MINUTEMAN
CAREER & TECHNICAL HIGH SCHOOL

MINUTEMAN MISSION

Minuteman collaborates with parents, communities, and business leaders to serve a diverse student body with multiple learning styles. Through a challenging, integrated curriculum our students develop the academic, vocational, and technical skills necessary to be productive members of a global community. We value life-long learning that fosters personal and professional development in a safe and respectful environment. Minuteman is committed to preparing all students for success.

MINUTEMAN PHILOSOPHY

Career and Vocational/Technical Education is responsive to the economic needs of the workplace and the individual. By being engaged with employers, business, and post-secondary institutions, the graduates of Minuteman will be better prepared to contribute to the strength of our nation and the quality of life for its citizens. Minuteman recognizes the attainment of skills needed in the global economy is best accomplished through understanding the unique learning styles that lead to performance and individual student success.

SIX INDICATORS OF PROGRAM EXPANSION OR CONTRACTION

(1) Job Growth
(2) Living Wage
(3) Student Interest
(4) Potential of "Emerging" Occupations
(5) Existing Alternative Training Sources
(6) Presence of Strategic Industry Partner

The DESE MGL Chapter 74 regulations involve three requisites of program expansion or contraction. As Minuteman's mission prepares individuals for a global economy, it should include additional variables to consider when making adjustments to the type and scope of CTE programming. Our investments in new programs are based upon a review of recommended workforce development data including (1) job growth, (2) living wage data, and (3) student interest. In addition, Minuteman considers (4) forecasting emerging occupations, (5) analyzing existing training sources, and (6) evaluating the strength (or potential strength) of a significant industry partner.

While workforce development data is historical in nature, emerging occupations data is projective and requires a mixture of research, risk, common sense and industry advice. Student interest is measured in (historical) enrollment data for existing programs and in student survey data around interests. The fifth indicator is the availability of similar training programs in the area. This is a significant market factor that is often overlooked when program development decisions are being made. Minuteman reviews the capacity and enrollment trends of similar programs in the region prior to investing. For example, if 8 schools are graduating 12 students per year and the region needs 50 new auto mechanics per year, then the region is training more students than can be absorbed by the market. The sixth indicator is the relative strength of an industry partner that seeks to support expansion. No single variable is a final determinant for a program being launched or terminated.

OCCUPATIONAL EMPLOYMENT PROJECTIONS 2004-2014

Between 2004 and 2014, 1.1 million job openings are anticipated in Massachusetts. It is critical to point out, however, that nearly three quarters of the openings or nearly 800,000 are due to replacement rather than growth. There are 266,000 new jobs expected, representing a modest growth rate of 7.8%.

MINUTEMAN
CAREER & TECHNICAL HIGH SCHOOL

MINUTEMAN CAREER CLUSTERS & PROGRAMS AND PROPOSED EXPANSION MAJORS

Trade & Engineering	Human & Commercial Services	Bio-Sciences	Business & Information Technology	Agriculture & Transportation	Performing & Technical Theater Arts
Drafting / CAD	Cosmetology / **Barbering**	Bio Technology	Office Technology	Automotive	Acting
Carpentry	Medical Careers **Emergency Med Tech**	Bio Manufacturing	Computer Programming	Auto Collision Repair	Dance
Plumbing	Early Childhood Education	Pre-Engineering	Commercial & Graphic Arts	Environmental Technology	Film Making
Electrical	Culinary Arts / **Hospitality**	Electro-Mechanical / Robotics	Retailing & Marketing	Landscaping Technology	Sound & Light Engineering
Telecommunication	Criminal Justice	Bio Medical Sciences	Business / Legal / Financial Services	Animal Sciences*	
HVAC		Animal Sciences*			
Welding/Metal Fab					

**Proposed expansion highlighted in light blue. Downsizing or merging programs highlighted in light red*

PLANNING CONSIDERATIONS

These considerations represent a basic sequence of thinking about a new facility. The sequence and priorities below will be greatly impacted by a consensus building process designed to articulate a commonly agreed upon direction for Minuteman.

The ability to sustain an enrollment reflective of the apparent increase in capacity of the Minuteman Career and Technical High School may require significant changes in overall organizational structure. The current structure is driven by several critical factors, including the school schedule. This schedule may be limiting full access to programming and discussions should begin to look at this in light of and in conjunction with the revised mission statement and the strategic plan for the future development of the Minuteman Career and Technical High School.

1. Recommendations made by advisory committees, teachers, employers, post-secondary representatives, community based organizations and workforce development specialists in the area.

2. Determine the types and classifications of employment as well as the connection to local post-secondary majors each of the programs represent.

3. Consult with and determine workforce growth trends in the local economy that will be requiring workers
   a. How many openings are projected in each program area?
   b. How many openings are projected in related program areas?
   c. What local post-secondary majors are represented and supported?
   d. In other words; what is the local supply and demand with the local labor market?
   e. What unmet local demand for training and education are not currently being met in the arts, small business, cultural, political and agricultural economies?
   f. What civic, community events might be served by a new Minuteman Career and Technical High School?

4. NOTE the 'openings' referred to above are openings in the field of employment, or in post-secondary programs **not** in the training program itself.

5. Determine the Adult Education, continuing education and workforce training potential of each of the programs.

6. Analysis of the current curriculum to address the needs of the students, the local area employers and the post-secondary institutions receiving students into post-high school programs.
   a. In other words, is the curriculum being taught moving in the right direction?
   b. Develop and describe competency listings for each of the courses of study
   c. Have academic competencies been identified and tied to the state frameworks?
   d. Are safety and health competencies fully identified by each program?

7. What potential for clustering common competencies exist in academic-related and occupational areas?

8. Develop equipment and supply listings based upon the desired courses of study and accompanying competency listings.

9. Validate the competency tasks listings with the assistance of the program advisory committee members.

10. Determine the size of the lab's, the classrooms, and the project/activity areas.

11. Identify Location Relationships of programs

12. Determine traffic patterns (at all times of the day)
    a. Including travel time between related programs and locations
    b. Including buses dropping off students at the Minuteman Career and Technical High School several times per day
    c. Including travel times to off campus work sites frequently used by programs

Vocational-Technical Education in Massachusetts

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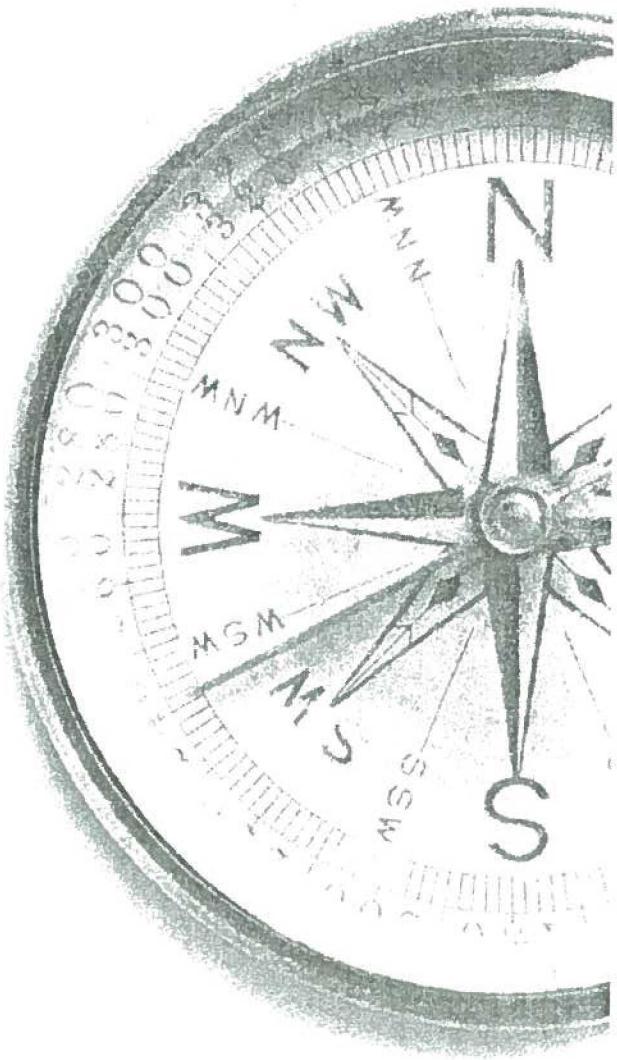
A Pioneer Institute White Paper

by Allison L. Fraser



PIONEER INSTITUTE
PUBLIC POLICY RESEARCH

Pioneer's Mission

Founded in 1988, Pioneer Institute is a non-partisan public policy think tank committed to keeping Massachusetts economically competitive and to strengthening the core values of an open society. To inspire market-driven policy reforms, Pioneer promotes individual freedom and responsibility and limited, accountable government. The Institute has changed the intellectual climate in Massachusetts by commissioning timely and rigorous academic studies from leading scholars. Pioneer injects new ideas into the public debate through forums and lectures, transcripts, the media, and outreach to legislators, business groups and the general public.

