



Photos by Laura Barrett

Electronics/robotics teacher Bob Makem and Whittier junior Andrew Plourde, in left photo, demonstrate a robot. At right, co-teachers Jack Ulrich, left, and Scott Robertson pose with a scale model of downtown Haverhill. Students designed and built both the robot and the model.

# Crucial skills for 21st century clearly in evidence at Whittier

By Laura Barrett

**Q**uietly and without a lot of fanfare, vocational-technical high schools in Massachusetts have been transformed from the “also ran” category in education to highly sought after schools with enviable graduation rates and impressive college attendance and job placement statistics.

This trend was documented in a report last fall by Alison Fraser of the Pioneer Institute, a conservative think tank. Pioneer Institute staff rarely have much good to say about public education, so it was notable that they found a lot to like about the state’s 63 vocational-technical education — VTE — programs.

“VTE’s academic results are due to many factors,” Fraser wrote in the executive summary of the October 2008 report, titled *Vocational-Technical Education in Massachusetts*. “The integration of academic and technical knowledge creates a basis 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.”

Perhaps these schools, whose origins are rooted in developing 19th-century agriculture and trade skills, can provide some useful lessons to educators seeking to incorporate 21st-century skills into their curricula.

The Partnership for 21st Century Skills, a task force of education, business and governmental organizations, says students should have:

- Information and communication skills.
- Thinking and problem-solving skills.

- Interpersonal and self-direction skills.
- Global knowledge and understanding.
- Financial, economic and business literacy, along with entrepreneurial skills to enhance workplace productivity and career options.
- Civic literacy.

MTA Today visited a vocational technical school in Haverhill in February to see if 21st-century skills were in evidence.

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Whittier Regional Vocational Technical High School is off the beaten track in a rural section of Haverhill not far from I-495, the New Hampshire border and the Merrimack River. The building itself is unremarkable; it’s what goes on in the shops and classrooms in vocational-technical schools that make them so different.

Whittier is one of 30 stand-alone regional vocational-technical schools in the Commonwealth. The school’s nearly 1,200 students come from 11 communities, with the most from Haverhill. The student body is generally reflective of the community. The students are mostly white (80 percent) and Hispanic (15 percent).

Whittier has fewer English language learners than the state average (0.5 percent versus 5.9 percent), though somewhat more special education students (21.5 percent versus 17.1 percent). About 30 percent of Whittier students are identified as low-income, which is average for the state.

Freshmen cycle through all 21 shops at Whittier during their first year and then pick their fields. For the next three years, they spend two weeks in mixed-grade shop classes alternating

with two weeks in academic classes. They can also participate in sports and other extracurricular activities. Like all students in the state, they have to pass the grade 10 MCAS tests in order to graduate.

Last year, all but one Whittier 10th-grader passed the English language arts test and all but three passed the math test on their first attempt. Both figures bested the state pass rate, as well as the rate for Haverhill High School and some of the other feeder districts.

“We can give our kids the same diploma that the comprehensive high schools do because our kids have done the same curriculum, but in half the time,” said Eileen Lawton, a Whittier English teacher.



Eileen Lawton

In order to meet that challenge, she said, Whittier offers an after-school MCAS program, and students identified as needing extra help are tutored by their academic teachers during their shop weeks.

The school has received a grant to help teachers better integrate academic and shop curricula. For example, Lawton and a couple of other English teachers went to the graphics shop to conduct writing lessons. The students wrote children’s stories and then illustrated them using their graphics skills.

“The kids loved it,” she said. “It meets a lot of the frameworks for graphics, though it took a long time. We’re always fighting against the clock.”

A long-standing example of interdisciplinary cooperation is the construction of a float for Haverhill’s holiday parade. The 2008 float, “Candyland Christmas,” won the top prize. With help from their teachers, art students created the decorations. Carpentry and metal fabrication students helped build the float. Electrical students wired it, automotive students made sure the mechanics worked, and journalism students helped to publicize it.

