

FILLING THE SKILLS GAP

MASSACHUSETTS VOCATIONAL-TECHNICAL SCHOOLS AND BUSINESS PARTNERSHIPS

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EXECUTIVE SUMMARY

Steadily, by economic necessity, a change is taking place in our society. The belief that a young person must obtain a college degree in something (anything!) is giving ground to the necessity for a person to acquire skills. The recognition of the value of a career vocational technical education is on the rise. Society is recognizing that in today's economy, many graduates of four-year liberal arts colleges are looking for work, while students from career vocational technical schools are finding high-skill, high wage jobs. Why? Because they have marketable, industry-sanctioned competencies and employability skills.

The skilled labor shortage is a real problem for manufacturers, builders and technical service providers. Many are losing experienced employees to retirement and struggling to find qualified replacements. Their costs for training rise, their ability to expand is constrained and their ability to compete is weakened.

To remain viable those employers are turning to vocational technical schools. Much like professional baseball teams have Triple A affiliates for promising players, companies are investing in vocational technical schools to help train their future employees. They're creating a pipeline for talent to flow to their openings by providing schools with the latest equipment and software, helping to finance new facilities and partnering in co-op programs.

The schools welcome the investment. It enables them to keep pace with changes in the workplace, which are rapid and dramatic. Automotive technicians, to name just one vocation, aren't "gear-heads" in the garage any longer. There is less turning of wrenches in the job and more analyzing the sophistication of the computerized diagnostic equipment that goes into it.

Through the partnerships with employers vocational technical schools become more vital contributors to the regional economy. The skills they teach in computer assisted design or machine technology can help fill openings among local

plastics manufacturers in western Massachusetts. Creating a first-of-its kind aviation program can train students for opportunities in the aviation cluster in the Pioneer Valley. And the training students receive on new computer-controlled lathes and milling machines enables them to step into jobs at the machine shops of Franklin County or in the Blackstone Valley.

These students aren't trained to be \$600,000 surgeons. But if they can master the software used on a factory floor or become a trained engineering or bio-technician, they can earn an income that is approximately what they would receive graduating college with a bachelor's degree. Their skill sets are valued and the opportunities for employment can be abundant.

This paper looks at how vocational technical school leaders, principals and teachers are building relationships with businesses and employers. It includes several case studies from Massachusetts vocational technical high schools that show how these partnerships work and the players involved. Through these connections, Massachusetts' young people establish a foundation for their futures, employers maintain their operations, and vocational technical education grows in importance in today's economy.

“...by many measures, the United States is failing to develop the talent that US businesses need to compete in the modern global economy. For instance... more than 95 percent of CEOs indicated that their companies suffer from skills shortages.”¹

– Business Roundtable, *Taking Action on Education and Workforce Preparedness*
October 2013

INTRODUCTION

When President Obama selected just one high school in the nation at which to deliver a commencement address in 2014,² he chose Worcester Technical High School, in Worcester, Massachusetts; a uniquely successful district vocational school that owes much of its turnaround from a low-performing school to a level one school to the support of the Worcester business community.

In 2006, frustrated by a shortage of skilled workers in the Worcester area, local businesses donated time and money to a new state-of-the-art campus to replace the aging trade school. Led by Edwin (Ted) Coghlin, chairman of Coghlin Electric in Worcester and the Worcester Tech board of trustees, the fundraising included \$3 million that was leveraged into a \$30 million fund with state money to purchase the latest computer and information technology equipment.³ The new attention has transformed the school. Worcester Tech’s dropout rate has fallen from 4.7 percent in the 2003-04 school year to 0.5 percent in 2012-13. Not only was it well below the district average of 3.4 percent, it was the lowest among the city’s seven high schools.⁴

In today’s global economy, it is no longer possible for the United States to maintain its competitive advantage without tapping into the potential of all of its workers. Every student who chooses career training through a career vocational-technical education (CVTE) system, must be equipped with skills that are more sophisticated and advanced than those required in the

industrial, manufacturing-based economy of vocational schools of 60 years ago.

