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Vocational Ed, Reborn

Making high-quality career training central to American schooling

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At a dinner for Silicon Valley executives in early 2011, President Barack Obama asked Apple CEO Steve Jobs what it would take to bring iPhone manufacturing back to America. “Those jobs aren’t coming back,” the typically blunt Apple cofounder told the president. Examining Jobs’s claim, the *New York Times* looked at Apple’s vast Chinese operations and found that workers there not only worked for less than Americans did; more of them were skilled. To oversee production and guide some 200,000 assembly-line workers, Apple, for instance, needed 8,700 industrial engineers—positions that required more than a high school diploma but less than a full college degree. While abundant in China, these kinds of employees are harder to find in the United States. “The U.S. has stopped producing people with the skills we need,” an unnamed Apple executive told the *Times*.

That’s a refrain that more and more American business executives are uttering these days. Even as politicians argue over how to create or keep “good jobs” in the U.S., a recent National Federation of Independent Businesses survey reported that the percentage of small businesses saying that they get no or few qualified applicants for available jobs has hit a 17-year high. Studies estimate that hundreds of thousands of positions in manufacturing firms went unfilled, even during the post-financial-crisis downturn and subsequent weak recovery, because of the lack of skilled workers. “Open manufacturing jobs are at an all-time high,” the former CEO of Siemens USA, the industrial giant, observed in December.

Much of the problem, say business leaders and employment experts, is an educational failure. Career and technical training in the U.S. hasn’t evolved to keep up with the transformation of the modern economy—with many schools even slashing funding for

vocational education. Worse, parents, guidance counselors, and even politicians keep pushing students to enter four-year college programs that provide no clear paths to employment. Meantime, jobs in traditional blue-collar trades—from manufacturing to automobile repair—have grown more sophisticated and demanding. A huge gap between job seekers' skills and employers' needs has resulted.

The good news is that some visionary businesses, educators, and nonprofit funders are intensifying efforts to revamp and upgrade career education—twenty-first-century vocational education—in the United States. The obstacles to such efforts are many, including school officials' reluctance to partner with industry and lingering prejudices against vocational schooling. But for the rising number of students participating in programs that tailor education to career goals—programs that emphasize work-related experience and teach to the high standards necessary for modern jobs—the payoff has been impressive. Now the challenge is to build on those successes to ignite a broader cultural change that makes high-quality career training central to American education.

Congress may have had good intentions in 1917 when it passed the Smith-Hughes National Vocational Education Act to promote vocational training in agriculture, industry, and trades. But the law, which required any student receiving trade-skill instruction with federal funds to spend at least half of his time in vocational training, tended to cut off vocational training from public school education. Career education eventually developed into something that teachers and guidance counselors encouraged students of low academic achievement to pursue. Though the robust post-World War II American economy provided many of these students with a solid middle-income living, vocational school became stigmatized. That stigmatization only intensified as American industrial jobs, battered by global competition and automation, started to disappear during the early 1980s, making four-year college seem for many the surest route to better jobs and higher earnings. Policymakers reinforced the message with subsidized student loans and other initiatives that sought to make college readily available to all.

Unfortunately, many students wound up enrolling in four-year colleges who weren't suited for it, and the results haven't been pretty. These days, only 55 percent of college students graduate within six years, leaving many with no degree and dismal job prospects. Meanwhile, student-loan debt has swelled to a monstrous \$1.3 trillion.

Many of the students would have been better off receiving some kind of vocational training. Both as candidate and now as president, Donald Trump has tapped into widespread blue-collar discontent with his call to overhaul free-trade agreements to

keep jobs from heading overseas. The reality, though, is that plenty of good-paying jobs are already available for properly trained workers. These positions typically fall into a category known as middle-skilled, meaning that they require some postsecondary education—for instance, a certified apprenticeship or a two-year associate’s degree from a community college—but not necessarily four years of university. These jobs are found in health care, information technology, manufacturing, and construction, among other fields. According to a 2013 Brookings Institution study, more than half of all jobs in science, technology, engineering, and math (STEM) do not demand four-year degrees—and they pay an average annual salary above \$50,000. Further, while high-paying STEM jobs requiring advanced degrees do cluster in a few major urban centers, plentiful middle-skilled jobs—ranging from cybersecurity specialist and web designer to robotics engineer and industrial-engineer technician—are dispersed throughout most American metropolitan areas, making them within geographical reach of most Americans.

Yet many of those jobs go unfilled. A 2011 survey by the consulting firm Deloitte and the Advanced Manufacturing Institute found that more than eight out of ten manufacturing firms reported a shortage of high-skilled workers—at a time when unemployment nationwide was above 8 percent. (By one estimate, some 1.5 million manufacturing jobs that America has added since the 2008 recession have been for workers with more than a high school education.) Even though the U.S. is graduating some 3 million high school students every year, nearly half of whom will enter the job market instead of continuing school, an estimated 1 million middle-skilled jobs in all fields remain unfilled.