Pioneer's Centers

This paper is a publication of the Center for School Reform, which seeks to increase the education options available to parents and students, drive system-wide reform, and ensure accountability in public education. The Center's work builds on Pioneer's legacy as a recognized leader in the charter public school movement, and as a champion of greater academic rigor in Massachusetts' elementary and secondary schools. Current initiatives promote *choice and competition, school-based management,* and *enhanced academic performance in public schools.*

The **Shamie Center for Better Government** seeks limited, accountable government by promoting competitive delivery of public services, elimination of unnecessary regulation, and a focus on core government functions. Current initiatives promote *reform of public employee benefits* and *the way the Commonwealth builds, operates, maintains and finances its transportation infrastructure.*

The **Center for Economic Opportunity** seeks to keep Massachusetts competitive by promoting a healthy business climate, transparent regulation, small business creation in urban areas and sound environmental and development policy. Current initiatives promote market reforms to *increase the supply of affordable housing, reduce the cost of doing business,* and *revitalize urban areas.*

Pioneer Institute is a tax-exempt 501(c)3 organization funded through the donations of individuals, foundations and businesses committed to the principles Pioneer espouses. To ensure its independence, Pioneer does not accept government grants.

Vocational Technical Education in Massachusetts

ALISON L. FRASER

A Pioneer Institute White Paper

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Executive Summary

Massachusetts, a pioneer in many ways, has always been at the forefront of vocational-technical education. A century ago, the Smith Vocational and Agricultural High School opened in Northampton. Smith is still operating today, and is the forerunner to a mode of education that remains vitally important to the state's workforce. Massachusetts' Vocational-Technical Education (VTE) is a unique method of academic, career, and extracurricular activity that creates a comprehensive blend of opportunity and advancement.

Every student in the Commonwealth has access to one of the 63 VTE programs throughout the state. While this is advantageous to those who are accepted into the schools, due to the popularity of VTE, there are often long waiting lists and specific entrance requirements for students who desire access to this unique combination of rigorous academics and practical apprenticeships. Those who are admitted find themselves on the path to a more "job-ready" future. Often praised as more prepared and capable by industry professionals, VTE graduates leave high school better equipped than most college-preparatory students. They are set to enter a workforce where their skills and talents can be utilized to the fullest.

Often praised as more prepared and capable by industry professionals, VTE graduates leave high school better equipped than most college-preparatory students.

Through the years, VTE has had to change with the rest of public education. Initially opposed to reform and standards, VTE educators have seen the advantages of accountability, pushing their students to better-than-average graduation and MCAS pass rates. Over 50 percent of VTE graduates pursue postsecondary education, and importantly, special education students at Massachusetts VTE schools are counted among those with the highest graduation rates. In fact, VTE dropout rates are significantly lower than state averages, 1.8 percent versus 3.8 percent.

VTE's academic results are due to many factors. They reflect a combination of high expectations by educators and the completion of challenging, rigorous coursework by students. The academic skills necessary for career or college entry and success are gained along with practical knowledge that elevates VTE students to the ranks of experts in their fields. Intricate concepts are placed in a recognizable context by allowing hands-on and demonstrative study. The integration of academic and technical knowledge creates a base for success. Theory is put in use and practical applications are tested in the classroom and workshop, so students leave with a well-rounded understanding of how their knowledge can work for them.

VTE's academic results...reflect a combination of high expectations by educators and the completion of challenging, rigorous coursework by students.

Vocational-Technical Education has become a successful model for instruction through a blend of operational autonomy, choice, rigorous instruction and effective relationships with local businesses. These are factors that any legislator or policy-maker should be aware of when focusing on school reform. VTE has the ability to serve disadvantaged populations and should not only continue, but be expanded as a viable, successful choice for secondary education and whole school improvement in Massachusetts.

1. Introduction and History

Almost 10 percent of Massachusetts' workforce is employed in manufacturing, creating nearly $40 billion worth of goods annually—it is our fourth largest sector, behind health care, retail trade, and education. One hundred thousand new openings for manufacturing employees are anticipated across the state in the next decade, challenging us to prepare enough skilled workers.[1] Vocational education—with increased support, availability, and corporate partnerships—is one important way to fill that need.

As the nature of Massachusetts manufacturing has changed over the last century from low-technology to high-technology, so has the nature of vocational schools. While they still offer traditional, relevant programs in carpentry, metal fabrication, plumbing, and machining, today's vocational students are also studying robotics, biotechnology, engineering technology, and electronics. Because the skills needed for success in even the most conventional manufacturing jobs have increased in step with technology, expectations for vocational students have grown as well, resulting in significantly higher academic achievement levels for the 27,000 young people in these programs.

Vocational-Technical Education has become a successful model for instruction through a blend of operational autonomy, choice, rigorous instruction and effective relationships with local businesses.

In Massachusetts, Vocational Technical Education (VTE), also known as Career and Technical Education (CTE), is over a century old. The educational reform movement begun in the late 1800s was crystallized when Massachusetts Governor William L. Douglas, a shoe manufacturer from Brockton, approved a legislative resolution on May 24, 1905, establishing a commission to examine the nature and the need for industrial education and to make recommendations on its implementation. The Massachusetts Commission on Industrial and Technical Education submitted its report in April 1906 and filed a Senate Bill that same year, An Act to Provide Further for Industrial Education.[2] Enacted in June 1906 and amended in 1911 and 1921, this law established Massachusetts as the first state to provide publicly funded industrial education, making it 'the Grandfather of Vocational Education.' In 1908, the Smith Vocational and Agricultural High School in Northampton was the first Vocational Technical school to open, followed a month later by New Bedford Independent Industrial School. A hundred years later, these two schools are still in operation, serving students who want their high school education to include both academics and occupational skills acquisition.

According to state and federal definitions, Vocational-Technical Schools educate and prepare students for both employment and continuing academic and occupational training, by integrating academic and vocational education, following both the Massachusetts Vocational Technical Education Frameworks and the Massachusetts Curriculum Frameworks. Their programs must include competency-based applied learning that contributes to students' academic knowledge, work attitudes, general employability skills and the occupational-specific skills necessary for economic independence. Funding for these schools comes from regional member districts, Chapter 70 disbursements, and grants from the federal Carl D. Perkins Vocational and Technical Education Act (authorized in 1984) through which the federal government distributes almost $1.3 billion federal dollars yearly to fund career and technical education programs in all 50 States.

In 2006, the Massachusetts Business Alliance for Education (MBAE) released a report entitled *Preparing for the Future: Employer Perspectives on Work Readiness Skills*[3], a project to inform educators and policy-makers about the work readiness skills that employers expect of Massachusetts high school graduates, and to describe the skills and characteristics these corporations require for entry-level positions with potential for growth and advancement. According to the report, of the dozens of professionals who participated in the study, "There was general agreement that vocational school graduates are more job-ready than general education or college preparatory high school graduates. In fact, a number of participants felt that vocational high school graduates were often more job-ready than college graduates." Also, employers felt that vocational graduates are more team-oriented, disciplined, and prepared to enter the workforce. Graduates of vocational schools were described as having superior soft skills and preparation in comparison to other graduates.[4] In a tight economic environment, results like these are hard to ignore.

2. High Schools of Choice

In 1962, a drive was begun to create Regional Vocational Technical High Schools across the state, resulting in the 26 regional vocational-technical and three regional agricultural schools in Massachusetts. Each regional VTE school is considered its own district, with a school committee, superintendent, etc, and (within state frameworks, guidelines, and accountability measures) the ability to create its own curricula and instructional policies and methods. As such, they are true examples of school-based management. They are also schools of choice, offering an opportunity for public school students and parents to have a focused, integrated education that provides successful graduates with not just an academic Competency Determination (CD), but also with occupational proficiency in the career or technical field they have chosen to study throughout high school.