No group understands this challenge more than our nation’s manufacturers. To compete with global manufacturing giants like China, Germany, and Japan, they are constantly upgrading their physical plants, modernizing systems, and adopting new processes. But their investments are often undermined by a lack of qualified workers to operate their production facilities. To offset that shortage, many are collaborating with vocational-technical schools to ensure their students are ready to work upon graduation. They offer industry expertise as members of school advisory boards. They donate sophisticated training equipment to school technical programs; they team up on new technical programs and provide funds for startups.

These collaborations have become vital to employers across Massachusetts because many are in need of new employees. Their businesses are expanding and their current staffs are aging and retiring. It’s estimated that 100,000 skilled advanced manufacturing positions will be created before 2020. More than 7,000 manufacturing firms have operations in the Bay State, creating 250,000 jobs with an average annual salary of \$75,000.⁵

The skills needed for even the most conventional manufacturing jobs have changed dramatically as companies have incorporated new technology into their operations. Vocational-technical schools have kept pace through new partnerships with local employers. Students who want to

improve their employment prospects by obtaining concrete skills are choosing vocational-technical programs and staying in school.

Vocational-technical schools have also become part of the local economy through services provided by their students. Car repairs at the school auto body shop; hair and nails treatments at the cosmetology shop; and printing services from the print shops are available through vocational-technical schools. Even public restaurants at schools that offer a culinary arts program give students an early start on learning the hospitality industry while being part of the local business community.⁶

TODAY'S CAREER VOCATIONAL-TECHNICAL SCHOOLS

Career vocational-technical schools were once considered ideal for students who only planned to work in the trades and not continue to college. Not any longer. More than 60 percent of Massachusetts' vocational-technical students go on to post-secondary education. A greater number attend post-secondary training through continual learning and professional development related to their careers. Yet the schools still combine rigorous conceptual class work with practical application. Majors in traditional trade programs such as carpentry, auto tech, health services and cosmetology are offered along with robotics, biotechnology, advanced manufacturing, electronics and engineering.

“When students in all our vocational schools cross the stage in June and accept their diplomas from high school, they can actually do something,” says James Brosnan, superintendent of McCann Technical School in North Adams. “They can be an electrician or a plumber or whatever. Other kids who cross the stage in high school can go on to the next level of education. Our students can do both.”⁷

All Massachusetts CVTE high schools have advisory councils of 10 to 15 community members, including local tradespeople, practitioners, and business owners and managers.

Each career-technical program has its own dedicated team of advisors, as well. The role of each advisory council is to ensure that the school's programs are state-of-the-art, to assist the superintendent in forecasting capital equipment needs, to maintain relevance of the equipment and curricula and to help build stronger business-school partnerships.

Advisory councils are an important way for businesses to partner with CVTE schools. They not only advise the shops, but act as their champions in the community. They offer co-ops and internships to the students and, in many cases, offer employment after graduation. Waters Corp. of Milford, Massachusetts, for example, has always had an employee on the Blackstone Valley Tech Machine Technologies Advisory Board. At the time of publication there were approximately 60 Blackstone Valley Tech graduates working in various capacities at Waters.

Working together, vocational technical school officials and local employers have implemented a change in education delivery that has produced significantly lower dropout rates than comparable traditional high schools. The statewide dropout rate at regular/comprehensive high schools averaged 2.2 percent in 2012-2013, but was only 1.1 percent among the 39 CVTE schools and averaged a mere 0.7 percent among regional CVTE schools.⁸ In Springfield, Putnam Vocational Technical High School's 0.7 percent dropout rate was well below the district average of 6.7 percent in the 2012-2013 school year.