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Encouragingly, policymakers have begun to offer programs to train students for such good jobs—and the early results are promising. In 2008, a task force commissioned by New York mayor Michael Bloomberg recommended overhauling and expanding the city’s career and technical training. Among the suggestions that the city adopted was a push to instill in high school technical programs “a strong academic foundation in literacy and numeracy” to prepare for today’s job market. The city also reformed

vocational schooling to include apprenticeships, intern programs, and other work-related learning, seeking to ensure that students who don't go on to college have some kind of certification or path to further training. Based on the task-force recommendations, the city has opened 25 new career and technical schools since 2010 and added vocational training to many others. New York now runs 50 schools entirely dedicated to career education and another 75 career academies within larger general-education schools, serving some 26,000 students in all.

Some of the leadership in the modernization of vocational training is coming from employers trying to reshape career education to fit the kinds of jobs they need filled. Siemens USA, a division of the German industrial powerhouse, has been working with high schools and community colleges around America to educate students via apprenticeships, based on a model common in Europe, where typically 60 percent to 70 percent of young people enroll in on-the-job training initiatives. In Germany, according to Eric Spiegel, former CEO of Siemens USA, the company has 10,000 paid apprentices; each year, it offers jobs to 2,500 students who graduate from its program.

In Charlotte, North Carolina, Siemens recruits juniors at the well-regarded Olympic Community of Schools—it has several career-training academies under one roof—via a rigorous application process. Just to be considered for an apprenticeship, a student must have taken advanced mathematics courses (such as calculus) and pulled off A's and B's. Then Siemens puts the qualified applicants through a company-designed test, seeking to narrow the field further. **The winners participate in a short, paid company internship, with several of the best students going on to a full-time apprenticeship—a four-year program in which they continue their education at a local community college while working at the firm.** At the end, the students have earned an associate's degree and gotten an offer for a Siemens job that could start at as much as \$55,000 a year. Perhaps equally important, explains Spiegel, the students graduate debt-free—Siemens pays for their education—and with valuable expertise “in the specialties of mechanical, computer, electronic, software control and system design engineering.”

As career and technical training draws more interest from educators and businesses, innovation in the field is intensifying—a crucial change after years of stagnation. Businesses formerly reluctant to partner with educators are now fashioning some of the boldest ideas. In 2010, for example, IBM went to education officials in New York City and at the City University of New York with a proposal to create what has become known as the **Pathways in Technology Early College High School, or P-TECH**, a six-year career and technical program that combines high school with two years of college to

ready students for entry-level technology jobs. The participants build robots, learn computer coding, and study network systems. IBM assigns a full-time employee to the school and uses its own workers as mentors. Student motivation is high. IBM promises students who succeed that they will get priority treatment for jobs. “Students understand why they are learning a strong academic program because they can convert it into the skills they need to know in the workplace,” Stanley Litow, IBM vice president, said in 2015, on the occasion of the high school’s first graduating class. Half a dozen students that year graduated by finishing the six-year program in just four years; three went to work for IBM, and three others enrolled in college to finish bachelor’s degrees. The model is spreading. Already, some 60 similar schools are running in six states with the help of 250 business partners. IBM hopes to see 20 more schools debut this year.

With innovations proliferating, schools that emphasize applied learning, internships, and apprenticeships have the potential to transform secondary education—even for students intent on four-year college and graduate work. That’s evident in the enormous success of **High Tech High** Learning’s network of charter schools (called High Tech High), founded by a group of business executives led by Gary Jacobs, a former Qualcomm executive and investor who’d grown concerned about how hard it was for San Diego technology firms to find qualified workers. High Tech High schools use few textbooks. Instead, they teach most subjects by having students do projects—employing trigonometry to design “staircases to nowhere,” say, or writing a monograph on the Harlem Renaissance, or programming an exhibit geared toward grade-schoolers for the San Diego Museum of Natural History.

Students at the first school, opened in 2000, performed so well on state tests that the California Department of Education awarded High Tech High a special status, letting it open charters statewide without having to get local approvals for each new school. Admitting students through a lottery, the schools have become a magnet for kids from families with no previous college attenders. Some students travel up to two hours a day to attend. The organization now has 13 charters in California, serving some 5,300 K–12 students.

Colleges and universities are taking notice of high schools that have adopted the rigorous standards and work-related education of the best career programs. Twenty years ago, an upstate New York high school technology teacher, Richard Blias, joined with donors to launch **Project Lead the Way**, which designs curricula to engage high school students in STEM subjects—teaching students through hands-on initiatives such as employing robotics or applied forensic science. “Project Lead the Way has provided

me with a curriculum I WANT to teach and that students can't wait to learn," Julie Beck, a Louisiana middle-school teacher, enthusiastically wrote last year. Businesses like Intel and Lockheed Martin have given funding and internships, and schools like Kansas State's engineering department and the Milwaukee School of Engineering offer scholarships to Project Lead the Way students; program grads get preferential admissions treatment at the University of Delaware, San Diego State, and other institutions.