These kinds of projects address several of the “21st-century skills,” including communication, problem-solving, interpersonal skills and entrepreneurial skills. William DeRosa, superintendent of Whittier, said that the float is also one of several examples of “civic literacy” — another 21st-century attribute.

“We are an important part of this community,” DeRosa said. “You can come here to have your car repaired. We have a dining room that seats over 100 people which our culinary arts program runs. We have three specials a day in addition to a fixed menu and a dessert cart. A lot of elderly services will bring a large group here for lunch because our prices are very low since we aren’t allowed to make a profit. The same is true of cosmetology. People come here to have their hair done.”

DeRosa added that Whittier has an evening program with enrichment courses and also classes in the trades through which electricians, plumbers and others can maintain their licenses. “We envision ourselves as full service to the community,” he said.

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Shop classes in a vocational-technical school do not look much

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# Whittier helps students build 21st-century skills

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like regular high school academic classes.

Although teachers sometimes instruct the whole class at once, more often students work on projects independently or in small groups.

In Bob Makem's Electronics/Robotics class, several older students were doing Internet searches for circuits and other items they needed for their projects while freshmen were about to get a lesson in soldering.

Makem enthusiastically showed off some of the robots his students built this year.

One of them was designed to climb stairs. Another took pegs out of a ramp, pushed two blocks together to complete a bridge, scaled the ramp, crossed the bridge, opened a door and released a toy gerbil.

Andrew Plourde, a junior, said that students worked in teams, solving problems for different parts of the robots.

"Normally when we're doing a project for open house, everybody has a section," Plourde explained. "I was working on the arm and someone else was figuring out how to do the claw section."

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'The true test is if you can explain to someone how it works. That's where the money is.'

—Electronics/robotics teacher Bob Makem

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Plourde said he is happy he chose to go to Whittier. "I like the idea of a vocational school — learning a trade while learning the academics," he said. "Like when you are studying math, it makes it more real. You know why you are learning these things."

"Most of my students go on to college," Makem said. "I've had some who moved into biotech or other fields, but it never hurts to understand electronics. All you have to do is ask those people in Fitchburg whose lights went out during the ice storm. It puts you back in a Third World country when you don't have electricity."

Makem said problem-solving is the name of the game.

"I'm having the sophomores build a telephone," he said. "But I don't just want them to build it because that's just an assembly job and there are no good jobs in assembly. If you want minimum wage, go into assembly. The true test is if you can explain to someone how it works. That's where

the money is. If you've never seen a toaster before and somebody gives you a toaster and says it doesn't work, how do you fix it? You can't, because you don't know how it works."

Makem advises students to steer clear of consumer electronics that are made overseas, such as DVD players, because when they break they are just thrown away.

"Learn high-end electronics," he said. "Medical equipment is very expensive, so there is demand for people who know how to fix it when it breaks."

More than just particular skills, Makem tries to instill a work ethic.

"I tell them, 'Make yourself important to a company,'" said Makem, who worked in industry for 27 years.

"I would shadow other people and learn their jobs in my spare time rather than just sit around," he added. "That's what I try to teach them. Most of them get it. Not all of them, but most. You can only give them what they are willing to take. They don't all come

out bright stars, but none of them come out dummies."

These work ethic lessons fit neatly into the "21st-century skills" agenda, which calls for "financial, economic and business literacy and developing entrepreneurial skills to enhance workplace productivity and career options."

Fraser, writing for the Pioneer Institute, quoted a Massachusetts Business Alliance for Education report that found: "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."

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That assessment would be music to the ears of Jack Ulrich and Scott Robertson, who co-teach the CAD/Drafting class at Whittier.

Robertson, in his fourth year, went to Whittier and was one of Ulrich's students. After graduating in 1995, he attended the Art Institute of Fort Lauderdale and then worked for an architect in interior design.

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# Vocational schools provide key support for students

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He moved back to Massachusetts to be with his fiancée and made the career change to teaching.