By law, each student in Massachusetts has access to either a regional or district vocational program. Eight of the larger districts in the state have vocational-technical high schools within their local systems (such as Worcester's Technical High School, Madison Park Technical Vocational High School in Boston, and Putnam Vocational Technical High School in Springfield) and another 26 districts have Chapter 74-approved vocational-technical programs within their comprehensive high schools, for a total of 56 programs. (See Appendix A)

In fact, a number of participants felt that vocational high school graduates were often more job-ready than college graduates.

Massachusetts' vocational-technical schools are, in essence, large magnet schools. They are schools of choice, which offer a student everything he/she would receive at any comprehensive high school. In these schools, a student does not have to give up football or electives or, more importantly, a full academic program, if he/she wants to participate in vocational education. Unfortunately, in many other states, students would have to opt for either career education or all of the extra activities that can make a high school experience so special.

As vocational education is practiced in Massachusetts, literally half of a student's instructional time is spent in shop or career education. In the southern United States, vocational schools run a six-period day, and one block of the day is a course called shop, much like an elective. Other northern states are closer to the southern model—for instance, New

York's vocational education system places the student in shop for just half a day at a time—but Massachusetts's delivery is unique.

Massachusetts supports the concept of long stretches of instructional time—usually one full week of academics alternating with one full week in shop—as vital to the success of the authentic learning that takes place in a vocational program. The Commonwealth's system, consisting of full-service schools, where the career and technical learning of the shop is given the same emphasis as the traditional academic work has been called "the Cadillac vocational education."

All vocational teachers must be licensed by the Massachusetts Department of Elementary and Secondary Education (DESE). Specific education credentials are required (associate, bachelor or master degree), as well as three to five years of experience in the field in which the teacher is licensed. For certain vocational fields, Massachusetts and/or federal government or industry issued licenses or certifications are required for program instructors. Vocational teachers must also pass written and performance subject area tests. (A small number of tests are not yet available, but all are under development.) In addition, all candidates are required to pass either the standard MTEL Communication & Literacy test or the Vocational Technical Literacy Skills Test. All academic instructors at VTE schools must hold state academic licenses in their fields of instruction.

2.1 Changing the Mindset and Improving Results

Most uniquely important about VTE programs is their focus on the educational improvement of the approximately 50 percent of Massachusetts high school students who may not plan to enter a four-year college program after graduation. Instead, most vocational high school students plan to go directly to a two-year college or technical program, the military, or the work place. These students deserve to be held to the same high standards as their comprehensive high school peers.

The academic improvement of career and technical education in Massachusetts has contributed to its increasing popularity with students and their parents.

Nationwide, enrollment in career and technical education, both secondary and postsecondary, rose 57 percent from 2000 to 2004. In Massachusetts, enrollment has increased by 15 percent in the last decade.[5] Today's pragmatic students are increasingly eager to acquire real-world skills and get an early start on career training, particularly with ever-increasing college costs. Vocational schools also offer a wider slate of attractive career programs (see Appendix B), outfitting shops with the latest equipment that simulates actual professional conditions.

2.2 Waiting Lists

The academic improvement of career and technical education in Massachusetts has contributed to its increasing popularity with students and their parents. There are 27,000 students in the regional vocational schools (see Appendix C), and virtually all VTE schools in the Commonwealth have waiting lists for admissions: Tri-County RVTHS had over 200 more applicants than available spots for the 2008-09 academic year; Northeast Metro-Tech in Wakefield received more than 700 applications for 330 places; Norfolk County Agricultural school reports having the most competitive and qualified applicants ever for the 2008-09 academic year, resulting in a waiting list of 200 students; Essex County Agricultural School has a waiting list of over 300 students for 130 openings; and Blackstone Valley RVTHS

had almost 700 applicants for 300 open slots in the class of 2012 (see Appendix D). The result is an application process for the vocational and agricultural schools that may include rubrics for scholarship (including successful completion of the sending grade), number of unexcused absences, discipline, and recommendations from the sending school. Most also require an interview.

"MCAS really did us a favor, because now every high school in the Commonwealth is on a level playing field."

Along with the traditional trades such as carpentry, cosmetology, and plumbing, VTE schools are offering specialties in telecommunications, networking, computer repair, medical assistance, environmental technology and pre-engineering programs (14 Massachusetts VTE schools—along with 13 comprehensive high schools—use the *Project Lead the Way* engineering curriculum), which tend to demand even more sophisticated academic skills. But vocational educators have come to understand that even today's traditional trades also require an increased level of academic knowledge.

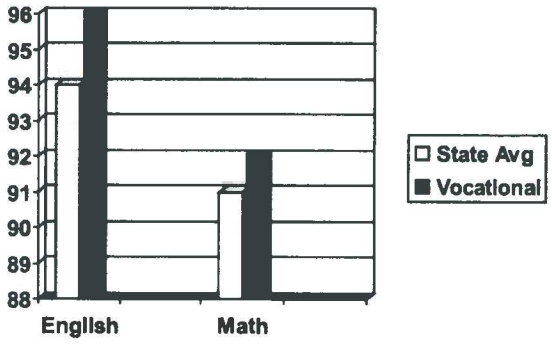
3. Increased Academic Excellence

With the support of research, vocational schools came to realize that the academic skills needed for entry-level career success are equal to those needed for college entrance[6]: The manuals used by professional plumbers, major appliance repair people, auto mechanics, etc., are written at up to a grade 14 reading level. Ignoring this reality was determined to be the reason why 95 percent of Connecticut vocational students failed a recent administration of an electrician's license test.[7]

The recent shift in the course of study at vocational schools to place substantially greater emphasis on academics than had been the case was motivated in part by the approach of high-stakes Massachusetts Comprehensive Assessment System (MCAS) testing. Although the academic standards mandated by the Education Reform Act of 1993 were originally resisted by the administrators of most vocational-technical schools, they have since come to embrace them. An early acceptance of the inevitability and usefulness of MCAS made Blackstone Valley Regional Vocational Technical High School the first vocational school where 100 percent of its students passed MCAS to graduate. A Blue Hills RVT administrator said, "MCAS really did us a favor, because now every high school in the Commonwealth is on a level playing field." Eugene Carlo, the superintendent at Assabet Valley RVT, who had been a vocal opponent of the state standards and assessments in the 1990's, publicly declared at a Massachusetts Business Alliance for Education event in 2006 that "MCAS was the best thing that ever happened to us."

Figure A

10th Grade MCAS Pass Rates 2007



Vocational schools that had been inclined to de-emphasize academics in the days before MCAS are now overhauling their academic approach in an effort to lift student achievement toward state

and federal goals (see Figure A). Since this shift in priorities, 96 percent of vocational-technical students in the class of 2008 passed both the math and English portions of the MCAS, beating out the statewide average of 94 percent, and the average Graduation Rate at the regional vocational-technical schools is almost 10 points higher than the state average: 90.5 percent, compared to 80.9 percent statewide.[8]

Blackstone Valley Technical has one of the most extensive programs for bringing up the academic levels of their students: recognizing that one in four Valley Technical students enter their freshman year with a fourth-grade reading level, they test every student before matriculation, and every one who is below grade level is placed in an individualized remediation program until he/she is reading at grade level. As part of their focus on academic and MCAS success, the administration also increased the length of math and English blocks, and gradually increased the length of the school year by 15 days to 195. All of this has made a tremendous difference in academic performance for Valley Tech students.

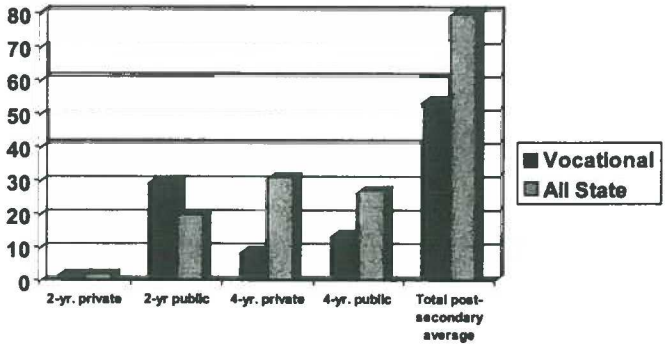
...the average Graduation Rate at the regional vocational-technical schools is almost 10 points higher than the state average...

Norfolk Agricultural Technical School is another CTE institution that has successfully embraced academic as well as professional improvement for its students. Since 2002, Norfolk Agricultural has focused on successful integration of the academic and vocational sides of education. Among the many projects that have grown out of professional development and Lesson Study sessions there are lessons that link dairy processing with chemical biotechnology, garden design with measurement skills, and diesel mechanics with earth science. Every instructor on the vocational side has created at least one lesson in partnership with an academic teacher.