According to the United States Department of Education, as found on the Office of Vocational and Adult Education website, federal involvement in CVTE, via the Carl D. Perkins Vocational and Technical Education Act, is to help all students acquire challenging academic and technical skills and be prepared for high-skill, high-wage, or high-demand occupations in the 21st century global economy.⁹ The latest \$1.123 billion proposal for funding of the Perkins Act recognizes that effective, high quality CVTE programs are aligned with career- and

college-readiness standards as well as the needs of employers, industry, and labor.¹⁰ So on the federal level, the CVTE focus is on ensuring that students are well prepared for further education, life-long learning, and satisfying careers. However, the deadline for Perkins re-authorization passed in June, 2013, and although

the Act is still funded, there is bi-partisan reluctance to re-authorize it until Congress is comfortable with proposed priority changes, including the administration's suggestion that portions of the funding formula be withheld for competitive grants, which would harm both rural, mid- and high-performing districts.¹¹

Case Study: Franklin County Technical School

Career vocational-technical education programs play a critical role in educating and training our workforce and giving students the technical skills needed to succeed in today's job market. Vocational-technical programs in high schools increase student engagement and improve graduation rates. According to the Association for Career and Technical Education (ACTE), the graduation rate for students concentrating in career and technical fields is 90 percent compared to the national average of 78 percent. One Massachusetts school that recently got an extraordinary lift from the business partners in its Advisory Council is Franklin County Technical School in Turners Falls, Massachusetts. Its mills and lathes dated as far back as the 1940s, and the graduates who were being turned out did not have anywhere near the advanced manufacturing skills for which the industrialists—large and small—were clambering. The Franklin County Program Advisory Committee, including several business owners of precision manufacturing companies, went to work to modernize Franklin County's program, so it would teach the automated machine skills that are needed and in use today. Area machine shops were becoming reluctant to hire under-trained Tech School students, because companies would then have to spend a lot of time and money to train the graduates on modern machines and technology. For instance, although Franklin County Tech School students were learning programming and computer-aided designs in computer lab classes, they weren't able to log the necessary practice hours to be ready for post-graduation work because the shop only had only one computer-guided metal-working machine. The Machine Tech Advisory realized that creating a pool of ready-to-work graduates would set up new good-paying jobs for local graduates, and also enable manufacturing companies to grow, because the low number of qualified job-seekers had forced them to turn away potential work.

A coalition of advisors and community leaders formed, including 14 businesses, Greenfield Community College, the Franklin Hampshire Regional Employment Board and Franklin County Technical School. Steve Capshaw, owner of Valley Steel Stamp led the campaign among his fellow corporate leaders to raise \$500,000, plus \$217,000 in grants. The result was the updating and re-equipping the program, in an effort to help his industry grow by providing more qualified workers for his business and others in the valley.

The new equipment, obtained with a large discount from HAAS Automation includes precision computer-controlled lathes and milling machines. "It's the same type of controls that they would find in the world of work," Franklin County Superintendent James Laverty said. "If we are training students and they are not encountering things that they would find in the workplace, then we are not doing our job as a vocational technical school."

Support came not just from Valley Steel Stamp, but from other area industries such as Pioneer Tool, Bete Fog Nozzle, Hassay Savage Co., Sisson Engineering, Applied Graphics, Mayhew Steel, Small Corp., Hillside Plastics, Judd Wire, Production Tool & Grinding, Cohn & Co., Greenfield Co-Operative Bank and Greenfield Savings Bank.

SUPPORT FOR VOCATIONAL-TECHNICAL EDUCATION

Going forward, workers will increasingly require greater knowledge and more complex technological skills. State officials and the business community are both aware of the possibility that the shortage of skilled workers may worsen in the future and are working together with CVTE schools to address the problem. According to Secretary of Housing and Economic Development Greg Bialecki, “Manufacturing has a great future. They’re looking for more people to hire, and we want to tell people it’s a great career for [anyone] to consider.”¹²

The state, business, academia and the legislature developed a strategic plan entitled *Choosing to Compete in the 21st Century* to create jobs and drive economic development across the Commonwealth. As part of that effort, and with the belief that manufacturing is an important part of the state’s economic growth and stability, they created an Advanced Manufacturing Collaborative. The Collaborative is committed to building manufacturing industries that are globally competitive. The state’s quasi-public agencies have played a large part in these efforts:

- Mass Development’s *AMP it up!* campaign shows students, parents, guidance counselors and teachers how advanced manufacturing careers can put them on the path to success. *AMP it up!* is for students who are builders and problem solvers. It can provide schools with resources, and students with the guidance they need for jobs in fields such as high-tech processing, factory automation, product development and nanotechnology. They do this by helping students explore what it’s like to work at an advanced manufacturing company. They learn what they need to do to acquire the right skills and training, and see what opportunities may be out there waiting for them. The *AMP it up!* motto? “No one dreams of working in a cubicle.”