The reputation of the school has improved since he attended.

"I'd say that 95 percent of my friends went to Haverhill High, but I was on that other ship," Robertson said. "When I was an eighth-grader I told them I wanted to go to the tech and my guidance counselor laughed at me and told me that I was too smart for this school. I'd love to go back and have a word with that counselor now. I'm so glad I went my own way."

When he arrived at Whittier, he was a quick study in computers and drafting, but his attitude needed work.

"I was a little too big for my britches at that time," he said. "Jack was able to take me down a notch, in a nice way. I needed to have more respect for authority."

Ulrich said that incoming students' skills and attitudes have both improved over the years he has been teaching.

"Vokes used to have a reputation for being for kids who didn't test well and didn't get good grades," Ulrich said. "Not anymore. Now when they come here they're good in math already. They're good in computers already. We get a lot of students who are thinkers. Now the question is, 'Do they like to draw?' 'Do they want to work in an office environment?' 'Can they sit all day and behave themselves?'"

CAD students learn the basics of their craft by the end of their sophomore year and then work on special projects of their own choosing. They design their projects on the computer and build them, sometimes with help from other shops.

"Say they're interested in music," said Ulrich. "I find out what they play or what they want to do. We've had kids design and build guitars." Some of those guitars are on display in the school lobby. Ulrich keeps a beautiful student-built acoustic guitar in the classroom to show students what they can make.

The pride and joy of the CAD class this year is a huge 3-D model of downtown Haverhill, complete with buildings on which photographed images of their exteriors have been glued, an elaborate system of lights, topographical features and a bridge over the Merrimack River.

Ulrich said he is hoping that Haverhill City Hall will be interested in displaying the model when it is completed to show residents and business leaders what planned revitalization projects might look like.

Student support doesn't stop at the classroom door at Whittier. Teachers are invested in helping their students find the right colleges or other post-high-school programs and eventually jobs. Even while they are still in school, motivated juniors and seniors are allowed to work during their shop

weeks under a co-op system.

"When we have an excellent kid who is really sharp, I'll go to extremes to find the student a job," Ulrich said. "I'll look in the newspaper. Maybe I'll see an ad for an engineer paying \$30 an hour. I'll call them and tell them they can hire my student for \$10 an hour. That's appealing to some employers during these tight financial times."

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Superintendent DeRosa acknowledges that some of the success of Whittier and other vocational-technical schools can be attributed to their selectivity. Whittier accepts only about half of the 700 students who apply each year. Admission criteria include grades, behavior, attendance record and recommendations from middle school guidance counselors.

"We have a very small dropout rate," DeRosa said.

Whittier's four-year graduation rate is 94 percent, compared to the state average of 81 percent.

"We know that's partly because it's a selective secondary school," DeRosa said. "Our students choose to be here. If they get here and it's not what they want, they can transfer back to their district school and all of their academic subjects transfer with them."

Vocational schools also spend a lot more money per pupil than comprehensive high schools, mainly because shop classes need small teacher-pupil ratios and require more equipment and supplies. According to the Department of Elementary and Secondary Education, Whittier's 2007 per-pupil expenditure was \$17,920, compared to \$10,702 for Haverhill High School.

These advantages mean that not all lessons from vocational-technical schools can easily be transferred elsewhere. After all, comprehensive high schools must educate all students who walk through their doors — with less funding.

In addition, some students considering professional careers prefer the wider array of college preparatory classes offered by comprehensive high schools, including Advanced Placement courses, which Whittier does not offer. While half of Whittier's graduates in 2007 said they planned to attend a two- or four-year college — and some go to very competitive colleges — that's less than the state average and less than the 78 percent at Haverhill High School.

Despite the differences, schools such as Whittier have a lot to offer. By implementing a model of education under which projects, teamwork, learning by doing, problem-solving, creativity and contributing to the community are the norm, they prove that examples of 21st-century education strategies that work are likely to be as near as the vocational-technical school in your neighborhood.