

Vocational Education and the Manufacturing Workforce

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The Graduate School of Education at Harvard University released a paper in 2011, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*, calling for more alternatives – more pathways – to success in the labor market than the standard college preparation that predominates in U.S. secondary education. In particular, the paper calls for more high-quality vocational education and work-linked learning. As the paper acknowledges, similar calls for educational programs more closely linked to work experience have been made in the past. However, arguments for alternative pathways that incorporate closer ties to work and that may lead to credentials other than a BA have been strengthened by two developments: first, many young adults in the United States are struggling to find their place in the workforce and, second, international comparisons show that the United States is losing ground in educational attainment and performance to countries that offer more varied approaches.

The *Pathways* paper was motivated by concerns that a focus on college preparation is not serving the needs of many students. Many students are not succeeding in acquiring a college degree and would be better prepared for their working lives with more occupationally oriented programs resulting in industry-recognized credentials. Additionally, many students learn better if they can see a clear relationship between what they are learning and its application in the workplace. For these students, more occupationally oriented programs can raise interest and achievement; some of these students may even be encouraged by the experience to continue on to college.

While the *Pathways* paper was concerned primarily about the educational and employment needs of young adults, its recommendations for more vocational programming in high school may also address some of the workforce challenges of the manufacturing sector. High schools offering occupational credits usually have programs in manufacturing-related activities. These programs should provide students with both valued skills and exposure to the nature of work in manufacturing, making them more productive employees if they seek a job in manufacturing after school. And some of those who go on to college may remain sufficiently interested in manufacturing that they pursue careers as engineers or production managers.

As a Massachusetts resident, I was pleased – and a bit surprised - to learn from the *Pathways* report that Massachusetts' vocational schools are considered among the nation's best. I myself have heard employers and educators speak very positively about the quality of graduates from Massachusetts' vocational schools and about graduates' success in securing employment. Nevertheless, I generally think about Massachusetts' educational advantages in terms of the high fraction of the adult population with college degrees and the state's high scores on national

tests of students' abilities in reading and mathematics. However, a 2008 white paper by Alison Fraser for the Pioneer Institute (*Vocational-Technical Education in Massachusetts*) found that Massachusetts' students in Vocational and Technical Education (VTE) high schools compare favorably with general education and college-preparatory students in terms of graduation rates and passing the high-stakes Massachusetts Comprehensive Assessment System (MCAS) test. Students at VTE schools spend about half their time in "shop" but still have strong academic programs and extra-curricular activities. Most VTE schools have waiting lists. One negative - the cost per VTE student is notably higher than for other students, in part because of the need for sophisticated equipment.

The National Center for Education Statistics (NCES) has been producing a report on career and technical education (CTE), the current term for vocational education, every five or so years for the past two decades. The most recent report was produced in 2008 and it provides information about changing participation in CTE.

According to the NCES report, about 5 percent of public high schools specialize in CTE, although most high schools offer some CTE courses. Most students take one or two occupational programs, even if their future aspirations are to attend college. Based on the experience of high school graduates, overall student participation in CTE was similar in 1990 and 2005 but shifts occurred among programs. Over 90 percent of graduates took at least one occupational course in both years. However, the fraction with three credits in a single program – an "occupational concentration" – fell slightly, from 23 percent to 21 percent. The fraction of students with a concentration in business services fell sharply. The fraction with a concentration in courses related to manufacturing also fell. In 2005, 3 percent of graduates had a concentration in materials production, print production or other precision production, compared to 5 percent in 1990.

Probably the most noteworthy change described in the NCES report on CTE is an increase in the academic preparation of high school graduates with high concentrations in occupational education. The number of credits in core academic subjects that were acquired by students with 4 or more occupational credits increased more than the academic credits of those with lower occupational concentrations. Relatedly, much larger fractions of graduates with four or more occupational credits met the New Basics academic standards in 2005 than in 1990 or completed 4-year college-preparatory requirements. The fractions of all high school graduates who met these standards also increased, but the increases were larger for those with the strongest occupational orientations. We do not know whether this increase in academic preparation involved any tradeoffs, such as a higher dropout rate.

The Massachusetts VTE schools examined in the Pioneer Institute white paper are an illustration of this increasing emphasis on academic preparation. According to the white paper, the VTE schools were opposed when Massachusetts

introduced its high-stakes MCAS test in the early 1990s. The MCAS forced the VTE schools to place greater emphasis on academics than had previously been the case. However, the results have been gratifying: MCAS pass rates at VTE schools compare well with the rest of the system, enhancing the stature of the VTE schools.

For high school graduates with an occupational concentration, increased academic preparation is clearly a very positive development. These have more postsecondary education and career options, and their productivity in whatever occupation they choose is likely to be higher. For manufacturing employers seeking to hire these graduates, the implications are more ambiguous. The graduates are likely to be more productive employees, with more upward potential; but they have more occupational alternatives available to them.

The *Pathways* report speaks very positively about the apprenticeship systems in Germany and Switzerland, although rejecting the “tracking” that steers some young people into these programs. In an apprenticeship, a younger worker works for pay under the close supervision of more experienced workers until he/she has mastered the intricacies of the chosen occupation. This process commonly takes three or four years. Thus, apprenticeships seem as though they might be a way of meeting manufacturers’ needs for highly skilled workers. The problem is that the number of apprenticeships in the United States is currently rather small and manufacturing accounts for only a small fraction of them.

Robert Lerman has authored or co-authored papers for the Urban Institute and the Center for American Progress [advocating more use of apprenticeships](#) in the United States. He cites research showing that apprenticeships provide substantial financial benefits to the apprentices, while he finds that employer sponsors of registered apprenticeships are strongly supportive of these programs. One of the primary benefits of apprenticeships to employers is providing skilled workers. About 500,000 individuals are in registered apprenticeships in the United States, with perhaps a similar number in unregistered apprenticeships. By comparison, over 15 million students are enrolled in two- and four-year colleges. Construction accounts for over 50 percent of apprentices, manufacturing only 5 percent. Within manufacturing, aerospace and motor vehicles seem to be most active employers of apprentices.

Lerman calls for more aggressive promotion of apprenticeships by the federal government, possibly supplemented with incentives in the form of tax credits for training new apprentices. He notes that several states offer modest tax credits for training apprentices in selected fields, including some manufacturing industries. Lerman also calls for more collaboration between community colleges and apprenticeship programs.