- The Commonwealth Corporation, another quasi-public organization, administers the Advanced Manufacturing, Technology, & Hospitality Training Trust Fund on behalf of the Executive Office of Housing and Economic Development and the Executive Office of Labor and Workforce Development. Just signed into law this August, the Fund was established to help meet the workforce pipeline needs of Massachusetts employers. The Fund supports training and education programs — especially in CVTE settings — that address the workforce shortages of the advanced manufacturing, mechanical and technical skills, hospitality, and information technologies industries across the state.⁹
- The Mass Life Sciences Center (MLSC) has been very supportive of CVTE schools, especially those starting engineering programs. MLSC’s Science, Technology, Engineering, and Math (STEM) Equipment and Supplies Grant Program enables the purchase of equipment and supplies so Massachusetts schools can train students in life sciences technology and research, and also addresses a capital funding gap for public and not-for-profit workforce training and educational institutions. Finally, the program seeks to support the implementation of state STEM standards and to increase student achievement and student interest in STEM. To date, the program has awarded more than \$8.4 million to 61 different Massachusetts high schools and organizations and leveraged more than \$1 million in matching funds from the life sciences industry.¹⁰
- Massachusetts Manufacturing Extension Partnership (MassMEP) gave rise to a business-led and very active Massachusetts Advanced Center Workforce Collaborative (MACWIC). Founded in February 2012, MACWIC has over 135 member companies, representing over 20,000

employees. The Partnership's mission is to facilitate employer-led workforce training and initiatives, with the goals of preserving manufacturing knowledge and transferring that knowledge to the current and future workforce. In partnership with Worcester Polytechnic Institute (WPI), MACWIC has developed an Applied Manufacturing Technology Pathway Certification, which is recognized by employers. MACWIC and WPI also make a "Curriculum in a Box" and Learn CNC software available for free to any CVTE school in Massachusetts that has a machine technology of manufacturing program. This program leads to additional MACWIC certifications. Through MACWIC, Siemens announced nearly \$660 million of in-kind software grants for manufacturing programs at vocational high schools and institutions of higher learning. Massachusetts students in the recipient institutions now have access to the same Siemens' product lifecycle management (PLM) software used in global manufacturing industries to design, develop, and manufacture a variety of sophisticated products.

- An active business-led group in Western Massachusetts that supports CVTE through various initiatives is the Western Mass Chapter of the National Tooling and Machining Association (WMNTMA). This geographical area is home to many manufacturers, and they've identified the need for skilled talent. The WMNTMA partners with vocational-technical schools in the Pioneer Valley Region in an effort to ensure that program graduates are prepared with the education and technical competencies they need for employment in precision manufacturing. WMNTMA has developed the Regional Precision Manufacturing Technology Advisory, to provide strategic guidance and support to the industry members on the Machine Tool Technology Program Advisory Committees (PAC's) at the technical/comprehensive

high schools in the Pioneer Valley Region. The technology advisory also helps them in collaborating with the administration and teachers in the successful operation of the Machine Tool Technology Programs. This approach has led to a pooling of resources to fund career technical shops with the equipment required to properly train the employees they will need to keep their businesses strong.

Much of what these groups do is public relations for career-tech education. Even huge multi-national corporations like Exxon Mobil have become players; they recently started a large, multi-media campaign called "Be an Engineer", aimed at young people. It shows how the many disciplines of engineering can be fun, exciting, and fulfilling. Like AMP it up!, the campaign hopes to convince students that their lives in STEM don't have to be spent in a cubicle. Engineering has become one of the most popular new programs for CVTE schools to open in the last few years, because there is such a demonstrated need for good people in that field.