Successes like these have helped change the image of vocational schools from a means to an end for students destined to go directly to work or the trades into institutions with reputations as schools of choice for students desiring a technical background who are likely to go on to post-secondary education (see Figure B). For instance, at Blue Hills RVTHS, 100 percent of students who took MCAS last year passed, and 76 percent of graduates continued their studies at the post-secondary level; at Essex Agricultural, where 95 percent graduated with an MCAS diploma, 86 percent went on to post-secondary schooling.

Figure B

Higher Education Plans for Vocational Students vs. State Average



The result of this new mindset has been academic growth in the 26 regional vocational and three agricultural schools averaging 42 percent on Massachusetts' Composite Performance Index (a measure of the extent to which students in a group are progressing toward proficiency) since 2001—ranging from +17.4 percent (Minuteman Vocational Technical High School) to +83.1 percent (Whittier Vocational Technical High

School). These schools' combined Average Performance Index of 81.7 points is fewer than five points below the statewide average of 86.5 points. The achievement gap between vocational and comprehensive high schools has closed by 27 percent in six years.

Vocational students' high performance on MCAS and other measures has demonstrated to the students, their teachers, and to the community that they have the academic foundation needed to succeed. The unique vocational-technical education attributes of close adult relationships, individualized instruction to recognized benchmarks, and student choice in the programs studied have also combined to result in a 1.5 percent dropout rate in vocational districts, compared to 3.8 percent statewide. Amazingly, Blackstone Valley RVTHS, Bristol County Agricultural School and Shawsheen Valley RVTHS each boasted a dropout rate of just one-fifth of one percent (0.2 percent) in 2007—and Norfolk County Agricultural School had zero dropouts.

3.1 Increasing Expectations

One of the most difficult to accomplish, yet most important conditions needed for success with any large scale education improvement program is to raise teacher and staff expectations for all students. Expectations have been defined as "teachers' perceptions of the extent to which the students are capable of learning the material that teachers try to teach."[9]

With this in mind, researchers discovered that when teachers see themselves as teaching extraordinarily difficult-to-educate students, they perceive a lack of efficacy and lose their motivation to try to reach them. Conversely, this same research group cites myriad investigations that indicate when teachers hold high expectations for their students, that feeling is communicated to the pupils, and "when students perceive that their teacher has confidence in their ability, ...[they] are likely to achieve at higher levels than are students who sense that their teacher considers them unable to master the work."[10] Expectations in schools are a cultural result of shared norms and values of school participants[11], so it is best when the issue of raising expectations is addressed on a large scale. One way to do this is to create an atmosphere in which the entire school community focuses on higher expectations. This is especially important in the context of vocational schools, which are generally viewed by the public (and many educators) as offering a lower standard of instruction. If the perception that what they are offering to their students is simply not challenging enough can be internalized, then raising the caliber of instruction will follow.

The achievement gap between vocational and comprehensive high schools has closed by 27 percent in six years.

An administrator at Assabet Valley RVT spoke of expectations thus: "We are definitely ratcheting up expectations. In the past, we didn't teach Shakespeare, for instance. We were teaching other things, and without exposure to this stuff, they had no chance. There is certain subject matter they really should know and understand, but they weren't getting it, and when the programs these kids are in are not teaching the material, they just can't win. Even a recent MCAS Alternative Assessment was on a Shakespearean play, *Romeo and Juliet*, so if you've never been exposed to it, and you're not used to talking about plot and theme and character, because they're busy giving you elementary reading, then you haven't got a chance. The interesting thing is that when you do the higher order stuff the right way with these kids, they love it and they succeed." The superintendent at South Shore RVT explains,

"We've made tremendous strides in improving the academic side of the house, and there has been a general trend toward the realization that a truly prepared craftsman really needs a balanced portfolio of skills; vocational schools can no longer be viewed as terminal points for education. This can truly be a dual-preparation high school process."[12]

To further demonstrate the new mindset of vocational schools as places of preparation for further education or for highly paid, entry-level placements, many vocational schools are now offering Advanced Placement (AP) classes for their students. Also, one out of the five high schools in the pilot year of the Massachusetts State Scholars Initiative—a program administered by the Massachusetts Business Alliance for Education, designed to prepare students for postsecondary success by pursuing a rigorous high school curriculum, including AP—is a vocational school, Assabet Valley, with more VTE schools applying for the program as it progresses.

A federally sponsored program that also leads to greater pre- and post-graduate opportunities for vocational students is the Perkins IV "Tech-Prep" program. This unique program focuses on linking eligible Chapter 74 high school career and technical education programs to postsecondary career and technical education programs, including registered apprenticeship programs. The formal partnerships between colleges and vocational schools are listed in Appendix E. A standard part of the VTE experience is the "co-op," where qualified seniors spend what would be their shop weeks working, for pay, at a real job in their fields of study, to supplement their formal instruction.[13]

Also available to vocational students are formal articulation agreements with the trades' registered apprenticeship programs. These programs have recognized the high caliber of vocational-technical education by accepting qualified VTE graduates into programs that offer a full time job in their fields, a master tradesman as a mentor, and support for one to two college courses per year.

3.2 Requiring a Challenging Program of Study

Dropping low-level academic courses and preparing academic teachers to teach the essential concepts from college preparatory curriculum to career-bound students and requiring students to complete a challenging program of study consisting of an upgraded academic core along with a vocational major can actually force the desired increase in expectations. By not only equalizing course levels, but also requiring that students take core academic courses in each of their four years of high school, teachers are compelled to offer the same opportunities to a full range of students. Massachusetts' vocational schools have been ahead of the pack in requiring all students to complete what has become the recommended MassCore of high school coursework.[14]

...the graduation rate of special needs students at vocational schools is almost 20 percent higher than the state average for special needs students...

The socio-cultural context of vocational education can never be ignored. Because of the perceived blue-collar nature of what the students are studying, versus the perception of academic teachers as white-collar, it can be a hazard of the climate for a cultural divide to open up between teachers and their students—even more so than in some low socioeconomic comprehensive schools. The raised goals and

expectations created for the students by raised academic expectations and the integration of academic skills into vocational shops helps to guard against this tendency. Often, the students at vocational schools have already felt sorted and selected out of many opportunities for successful futures. The job of the effective VTE school is to counter these feelings with exposure to the same college preparatory curriculum they would have at an effective comprehensive high school.

Mary Metz's extensive study of *How Social Class Differences Shape Teachers' Work* demonstrated that the students themselves introduce class issues into schools, as do the communities from which they hail. However, the faculty and administration must not reinforce these feelings by teaching down to them. The integrated nature of a successful VTE school gives these students the advantage of determining how their knowledge can be applied to real world situations, but this is not all they need. Metz warns that no matter what the socio-economic status of the students or the instructors, "Schools should be places to create the curious, informed and responsible citizen, rather than the ready occupant of an occupational slot."[15] Therefore, all students must receive an education worthy of any child desiring to go on to higher education.

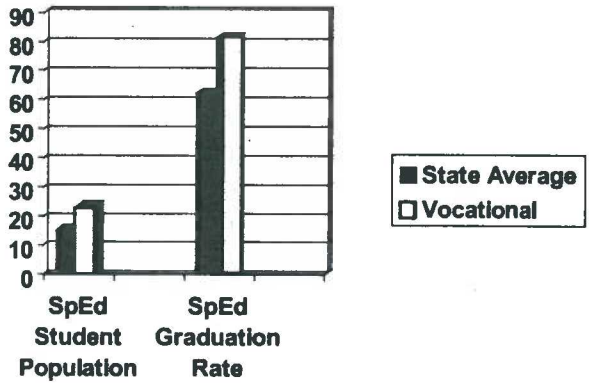
On this topic, a vocational school administrator says, "There were some things about low expectations that needed to be addressed. We could knock at least 30 points off a student's eighth grade MCAS scores just by putting them in an "applied" academic course for two years. The student didn't change; just what we were expecting of him went downhill from what he was capable of. The reality is that because of the material in "applied English" and in "applied math"—those kids didn't stand a chance, because they weren't being exposed to what they needed."

3.3 Success with Students with Special Needs

Massachusetts' regional vocational schools also have excellent success with their students with special needs, even though their populations of students with Individualized Education Plans (IEP's) are significantly higher than the state average. The average percentage of special needs students in the state is 17 percent, whereas the average percentage of students with special needs in the regional vocational schools is 24 percent, with four schools having greater than 37 percent of their students on IEP's, ranging up to 41 percent special needs students at Minuteman RVTHS. Nonetheless, the graduation rate of special needs students at vocational schools is almost 20 percent higher than the state average for special needs students: 82 versus 62.8 percent (see Figure C).

