scope of your work:

(1) **scheduling and busing**; (Where schedules among tech centers and sending schools are not aligned, and where there are more sending schools, scheduling and busing become more problematic. Sending school scheduling decisions are often made without consideration of, or input from tech centers. Where travel time is increased, more instructional time is lost. Scheduling continues to be based largely on a credit/seat time model, and CTE is not always valued in that context. As we transition to a proficiency-based system, there is the potential to relieve some of the stress related to scheduling.)

(2) **reasons for the relatively lower demand for day and adult programs, whether culture, tuition costs, hours of operation, travel, or other issues**; (The decline in the general student population is also affecting the CTE student population. Travel challenges, scheduling conflicts, and funding model disincentives all affect demand for CTE. There may also be a lack of consistent, positive communication about the value of CTE from tech centers and especially from sending schools. Lack of available funding for adult technical education coordinators serves to limit the availability of a person to coordinate programs in the evening; lack of time and resources to recruit students and instructors may contribute to the variability in each center being able to adequately serve its region.)

(3) **who currently bears responsibility within Vermont schools for counseling and referrals of students to CTE, whether guidance counselors, teachers, principals, etc**.; (This may be any one of, or combination of guidance counselors, teachers, special educators, and CTE outreach staff. Students and parents often serve as champions of CTE. With the transition to Personalized Learning Plans, all educators engaged in

that process must be knowledgeable proponents of CTE as a valuable element in a student's flexible pathway to graduation.)

(4) **details on the mechanics of funding, including for development of programs, payment of staff, facilities, equipment, etc., and how the money moves between a high school and CTE**; (There is a belief, though not universally shared, that the current tuition funding model creates a disincentive for sending schools to encourage student use of CTE. The report provides more detail on that model and offers an alternative which has previously been introduced as a House bill. The State has made a considerable investment in the facilities that house CTE and continues to support the purchase of equipment as needed. There is also financial assistance in support of administrator salaries and transportation. In addition to considerable state funding, there is also a significant investment of federal funds (Perkins). It appears that funding to support CTE is adequate, and is able to grow with growing demand. The problem is the perceived disincentive related to the mechanism through which the bulk of that funding is delivered to the CTE system.)

(5) **reasons why tech centers are more or less likely to partner with other education and training providers**; (The perception of CTE Directors includes a lack of clarity regarding the role of CTE, inadequate staffing to support partnerships, lack of aligned curriculum/instruction, and lack of articulation agreements with higher education. It is also recognized that such partnerships would serve to broaden the base of potential users of CTE and create the Career Pathways structure that is the goal.)

(6) **governance and the impacts on operation and expansion**; (Where tech centers are part of a larger supervisory union/district there is often a sense that CTE needs are not a high priority. Conversely, independent CTE districts are perceived to have an advantage. *When the existing independent tech centers were created there was an intention that the model be reviewed following a period of operation. Such a review would be useful now in order to determine the relative value of the model and would be fulfilled by the report identified in the recommendation section in the full report above.*)

(7) **current CTE ability to aggregate employers to develop programs that serve multiple employers**; (This is also perceived to be hampered by a lack of adequate staffing for the purpose. However, Directors report some local success, especially where employer members of the Regional Advisory Board have been engaged.)

(8) **current CTE ability to recruit students, including for both day and adult programs**; (Recruitment is done through cooperative educators, parents, students, CTE outreach staff, and the use of media. Sending schools can offer more support for recruitment efforts and increased use of social media may help.)

(9) **reasons why relatively fewer CTE graduates enter construction trades**; (Some construction programs have been discontinued in recent years because of declining interest. Where that trend has not been seen, it tends to be due to the efforts of local instructors. It is also perceived that the "high-skills" expectation has impacted the "trades" generally. In addition, some believe that entry-level jobs in the construction trades are low paying.)

(10) **barriers for adult students entering available education programs in the construction trades**; (The perceived barriers include scheduling that conflicts with work, risks associated with adult/teen classrooms, and the lack of apprenticeship programs.)

(11) **the potential costs and benefits of tech centers becoming specialized or magnet schools in certain areas, versus all centers developing programs in all fields**; (There is a potential cost reduction in such an approach based on the reduction in equipment needs. However, there may also be a cost increase associated with travel in such a model. Some believe that regional needs differ too much to be a feasible approach. Others believe that centers in close proximity should specialize and avoid duplication of programs.)

(12) **the messages that are conveyed by colleges to high school students, and how those messages characterize the value of technical education**; (Colleges have at times expressed concern about the rigor of CTE programs, and in some cases, do not allow the transfer of dual enrollment credit earned through CTE. Such messages can be assumed to have a dampening effect on student and parent interest in CTE. Statewide articulation agreements between CTE and Vermont's colleges have been in place for a limited amount of time, the details are still being negotiated and the process is still being developed. The expansion of the Dual Enrollment Program may serve as a catalyst for greater cooperation.)

(13) **the alignment between the tech programming and college degrees**; (Statewide articulation agreements are not currently in place. However, some local agreements exist and offer evidence of the potential. There is certainly existing alignment of programming that can be taken advantage of in the context of Career Pathways.)

(14) **any stigma that exists regarding tech centers**; (Whereas the perceived stigma associated with CTE continues to exist, there is a belief that this is changing. The transition to flexible pathways that enable all students to take advantage of technical education opportunities may serve to support this changing attitude.)

(15) **the value of CTE programs that are not included in the priority pathways programs of study;** (Such programs continue to be valued and delivered based on local needs. They are also another important resource in the context of transferable skills acquisition and demonstration.)

C. Perkins State Plan (http://education.vermont.gov/documents/educ_teched_pubs_state_plan_2013_edited.pdf)

D. Comprehensive Economic Development Strategy (http://accd.vermont.gov/business/strategic_planning)

E. Rockefeller Center report on CTE in Vermont (http://rockefeller.dartmouth.edu/shop/vermontctevt_final_052614.pdf)

F. US Department of Education Report on Financing CTE (http://ctecenter.ed.gov/files/NCICTE_CTE_Finance_Study_Final_508.pdf)

G. CTE funding (http://legislature.vermont.gov/bill/status/2014/H.346)

H. Career Pathways Toolkit (https://www.workforce3one.org/view/2001523732879857569/info)