THE VALUE OF CAREER VOCATIONAL-TECHNICAL EDUCATION

Increasingly, Massachusetts families are seeing that vocational-technical schools allow their children to simultaneously learn a trade and prepare for college. The rise in popularity has created waiting lists in the hundreds at many schools. In one Massachusetts vocational-technical regional district, 55 percent of the eighth grade students in the sending towns applied for places in the local regional vocational school's freshman class, resulting in a waiting list of 550 students for 300 spots.

Admission to all regional CVTE high schools is determined through a transparent process approved by the DESE. It includes a common rubric covering attendance; behavior; an interview consisting of publicized, common questions; grades; and counselor or middle-school team recommendation. There are no

entrance examinations or writing samples in the applications, nor are applicants' special needs standings or 8th grade MCAS scores made known before acceptance to the regional

vocational technical schools. This methodology, developed over decades, has produced graduating classes that have gone on to fill many of the most important jobs in the Commonwealth.

Case Study: Nashoba Valley Technical High School

Nashoba Valley Technical High School in Westford, MA is a CVTE school that has spent the last two decades growing from a school with a graduating class of 74 to having a freshman class of 200. With the constant input of their active Advisory Committees, Nashoba Tech has not been reticent to close programs that are not relevant to the local economy, and has used the knowledge and generosity of their business community advisors to open new rigorous and relevant programs. So programs like Horticulture, Upholstery, and Painting & Design have been phased out, and TV, Media/Theater Arts, Programming & Web Development, and Engineering have been opened.

Along with community and business supported expansions over the years, under the intrepid leadership of Superintendent Dr. Judith Klimkiewicz, in July of 2002, ground was broken on a \$25.5 million renovation and expansion project. It added two new wings to the existing building, as well as completely renovated and updated all technical program areas, critical infrastructure and academic classrooms. One program that benefitted tremendously from this was the Banking, Marketing & Retail program that has a very solid collaboration with the Lowell Five Cent Savings Bank. A full working branch was opened in Nashoba Tech, staffed by a full-time bank employee who works side by side with the career-tech students. In early 2014, a drive-up ATM on the school campus was opened, available to the public twenty-four hours a day, seven days a week. That's a first for a public school in Massachusetts.

Nashoba Tech's most loyal sponsor has been Juniper Networks, whose headquarters are adjacent to Nashoba Tech. Juniper's and Lowell Five Cent Savings Bank's generosity have earned both sponsorship placards on the main school sign in front of Nashoba. For many years, Juniper has been contributing computers, furnishings, and technical equipment, as well as funding, to its neighbor; and it is often Juniper that initiates the donations. When Nashoba Tech built its state-of-the-art Performing Arts Center and TV studio, it was Juniper that supplied the furniture for the theater; in return, they hold their yearly CEO meeting in the modern new facility.

The TV studio's industry-standard AVID Media Composer software was supplied by an Advisory member, who was instrumental in getting the TV/Media program approved by the Department of Elementary and Secondary Education (DESE).

The latest project at Nashoba Tech is the opening of their unique Engineering Academy. The Academy is a truly interdisciplinary project that combines what would be, in other vocational technical schools, the Drafting (which is universally Computer Aided Design [CAD]) and Electronics programs, with a fully DESE certified Engineering program.

The twist is that Nashoba Tech's Engineering Academy is a school within a school. The 30 students in the Academy are housed in one floor of one wing. They rotate among a dedicated group of teachers who teach all of the engineering modules of the nationally respected engineering curriculum, Project Lead the Way (Biotech, Aerospace, Geophysical, Environmental, Electrical, Mechanical, Architectural, Civil, and Telecommunications), as well as mathematics, science for engineering, and English.

The students join the general population for social studies, Spanish, and music. Nashoba Tech's interest in engineering began with their involvement--as it has with so many schools--in FIRST Robotics, which was and still is sponsored by their business partners, Raytheon and NASA.

By maintaining an open, fair and careful application process for regulation Chapter 74 schools, Massachusetts will continue to matriculate graduates who meet the high standards and work ethic required by the nation's employers, manufacturers, and institutions of higher learning.