Figure C

Special Education Performance in Massachusetts Secondary Schools



Because of the larger number of students with special needs in VTE schools, the staff and faculty have created programs that are not usually available on a large scale at a high school level to address remedial academic needs.

Reading classes taught by reading specialists are a common feature of vocational schools, as are computerized reading laboratories using software such as Pearson's SuccessMaker™, along with specialized math courses in basic skills featuring programs like Riverdeep's Destination Math™ software, a program of sequenced, prescriptive instruction and assessments for students who need to reach grade level ability in mathematics. Once students have improved their skills, they are transitioned into mainstreamed courses as soon as possible. In addition to VTE schools addressing their students' academics deficits head-on, the curriculum and manner of learning at vocational schools can be conducive to the learning styles of students with special needs.

4. Concepts in Context

Students at vocational schools report that they want to do more than just "sit in a classroom." They appreciate the opportunity offered by career and technical education to learn by doing, and to understand deeply what Blue Hills RVTHS teachers call "concepts in context"[16]—like learning physics by studying how hydraulic brakes work, or knowing how to correctly frame a house because of a thorough understanding of the Pythagorean theorem.

David Hawkins, in his seminal essay, *I, Thou, and It*, might have been describing vocational education when he praised that "third thing which is of interest to the child and to the adult, in which they can join in outward projection."[17] That third thing—that "it"—is the in-depth study of skills that is the basis for career and technical education. Vocational education supports the philosophy that many students learn more effectively within a "real world" context—that is, within a "structured system of work-based and school-based learning" that involves schools working with employers within the local community to provide a career/employment context for the students' academic and vocational coursework.[18]

Every Massachusetts career/vocational technical school and agricultural technical school has, according to the regulations of Chapter 74, a General Advisory Committee. It is their responsibility to "advise the school committee, based on adequate and timely information, as to the planning, operation, and evaluation of vocational technical instruction provided by programs under its control". This committee is made up of the chairs of each of the Program Advisory Committees. Each program (shop) has its own dedicated group of advisors made up of industry professionals in the community or region who advise VTE teachers on the skills that will be most marketable for their graduates, "in light of workforce and job development demands or job market trends, technological developments, training alternatives and other factors affecting the quality of the program."[19]

Along with the advisory committees, vocational and agricultural technical schools have deep and useful ties to their communities. For example, the auto body and auto shops are open for residents to use for car repairs, and the cosmetology shops have regular days when they are open to the public for hair and nails, etc. District schools and municipal governments use the talents and equipment of the VTE graphics and print shops for their printing needs like forms, brochures, and even raffle tickets. When the public uses these services, they pay for material costs, but not for labor. Every VTE school with a culinary arts program has a restaurant that is open to the public, whose waiting lines are testament to the excellent quality of the food and service provided by the chefs-in-training. One famous alumnus of these programs is Emeril Lagasse, who learned to work effectively in a kitchen at

Greater Fall River Regional Vocational Technical High School.

Students in many shops go off-site often, to share their skills with the community and to get practice working in real-life settings. The health professions students rotate through area nursing homes, hospitals, and clinics, to learn about professional patient care, while the construction cluster students build, renovate, and improve both municipal and non-profit properties. Students from the various facilities maintenance programs regularly ply their trade not only by maintaining the interiors and exteriors of their own schools, but through the design, planting, and upkeep of public properties throughout their regions. Likewise, much of the interior and exterior painting of public buildings is done by students in the painting and design shops, and they learn about historical decoration by working on historic churches and other buildings. The professional-grade work of the students in the carpentry shops may be viewed and enjoyed throughout the Commonwealth in gazebos, bandstands, picnic groves and boathouses, along with cabins, lodges and other buildings at scout camps across the state.

Often, several programs will work together to complete large projects. For example, when Blackstone Valley Tech built a new school facility, they used the opportunity to have their own student electricians, plumbers, carpenters, metal fabricators, painters, and Heating, Ventilating, Air Conditioning (HVAC) technicians work alongside the subcontractors to complete the state-of-the art building. In Marlborough, the students in the construction cluster from Assabet Valley recently completed the redesign and renovation of the old central fire station for use as exhibition and office space.

At successful vocational schools, though, integration of academic and vocational skills means that students are given the tools to succeed either in the world of work or in college. The idea is that while students are learning skills in an authentic environment, they should also be learning that reading and writing; algebra, geometry, and trigonometry; biology, chemistry, and physics; history and social science each has a place in the learning they are achieving in their shops or career education.

At successful vocational schools... integration of academic and vocational skills means that students are given the tools to succeed either in the world of work or in college.

The key to this system, though, is that it is true situated learning. It is what Brown, Collins and Duguid, in their study of "Situated Cognition and the Culture of Learning," describe as cognitive apprenticeship. To them, the term apprenticeship emphasizes "the centrality of activity in learning and knowledge, and highlights the inherently context-dependant, situated, and enculturating nature of learning."[20] The theory behind the cognitive apprenticeship is being utilized in its fullest sense in integrated academic-vocational situations. The teachers first "make explicit their tacit knowledge," then model its use in authentic activities, then support and finally empower the students to use that knowledge in independent authentic activities. By further physically placing the learning experience within the environment of career education, the goal of the advocates of situated learning—making knowing and doing inseparable—has been reached.

The term "student-centered" is widespread in the literature of school reform, but one rarely encounters a definition of what that really means. In the world of career and technical education, though, the term means something. "Student centered" in these programs means that

because of the nature of academic and vocational integration, teachers are forced to do more than lecture, and are encouraged to take on the role of instructional coach as often as possible. Information gleaned from a student survey taken at highly improved vocational schools indicates that successful students consider such things as cooperative learning, laboratory activities, student participation in decisions about achievement goals, mathematical models and the creation of a plethora of products to demonstrate their expertise, to be examples of student centered activities which were a part of their everyday educational experience.[21]

On that same survey, teachers were asked on what types of activities they had placed an increased emphasis since their school had started focusing on high expectations. Their responses included engaging students in learning activities that involve academic content, using manipulatives and hands-on experiments or projects to make content more concrete, students doing joint assignments in which they work with an academic and a vocational teacher, and having students write in shop to clarify and communicate their ideas. Further, these teachers reported an increase in instances of: asking students to use mathematics to solve challenging real-world problems; the amount of time students spend on assigned reading; and encouraging students to take greater responsibility for their learning.[22]

4.1 Student Products and Performances

Because of the hands-on nature of vocational education, the creation of products and demonstrations should be a natural phenomenon, but it must be encouraged. One method for this encouragement is to offer activities and opportunities that will prepare the students from the time they arrive at high school for a major project in their senior year. A majority of vocational schools in Massachusetts require that all students produce a senior project and/or a portfolio, as a requirement of graduation. This is, of course, recognizable as a key element of many school reform programs; however, in the context of career or vocational education, the senior project takes on a much greater significance. When a student has spent four years becoming an expert at a trade while at the same time completing a program of rigorous academic study, he/she deserves a chance to display his/her accomplishments.

The senior project is an opportunity for students to combine their knowledge and skills to show what they have learned in their high school career. The student can choose an area of interest, as long as it is related to his career education, conduct in-depth research, and demonstrate problem solving, decision-making and independent learning skills. It helps to make the senior year one of challenging courses and practical experiences that prepares students for the world of work or further education.[23] Most importantly, though, it demonstrates to the student and to the community how his/her integrated program of academic and vocational studies has given him/her the tools to create a major, professional product and to deliver a professional presentation, usually complete with PowerPoints, models, and intricate handouts.

Senior projects, as practiced at vocational schools, involve several steps. First, the student selects a topic, gathers information, writes a research paper and keeps a portfolio of project activities. Second, the student produces a product that applies some aspect of the research. Third, the student makes a formal presentation to a panel composed of teachers and community leaders who know about and are interested in the topic. After the presentation, members of the senior project panel ask questions about the research and the product, find out what the student learned during the project, and review

the student's portfolio. During the yearlong process of producing the senior project, each student meets periodically with a teacher who has been designated a senior project adviser. In addition, the student may work with a project mentor from the community who has expertise in the student's field of study.[24]

The creation of this major authentic assessment tool has many benefits, including teaching students to plan in order to meet deadlines and to manage a project successfully. It also creates opportunities to gather information, integrate academic and vocational studies, develop verbal and nonverbal communication skills and feel a sense of accomplishment and camaraderie (and commiseration) with fellow seniors. The project system fosters a collegial atmosphere among faculty and the professional community when, on demonstration day, they all come together to judge and to celebrate the accomplishments of their seniors. The senior capstone project, a culmination of the students' four years of academic and vocational studies, is a way for them to go out with a bang instead of a fizzle, as well as being an inspiration for students to continue with rigorous studies after they have successfully completed their MCAS requirements in 10th grade.