Dr. Michael F. Fitzpatrick, Superintendent-Director of Blackstone Valley Regional Vocational Technical High School, and a nationally-recognized expert in CTVE, addressed the Massachusetts Board of Elementary and Secondary Education about the

reasons behind the success of the Massachusetts model of CVTE, in fall, 2014. Among his remarks:

*Research studies by multiple investigators have illustrated that successful CVTE programs require several driving forces, including, but not limited to, professional development, an integrated and applied approach to academics, and teaming. Massachusetts CVTE systems use aggressive professional development in the form of providing all staff members with new, relevant skills **validated by industry**. Instruction needs to reflect that which industry demands and expects of today's workers.*

Case Study: Westfield Vocational Technical High School

The Pioneer Valley in the central-west region of Massachusetts is home to an aviation cluster of airports, manufacturers, aircraft service centers and flight schools. This cluster could soon receive an infusion of skilled workers through collaboration with Westfield Vocational Technical High School, to start the state's first high school aviation technology program.

Since January of 2014, several companies, including Gulfstream Aerospace, Rectrix Aviation, Embraer Executive Jet, Bombardier and Mobius Works, as well as Massachusetts state officials, have been working with school administrators on the plan. With industry giant Boeing forecasting that the global aviation industry will need a million new pilots and maintenance technicians during the next 20 years,¹³ their goal is to see more students graduating from Westfield Vocational Technical High School ready to join the workforce.

"They're interested in a lot of our programs," says Stefan Czaporowski, principal of Westfield Vocational Technical High School. "We know that there is a huge shortage and they're willing to devote a lot of time to this because in the end it will benefit them," he adds.¹⁴

Westfield Vocational Technical High School, first opened in 1911, provides 11 vocational programs to 530 students including automotive technology, information technology, culinary arts and allied health. Like other secondary vocational technical schools in Massachusetts, it combines academic and technical courses to prepare students for careers or college.

Creating an aviation technology program makes sense considering the local economy. The Westfield-Barnes Airport is only seven miles from the school and more than 30 manufacturers are in the school's district. Bradley International Airport at Windsor Locks, CT, itself a hub of aviation activity, is less than an hour away.

Many of the advisory board members at WVTHS have connections with aviation in the area, either professionally or personally, and encouraged the creation of an aviation program. Rectrix, a private jet charter service, and Embraer, an aircraft manufacturer, have seats on the board, and Ed Watson, the chairman of the advisory board and CEO of Mobius Works, has a hanger at Westfield-Barnes. Four subcommittees were created among the board members including finance, technology, real estate and marketing. An aviation advisory committee was formed, chaired by Ken Dromgold, a pilot for Janus

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Corporation and a marketing plan was created by Janet Garcia, the director of marketing for Westfield State University.

The new aviation program is expected to be fully operational by January of 2016, at an estimated startup cost of about \$3.5 million.¹⁵ Czaporowski expects to fund it through public money, corporate grants and in-kind donations of equipment. The academics will be taught at the school, but the hands-on engine, electronics and body work will be taught at Westfield-Barnes Airport. There, the students will be located in Hanger 2, a 10,000 square-foot building constructed as a Works Project Administration project in the 1930's and donated to the school by Westfield officials. After applying to have the building declared a historical site, school officials received \$500,000 in funds from the Community Preservation Commission to make repairs to the exterior of the building.

Gulfstream, which has its New England office at Bradley International Airport, was the first private employer to make a financial commitment, promising to provide \$50,000 per year for four years to the program. But as of this publication, other companies were still waiting for the materials list to be drawn up before committing.

Textbooks range from \$40 to \$90 each. But other items are far more expensive. Czaporowski says the materials list includes two aviation simulators for \$5,500 each and a lab test engine for about \$205,000. The Massachusetts Department of Transportation is giving the school an RV4 plane frame that had been unused at another school. A tug to pull planes has been donated by a private party.

“We know we need money,” says Czaporowski. “We needed someone to start the ball rolling in terms of donations. We have that (from Gulfstream).”