4.2 Integrating Academic and Technical Studies

Some vocational schools use a system of cross-visitation among academic and vocational teachers as a basis for effective professional development. Not only can the vocational teachers observe what is expected of their students in academics and how their colleagues interact with their mutual students, but academic teachers can see that what goes on in the shops involves math, English and science. The most significant benefit of teachers visiting the shops is that they can observe how very differently their students, even those they had thought of as troublesome, behave in shop. When academic teachers observe those students whom they had held in low esteem in their classrooms easily take apart and reassemble a freezer, or machine a set of tools, or expertly perform cardiopulmonary resuscitation (CPR), suddenly their impression of these lower–performing students changes, and their expectations for their other school work are raised. These cross-visitations can suggest myriad teaching opportunities for all involved, and the experience of observation leads to cooperation and integration.

Successful VTE schools use the unique opportunities offered by their distinctive structure to teach their faculties to use each others' strengths to improve their professional practice, and ultimately their students' outcomes. One of the top VTE schools in the state, Blackstone Valley RVT, is an example of excellent academic-vocational integration. The Valley Tech faculty works together to merge academics and vocational training by emphasizing reading, writing, and math skills across the academic and vocational curricula.

Vocational-technical schools... should be used as models of how schools can turn around the performance of underserved student populations, and their methods should be viewed as viable turnaround techniques for currently low-performing schools.

Valley Tech assembled multi-disciplinary teams to identify specific areas in need of improvement, by evaluating MCAS data for each discipline and identifying student weaknesses in basic skills. The teams then created teacher "toolboxes" to address those weak areas. The teams assembled informational binders divided into three sections: a how-to section on basic skills; practice problems/exercises for rote

skills; concrete applications for integration into other subjects. Teachers worked together to develop specific examples of how to apply the concepts in different class settings. For example, proportions might be reinforced in auto shop with algebra problems asking students to figure the rate at which a car is burning oil or losing tire tread, and a machine shop instructor might ask students for daily written reflections of their work. The development teams trained the entire staff in how to use the toolboxes before their implementation system wide. All teachers, for example, received training in the John Collins writing method—a strategy used in most VTE schools—enabling them to consistently use the same writing rubric in every academic and vocational classroom. The toolbox as a whole is a way of bringing everyone onto the same page and giving them a common language.

4.3 High Schools That Work

To further formalize teacher development for academic/vocational programs, fourteen Massachusetts schools with VTE programs, including Blackstone Valley Technical H.S., have chosen to join with over 1,100 schools nationwide in becoming members of *High Schools that Work* (HSTW).[25] This is a program that was developed in 1987 by the Southern Regional Educational Board (SREB) within its State Vocational Education Consortium, as a framework of goals and key practices to raise student achievement. Local and national test scores indicate that relative achievement levels tend to drop toward the end of the middle school years, and stay down. High Schools That Work, as its name implies, addresses this issue by focusing on secondary level reform—specifically for vocational schools. The American Federation of Teachers (AFT) endorsed the program, indicating that it shows significant evidence that it met their criteria of high standards: effectiveness, replicability, and strong support structures.

HSTW's mission is "to improve the way all high school students are prepared for work and further education," and its concentration is on "high school students who seldom are challenged to meet higher academic standards."[26] The majority of the member schools are vocational in nature, or have a large vocational-technical element. When a vocationally-based high school chooses to contract with HSTW for school improvement programs, it is provided services and resources, including specialized research pieces written by teachers for teachers cover such diverse topics from students using technology in studying environmental science, to how weather projects can help hone students' mathematics skills, to how students can learn space-age technology through building a solar-powered car.[27]

HSTW's research shows that the most successful vocational sites are those that most fully integrate college-preparatory level academics with vocational courses. This would, of course, coincide with current theories of situated learning, but there is much more to the structure than that. The resulting changes in the proportion of students perceiving that their academic and vocational teachers were working together to improve students' mathematics, reading, and writing skills had almost as much positive effect in the statistical model as actual changes to make curriculum more rigorous.[28]

As for the more formal types of HSTW professional development: although teachers and administrators who have taken advantage of it report that it is the best they have ever experienced, much of the HSTW training occurs off-site, during summer institutes held in various southern states. Recognizing that any program that will produce results must have intense follow-up, however, HSTW sites build the capacity of teachers to train others, because the program acknowledges that any comprehensive professional development program includes

preparing "in-house experts." Another aspect of the formal professional development program is when other HSTW schools host site visits to display their best practices, as well as to hold workshops for and by other practitioners.

The students at HSTW sites also participate in extensive surveys about their perceptions of their educational experience, as do the teachers and administrative personnel. These surveys act as a sort of periodic instrument for reflection. When the data are returned to the schools, they may determine if what is perceived as being taught and expected is actually being received and internalized by the students. Although HSTW does not contain any radical ideas for school reform, it is, nonetheless, an effective program for systemic improvement. At vocational schools, it coalesces all of the notions and good ideas about improvement, keeps goals at the forefront of conversation, and offers practical, proven supports for putting them into effect.

4.4 Occupational Proficiency

Massachusetts CTE graduates and their employers are being given a unique tool, in the Massachusetts Certificate of Occupational Proficiency (COP) program. Approved by the Massachusetts Board of Education and entered into state policy in 2006, the COP, when fully implemented, will be not only a validation tool used to assess student performance, but also a powerful classroom tool to provide uniform CTE curriculum across the state. Starting soon, successful vocational students in Massachusetts will receive, in the COP, an additional recognition when they graduate: a credential that is not only recognized by industry but is backed by academic and professional standards.

The Certificate of Occupational Proficiency Project has an advisory committee modeled after the General Advisory Committee for Vocational Technical Education. The high point of the five-year COP effort so far has been the release of the Vocational Technical Education Curriculum Frameworks (VTECF) for approval and implementation by all Massachusetts vocational schools during the 2007-08 school year. The VTECF, which were developed by committees of educators and industry personnel across the state, form the basis for assessing students against specific benchmarks for the award of the Certificate of Occupational Proficiency. A second major part of the program, the Competency Technical Vocational Tracking System (CTVTS) is an electronic system that allows teachers to keep records of students' progress at meeting benchmarks and that electronically tracks portfolios.

The autonomy of the regional vocational technical schools has been an important factor in the rapid and measurable improvement of their programs

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The CTVTS went online in 2008, going through educator training, adjustments, and enhancements based upon feedback from the field. The frameworks and the tracking system are organized in 10 educational cluster areas and presently total 43 separate career curricula. They consist of two parts, cluster frameworks and occupational frameworks:

·Cluster frameworks include standards common to related occupations. (See Appendix B for a list of clusters and their related trades.) For example, a cluster framework skill for the Business and Consumer Services Cluster (which includes cosmetology, office technology, marketing, and fashion technology) is 2.E.04, "compare and contrast skills used to participate effectively in meetings and online meetings." A cluster framework for the Construction Cluster (encompassing carpentry, cabinetmaking,

electricity, facilities management, HVAC, masonry, painting, plumbing, and sheet metal) is 2.A.04, "determine true measurements from a print using an Architect's scale".

· Occupational major frameworks include all the skills learned within a specific program. Each of the career curricula contains four common strands: Health and Safety, Employability, Management and Entrepreneurship, and Underlying Principles of Technology. A fifth strand is industry validated and integrates embedded academic knowledge, skills and competencies. It also refers CTE instructors to the previously released Massachusetts Curriculum Frameworks in Arts, English Language Arts, Foreign Languages, Comprehensive Health, Mathematics, History and Social Science, as well as Science and Technology/Engineering.

The *Vocational Technical Education Curriculum Frameworks* offer extensively detailed guidance for education professionals. Unlike their companion academic frameworks, all of the strands contain sample performance tasks and indicators, and most include an extensive "crosswalk" of specific resources (including call numbers for books, binders, and videos) that address each standard. Also, unlike the academic frameworks, each vocational framework also includes the recommended sequence for acquisition of the knowledge, skills, and competencies in each strand and the recommended industry standards and student credential for the program.