Others involved in the program include the Federal Aviation Administration, which must approve the curriculum in order for the students to be FAA certified with an Airframe and Powerplant License when they graduate. The Massachusetts Department of Transportation has provided a grant of \$25,000 for the school to hire a consultant to guide it through the FAA process. Czaporowski expects the school to receive funding under the Perkins Act¹⁶ from the Massachusetts Department of Elementary and Secondary Education. The 104th Fighter Wing of the Massachusetts Air National Guard, located at Barnes, has two members on the Westfield advisory board, and the New England Air Museum in Windsor Locks, CT, has also said it will donate equipment.

With no other high schools in Massachusetts offering an aviation shop, Czaporowski visited other schools that had similar programs, including Nashua Community College¹⁷ in New Hampshire and Aviation High School¹⁸ in Queens, New York. Aviation High is a 2,200-student vocational technical high school near LaGuardia Airport that prepares students for careers in aviation maintenance and the aerospace industry. It has a waiting list of about 500 students, says Czaporowski, a promising sign that the program will be popular at Westfield.

“I would expect kids will want to come here from all over when we open this aviation program,” he says. “It’s a great career. It pays very well. If we’re the first program in the state, I would anticipate a lot of people wanting to come to it.”

Case Study: McCann Technical School

The Route 128 belt in eastern Massachusetts is internationally known as a high technology hub, but at the western end of the state, Berkshire County has its own industrial claim. The region has often been called the “plastics research technology center of the nation”¹⁹ because of the high concentration of plastics manufacturers among the Berkshire Hills. The county hosts more plastics firms than any other county in the nation with SABIC Innovative Plastics (formerly GE Plastics) as a core. The Berkshire Plastics Network has 42 member companies.²⁰

Since its opening in 1962 students graduating from the Charles H. McCann Technical School in North Adams have worked in local factories, providing a steady source of employees for local industry. Still, the rapid change in technology used by those manufacturers has created a challenge to find skilled labor as their businesses expand.

Two major software makers who sell to the smaller manufacturers of Berkshire County have the same concern. In 2013, Cimatron and Siemens PLM Software donated millions of dollars in specialized software to McCann. The gifts enable McCann students to use the same technology in their classrooms that companies throughout Berkshire County and around the globe are using each day to design products. The donation represents the sort of collaboration that private industry and vocational technical schools can make to train students for waiting jobs and bolster the local economy by helping manufacturers to compete.

“In Western Massachusetts we have a lot of the niche manufacturers that make precision pieces,” says James Brosnan, superintendent at McCann. “These are smaller companies that employ 25 to 40 people and who have a worldwide market of very sophisticated pieces. They need a very well-educated workforce.

“The companies know that for 50 years they’ve been dealing with McCann and they’ve gotten 50 years of McCann workers and they can keep replacing them because we keep producing them,” he adds. “For employers that’s good.”²¹

McCann connects with local manufacturers through its co-operative program and through their representatives on the school’s 22-member vocational advisory committee. Brosnan says about 35 to 40 companies participate in the co-op program, which is open to qualified students during the second half of their junior year and during their senior year. In the fall of 2014, 32 McCann students were working with companies on co-op.

McCann also connects with companies through Project Lead the Way, a national science, technology, engineering and math program that prepares students for high tech careers. Students at McCann create tech projects that are viewed by professionals in the field and they earn articulation credits to colleges such as Worcester Polytechnic Institute and Rochester Institute of Technology.

In fact, McCann’s participation in Project Lead the Way prompted Siemens to contact the school about donating its software. Siemens NX software was awarded to McCann through Siemens’ “GO PLM” grant program. In addition to using the software in class, school officials plan to host a “manufacturing summer camp” to introduce students in the fifth, sixth and seventh grades to modern manufacturing.

The Cimatron donation came about after the vice president of engineering at Cimatron visited a local company that uses his company’s software and learned that many of the employees there were McCann graduates. Intrigued, he visited the school and offered to donate 25 seats of the CimatronE software. Computer-assisted design students use it to design injection molds. Machine technology students use it to provide the automated manufacturing code that allows the part or component being milled, drilled

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or cut to the specifications required to make the part. It also allows students to use advanced machining simulation before actually operating the CNC equipment on the shop floor.