The vocational frameworks have several direct benefits for VTE programs—and by extension employers and post-secondary programs—throughout the state, by allowing absolute alignment to the same VTE curriculum format; transferability among programs statewide; common terms, goals and program elements; and perhaps most importantly, legitimizing vocational programs to put them on an equal footing with previously published state academic frameworks.

5. Vocational-Technical Schools and Accountability

Nineteen of the 29 regional career and technical education high schools were audited by the Massachusetts Office of Educational Quality and Accountability (EQA). While most of them were judged through the audit process to be performing adequately, five schools were put on "watch" by the overseers of the agency, the Education Management Audit Council (EMAC), the EQA's governing body. As are all districts on "watch," the districts were given specific suggestions for improvement, and the superintendents were supplied with experienced coaches, who helped them to implement the necessary changes to bring their regional districts up to a satisfactory level of teaching and learning. The districts were then re-audited, and by 2007, each was subsequently removed from "watch" status, and their reports were accepted by the EMAC.

The audits are not only helpful to those VTE schools that were found wanting in their preliminary audits, and subsequently went on and came off of watch. Former Superintendent Wilfrid Savoie, who led Blue Hills Regional Vocational Technical High School for 16 years, served as a senior examiner and coach for EQA on several of the VTE school audits. An active member of the Massachusetts Vocational Association (founded 1930), he indicates that many VTE superintendents used the audits to drive improvements in student achievement on both the academic and shop sides of Vocational-Technical schools.

As a result of the EQA report findings, typical actions taken by VTE superintendents and their staffs have been: developing action plans that identified the EQA standards/indicators receiving "unsatisfactory" or "needs improvement" ratings and identified corrective steps and the documents providing evidence that those steps had been taken; placing and identifying in the school improvement plan (SIP) the EQA standards/indicators receiving "unsatisfactory" or "needs improvement" ratings with the updated SIP, then delineating action steps, time-lines and responsible party(s); establishing early predictors of student difficulty with the MCAS test, (such as the Stanford 10 standardized achievement test), providing student academic achievement data to both academic and vocational teachers in order to stress the joint responsibility for academic achievement, and then providing early interventions. They have also implemented suggested strategies, such as aligning curriculum and evaluating levels of rigor, updating text books, increasing academic staff to provide broader course offerings and reduce class size, integrating academic and vocational instruction, implementing senior projects and production projects, reading and writing across the curriculum, increasing staff development to implement new strategies, creating smaller learning communities and advisory committees, and increasing national and state industry third party credentialing of staff, students and programs. These independent EQA audits, along with the vocational-technical schools' embrace of rather than resistance to accountability, provided invaluable assistance to VTE schools in implementing needed reforms and best practices to drive student achievement.

6. Funding

The per pupil expenditures for regional vocational technical high schools in Massachusetts average $16,945 per pupil, ranging from $13,374 at North Shore RVTHS to $26,971 at Tri-County RVTHS. Some of these higher costs are a result of the significantly higher special education populations in these schools; but also, in contrast with the average statewide academic expenditures of $11,870 per student, vocational schools must equip their shops with the sophisticated technical equipment needed to assure training to industry standards. These costs are often off-set by in-kind contributions to the career and technical programs by those industries that will benefit from the professional training of the graduates of VTE schools. For instance, Ford Motor Company has donated over a million dollars worth of diagnostic computers and equipment to the Automotive Technology shop at Assabet Valley RVTHS. Likewise, hospitals regularly donate state-of-the-art equipment to train the Health Assistants students in CTE programs, and Intel Corporation and other high-tech manufacturers regularly donate up-to-date computer equipment for Programming & Web Development, Information Technology and Networking, and Office Technology programs.

The regional vocational districts are funded through assessments based on attendance from the member communities in each region, Chapter 70 state funding, Perkins IV allocation and other grants, nonresident tuition (averaging ~ $15,000) and fees earned from programs offered to members of the community like evening adult education and post-secondary career and technical programs. Regional vocational district superintendents report that one of the most taxing aspects of their job is when, during budget season, they must meet with the finance committees, city councils, and town meetings of each member district, to present and justify their municipal assessment to support the budget of the school. This can mean negotiating with up to a dozen municipalities simultaneously.

The Carl D. Perkins Career and Technical Education Improvement Act of 2006, a.k.a. Perkins IV, is a federal funding program monitored and administered by state education agencies. Massachusetts received and disbursed $18,392,738 in 2007, to both Chapter 74 schools and to eligible two-year post-secondary career and technical programs. Secondary schools receive a minimum of $15,000 and colleges receive a minimum of $50,000, but the average award for Massachusetts Chapter 74 high schools is $155,611, ranging from a high of $1,522,419 to Boston to a low of $15,000 to Central Berkshire. Specifically, vocational programs eligible for Perkins funds must offer a sequence of courses that provide individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions. Specifically, vocational schools eligible for Perkins funds must offer a sequence of courses that provide individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions. The programs must include competency-based applied learning, occupational safety and health, management and entrepreneurship knowledge and skills, and computer skills.

7. Conclusions and Implications

There are tremendous lessons to be learned from vocational-technical education in Massachusetts. The achievements and contributions of these schools set examples that should be studied as some of the most successful models of high school design.

As has been demonstrated, the unique combination of increased academic expectations and professional-level occupational training unite to make the century-old history of Massachusetts vocational-technical education a true American success story. The proper integration of vocational and academic programs are potent examples of whole school change, and the evolution of these important schools and programs has created a model for other secondary education institutions and for educational delivery in general.

· *Since 1962, regional vocational-technical schools have been models of how regional schools can thrive, while offering appropriate education for students from up to twenty communities. Since it is not unusual for twelve to eighteen municipalities to join together in these vocational-technical regions, legislators and small districts across the Commonwealth should look to them as the archetypes of how divergent communities can join together to create efficient, successful regional institutions for educating our children;*

· *As Massachusetts educators have begun to look at the addition of authentic assessments to supplement (but not replace) MCAS exams, they need look no further than the senior project programs that are graduation requirements at the majority of the Commonwealth's VTE schools. Faculty and administrators at these schools have developed systems and rubrics that could serve as anchors and best practice models for the state policy board or any school wishing to add this aspect of assessment to their programs;*

· *Vocational-technical schools have demonstrated remarkable academic and occupational-education successes with hard-to-serve populations. As such, they should be used as models of how schools can turn around*

the performance of underserved student populations, and their methods should be viewed as viable turnaround techniques for currently low-performing schools. Those district high schools that already have Chapter 74 programs in place (see Appendix A) should use the models of integration, individualized intervention and remediation, and cognitive apprenticeships that are hallmarks of high-performing autonomous regional vocational-technical schools, as a means for improvement and, if needed, turnaround for their schools;

· Because of the success of VTE and Career and Technical Education (CTE) schools with at-risk students, urban centers should consider opening charter high schools based on the vocational-technical and career education model;

· The autonomy of the regional vocational technical schools has been an important factor in the rapid and measurable improvement of their programs. Those vocational schools that are imbedded in urban districts should be given the autonomy that exists in the regional schools to make the changes and improvements that have been so successful in their sister institutions;

· The success of technical career education at the regional VTE schools should encourage the possibility of creating specialized education programs based on the vocational model for student with other kinds of talents/interests, such as the visual and performing arts.

· VTE and CTE schools have enviable relationships with businesses, not only in resource development, but as advisors on the skills and knowledge that employers need and are searching for in Massachusetts high school graduates.

8. Endnotes

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Appendix A

MA Chapter 74 Programs

REGIONAL VOCATIONAL TECHNICAL SCHOOLS

Assabet Valley Regional Vocational School District
Bay Path Regional Vocational Technical High School
Blackstone Valley Regional Vocational Technical High School
Blue Hills Regional Technical High School
Bristol-Plymouth Regional Technical School District
Cape Cod Regional Technical High School
Diman Regional Vocational Technical High School
Franklin County Technical School
Greater Lawrence Technical School
Greater Lowell Regional Vocational Technical School
Greater New Bedford Regional Vocational Technical High School
Minuteman Regional High School
Montachusett Regional Vocational Technical School
Nashoba Valley Technical High School
North Shore Technical High School
Northeast Metropolitan Regional Vocational School
Northern Berkshire Vocational Regional School District
Old Colony Regional Vocational Technical High School
Pathfinder Regional Vocational Technical High School
Shawsheen Valley Technical High School
South Middlesex Regional Vocational Technical School
South Shore Regional Vocational Technical School District
Southeastern Regional Vocational-Technical School
Tri-County Regional Vocational Technical School District
Upper Cape Cod Regional Technical School
Whittier Regional Vocational Technical High School

INDEPENDENT VOCATIONAL HIGH SCHOOLS

Smith Vocational and Agricultural High School

DISTRICT VOCATIONAL HIGH SCHOOLS AND DISTRICT HIGH SCHOOLS WITH VOCATIONAL PROGRAMS

Attleboro Vocational Technical High School
Brockton High School
Center for Technical Education at Leominster High School
William J. Dean Technical High School*
Dighton-Rehoboth Regional Vocational High School
Everett High School

Lynn Vocational Technical Institute*
Madison Park Technical-Vocational High School*
Malden High School
Martha's Vineyard Regional High School
Medford Vocational High School
Newton North High School
Peabody Vocational High School*
Pittsfield Vocational Technical High School*
Plymouth South High School
Putnam Vocational Technical High School*
Quincy Center for Technical Education*
Rindge School of Technical Arts
Salem High School
Silver Lake Regional High School
Somerville High School
Tantasqua Technical School
Waltham High School
Westfield Vocational Technical High School*
Weymouth High School/Vocational Technical High School
Worcester Vocational High School*

AGRICULTURAL HIGH SCHOOLS

Bristol County Agricultural High School
Essex Agricultural and Technical Regional High School
Norfolk County Agricultural High School

Appendix B

Massachusetts Vocational Program Name by Cluster and # of Programs in MA Vocational & District High Schools

Agriculture & Natural Resources Occupational Cluster	
Agricultural Mechanics	3
Animal Science	4
Environmental Science & Technology	4
Horticulture	18
Arts & Communication Services Occupational Cluster	
Design & Visual Communications	17
Graphic Communications	40
Radio & Television Broadcasting	3
Business & Consumer Services Occupational Cluster	
Cosmetology	38
Fashion Technology	5

Marketing	27
Office Technology	17
Construction Occupational Cluster	
Cabinetmaking	3
Carpentry	53
Electricity	44
Facilities Management	10
Heating - Ventilation - Air Conditioning - Refrigeration	19
Masonry & Tile Setting	8
Painting & Design Technologies	5
Plumbing	26
Sheet Metalworking	6
Education Occupational Cluster	
Early Education and Care	22
Health Services Occupational Cluster	
Dental Assisting	6
Health Assisting	39
Medical Assisting	6
Hospitality &Tourism Occupational Cluster	
Culinary Arts	52
Hospitality Management	5
Information Technology Services Occupational Cluster	
Information Support Services & Networking	20
Programming & Web Development	16
Manufacturing, Engineering & Technological Cluster	
Biotechnology	3
Drafting	28
Electronics	29
Engineering Technology/Pre-Engineering	27
Machine Tool Technology	27
Major Appliance Installation/Repairing	2
Metal Fabrication & Joining Technologies	35
Robotics and Automation Technology	2
Stationary Engineering	1
Telecommunications - Fiber Optics	2
Transportation Occupational Cluster	
Automotive Collision Repair & Refinishing	37
Automotive Technology	54
Diesel Technology	3
Marine Service Technology	2
Power Equipment Technology	3

Appendix C

Enrollment in MA Regional Vocational Technical Schools

	Enrollment	
	2006	2007
Total	**26,585.4**	**26,918.9**
Greater Lowell Voc Tec	2,032.2	2,018.4
Northeast Metro Voc	1,966.0	1,994.1
Southeastern Reg Voc Tech	1,669.6	1,599.9
Montachusett Voc Tech Reg	1,330.7	1,377.3
Blackstone Valley Reg	1,263.8	1,301.6
Blue Hills Voc	1,288.0	1,281.5
Franklin County	1,229.3	1,243.5
Upper Cape Cod Voc Tech	1,194.9	1,240.9
North Shore Reg Voc	1,077.1	1,140.0
Greater Fall River	1,086.4	1,128.5
Minuteman Voc Tech	1,102.6	1,071.8
Bristol-Plymouth Voc Tech	904.6	968.2
Southern Worcester Cty VT	939.1	947.2
Essex Agr Tech	853.8	904.2
Greater New Bedford	810.5	834
Old Colony Reg Voc Tech	710.5	686.7
Norfolk County Agr	672	678.3
Tri County	714.4	677.4
Assabet Valley	640.8	650.3
So Middlesex Voc Tech Reg	622.1	638.2
Shawsheen Valley Voc Tech	542.8	588.2
Cape Cod Region Voc Tech	580.8	581.6
Whittier Voc	585.5	565
South Shore Reg Voc Tech	526.2	515.3
Bristol County Agr	489.1	505
Pathfinder Voc Tech	459.9	459.4
Greater Lawrence RVT	452.4	456.7
Northern Berkshire Voc	415.2	434.7
Nashoba Valley Tech	425.1	431

Appendix D

DIFFERENCES BETWEEN APPLICATIONS AND AVAILABLE PLACES AT SAMPLE MASSACHUSETTS VOCATIONAL TECHNICAL PROGRAMS (CLASS OF 2012)

MA Vocational Technical Program	Number of Applications	Available Spots	Difference
Assabet Valley RVTS	300	250	+50
Blackstone Valley RVTHS	700	300	+400
Blue Hills Regional VTHS	400	235	+235
Bristol-Plymouth Regional VTHS	588	346	+242
Essex Agricultural and Technical HS	420	130	+290
Minuteman RVTS	260	220	+40
Norfolk County Agricultural High School	330	120	+110
Northeast Metro-Tech RVTHS	700	330	+370
Northern Berkshire (McCann) RVTHS	182	140	+142
Shawsheen Valley Regional VTHS	700	335	+365
Tri-County Regional Vocational Tech HS	460	250	+210
Worcester Technical High School	821	400	+421

Appendix E

Secondary-Postsecondary CVTE Tech-Prep Consortium Membership List 2008-2009

Berkshire Community College Consortium

Central Berkshire RSD
Northern Berkshire RVTSD
So. Berkshire Perkins Consortium (Berkshire Hills RSD, Lee SD, Lenox SD, So. Berkshire RSD)
Pittsfield SD

Bristol Community College Consortium

Attleboro SD
Bristol County Agricultural SD
Bristol-Plymouth RVTSD
Dighton-Rehoboth RSD
Fall River SD
Greater Fall River RVTSD
Greater New Bedford RVTSD
New Bedford SD
Old Colony RVTSD
Taunton SD

Bunker Hill Community College - Roxbury Community College Consortium

Boston SD
Brookline SD
Cambridge SD
Medford SD
Somerville SD
Watertown SD

Cape Cod Community College Consortium

Cape Cod RVTSD
Falmouth SD
Martha's Vineyard RSD
Plymouth SD
Upper Cape Cod RVTSD
Wareham SD

Greenfield Community College Consortium

Franklin County RVTSD
Northampton-Smith SD

Holyoke Community College - Springfield Technical Community College Consortium

Chicopee SD
Hampshire Perkins Consortium (Amherst-Pelham RSD, Easthampton SD, Gateway SD, Hadley SD, Hampshire RSD, Quaboag RSD, So. Hadley SD)
Holyoke SD
Lower Pioneer Valley Career and Technical Education Center
Pathfinder RVTSD
Springfield SD
Tantasqua RSD
Westfield SD

Massachusetts Bay Community College Consortium

Assabet Valley RVTSD
Blackstone Valley RVTSD
Framingham SD
South Middlesex RVTSD
Milford SD
Newton SD
Tri County RVTSD
Waltham SD

Massasoit Community College Consortium

Blue Hills RVTSD
Brockton SD
Hull SD
Marshfield SD
Norfolk County Agricultural SD
Quincy SD
Silver Lake RSD
Southeastern RVTSD
South Shore RVTSD
Stoughton SD
Weymouth

Middlesex Community College Consortium

Greater Lowell RVTSD
Lowell SD
Minuteman RVTSD [RHS]
Nashoba Valley RVTSD

Mount Wachusett Community College Consortium

Fitchburg SD
Leominster SD
Montachusett RVTSD

North Shore Community College Consortium

Beverly SD
Essex Agricultural & Technical SD
Gloucester SD
Lynn SD
Northeast Metro RVTSD
North Shore RVTSD
Peabody SD
Salem SD

Northern Essex Community College Consortium

Greater Lawrence RVTSD
Methuen SD
Shawsheen Valley RVTSD
Whittier RVTSD

Quinsigamond Community College Consortium

So. Worcester County RVTSD
Worcester