“Because we have the equipment and latest software, having a co-op student from McCann is very desirable,” says Brosnan. “That 17 or 18 year-old senior is able to bring the latest techniques in and on a number of occasions they have helped train the workforce. Employees who are 40 or 50 years old might receive training from a 17- or 18 year-old. We think that’s terrific because it helps with the student’s maturation process.”

The challenge for the manufacturing sector today is to make it attractive to younger workers. Brosnan points out that it is not the factory of old, where someone stands at the same machine all day while someone else stands at another machine. Today, with computer numerical code manufacturing centers, one person is responsible for multiple machines, inputting the process, making sure the product is there and making program changes.

“So instead of having four or five people on a hand machine, you have one person that has to have software programming knowledge for that equipment, as well as the product and the metallurgy and more,” he says. With the more sophisticated demands of the new economy in mind, curriculum in the CVTE setting must be viewed as an active process which promotes vigorous, thought provoking, facilitating, and individual assessment activities to develop each student’s potential as a learner. Students must be given the opportunity to acquire an understanding of the technical application of the science, technology, engineering and math (STEM) processes essential to their given trade areas and to improve their total skills if they are to reach their individual potential in the new workplace. The vocational technical education environment is made for authentic learning in STEM, and science, math, and engineering processes are integrated in every career technical shop, as well as each academic classroom.

CONCLUSIONS AND RECOMMENDATIONS

With the more sophisticated demands of the new economy in mind, curriculum in the CVTE setting must be viewed as an active process which promotes vigorous, thought provoking, facilitating, and individual assessment activities to develop each student’s potential as a learner. Students must be given the opportunity to acquire a full understanding of the technical and mechanical applications of the science, technology, engineering and math (STEM) processes essential to their given trade areas and to improve their total skills if they are to reach their individual potential in the new workplace. The Massachusetts Model of the vocational-technical education environment, with its alternating academic and technical/shop weeks –as opposed to just a couple of periods a day in a technical “major”— is made for authentic learning in STEM; and science,

math, and engineering processes are integrated in every career technical shop, as well as each academic classroom. This model should be protected, replicated, and made available to the one third of Massachusetts cities and towns who do not belong to a regional vocational-technical district. Additionally, this will give more regional employers the chance to impact the relevance of the career-technical curricula being taught to prospective employees, and more opportunities for industry to enjoy the gratification of working with the next generation to assure that they are graduating as skilled members of society.

- To supply the skilled employees that Massachusetts industries see as a vital need in the immediate future, continued administrative and legislative funding support for grants and training programs for technical programs at CVTE schools is an economic imperative. The Michael and Kitty Dukakis Center for Urban and Regional Policy Development

at Northeastern University found, in its extensive survey of Massachusetts manufacturers, that “Continued alignment of the vocational and community college curricula with industry needs,” and “Programs to increase school, student, and parent awareness of careers in manufacturing,” along with “Working with vocational school instructors to incorporate industry standards into curriculum,” led the lists of *very* or *extremely important* initiatives to strengthen and promote manufacturing in Massachusetts. Manufacturing and business groups should look to best practice in these activities by growing their advisory roles into public-private partnerships that will strengthen the high-skills pipeline.

- A key element in making CVTE available to all students who would benefit from it, thereby training the workforce today’s manufacturers are looking for, is to change any district policies that make vocational-technical education a random or neighborhood choice among all other high schools in a district. Data show that when a student has chosen vocational-technical education, rather than having had it imposed upon him or her, the academic and professional results can be remarkable.
- Along with making urban vocational-technical education schools into schools of choice, district-run CVTE schools’ administrations should be given the autonomy over budget and staffing that is enjoyed by their regional CVTE brethren. Additionally, the Chapter 74 and Perkins Act funding that is granted to urban districts specifically to support their vocational programming should be funneled directly to the schools that host those programs, rather than being distributed throughout the district for general education.

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