The new generation of career and technical schools has started to change the educational script. Whereas vocational-education students were once considered academic laggards, today's career-school students tend to outpace their contemporaries. According to one 2014 study, the high school graduation rate for students concentrating in career and technical training was 93 percent, compared with an overall graduation rate of 80 percent. Similarly, a recent Manhattan Institute report by Tamar Jacoby of Opportunity America and Shaun M. Dougherty from the University of Connecticut found that students taking career and technical-education courses in New York City have better attendance records and are more likely to graduate than students not enrolled in vocational courses. And a 2016 Thomas Fordham Institute study noted that career-directed education and training are especially beneficial to lower-income students; enrollees in these programs are 25 percent more likely to finish high school than comparable students who don't take such courses. Graduating has its own payoff. Students with high school diplomas that include certified apprenticeship programs, as well as those who obtain associate's degrees in technical fields, easily outearn the average high school grad.

Philanthropy is getting on board, too. Many funders previously behind innovations in K-12 education like charter schools are now focusing on career education. The Gates Foundation, for example, has given crucial support to Charlotte's Olympic Community of Schools and the High Tech High Learning network. A number of groups, including the Joyce Foundation and the Kellogg Foundation, have joined with major employers like Target, Wal-Mart, and J. C. Penney to set up 100,000 new internships and apprentice positions within the next two years. JPMorgan Chase has dedicated \$75 million toward **New Skills for Youth**, an initiative to increase the number of students graduating from high school ready for a career. North Carolina entrepreneur Robert Luddy, an engineer by trade who owns the industrial firm CaptiveAire Systems, has founded a chain of low-cost private schools known as the Thales Academy, housing within them the Luddy Institute of Technology, a STEM-oriented career curriculum for high schoolers. The Lenfest and Wal-Mart Foundations are among the donors to the YouthBuild Charter

School of Philadelphia, which provides at-risk students with academic instruction and career training in construction, health care, and other fields.

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Despite such successes, quality career and technical training still reaches too few American students. Blame deep-seated institutional obstacles. Compared with Europe, America has few firms that participate in apprenticeship and other job-training programs—cooperation that is essential in career education. “It’s well understood in workforce circles: there can be little effective workforce training without employers,” Opportunity America founder Jacoby observed earlier this year. “Only employers know what skills are in demand and will be in demand in months and years ahead. Only they can offer students the work-based learning experience that is so critical to effective training.”

The number of new apprenticeships offered each year in the U.S. has increased by just 50,000 or so since 2008 and now totals 200,000 annually—in a country where about 1.5 million students annually will graduate from high school and skip college. Even with New York City’s push into career and technical education, a 2015 New York City Partnership survey found only 733 employers working with local schools on such initiatives, a paltry number in a city with more than 20,000 firms with 20 or more employees. And though some school systems have embraced collaborations with willing businesses, other educators remain wary of giving outsiders a significant voice in areas that they traditionally control, such as curriculum development. As the *San Jose Mercury News* detailed, business-school partnerships have their critics, “nervous about local districts losing control of public schools and corporations using the school system to train obedient worker bees any way they see fit.” Some school systems have also balked at certifying instructors with the knowledge necessary to teach in highly technical career programs but who lack education-industry credentials.

State and local governments, which set most education policy, have a crucial role to play in removing these obstacles. States need to change certification requirements so that those with the technical skills needed in industry-specific training programs can teach in public schools. Local educators must be willing to coordinate with area businesses to tailor their career schools and academies to a region's needs—which means that school officials should start emphasizing curricula that prepare students for the jobs likely to be available after graduating. Many high schools should be pushed to beef up their career- and guidance-counseling services. Critics note that guidance counseling these days is all about solving students' social or personal problems; career guidance, once prevalent, has all but disappeared from many schools. And perhaps most important, school systems must upgrade academic standards in career and technical programs, especially in math and literacy.

The federal government is less crucial here, but if it has one key function, it would be for President Trump and members of his administration—especially education secretary Betsy DeVos—to promote the need for better training and more cooperation between business, labor, and schools. One option would be to redirect some of the federal resources that currently go toward subsidized college loans to support more, and better, vocational programs. Rather than focus solely on the jobs leaving America, the president could also highlight what kinds of blue-collar jobs the country *is* generating—and what it takes to get hired for one.

Rather than completely disappearing, middle-income work is transforming. Siemens's Spiegel calls what's happening in manufacturing, in particular, the next industrial revolution: "high-tech workers using high-tech tools to bring unprecedented speed, efficiency, and flexibility to manufacturing operations." Workers need to be prepared for this latest revolution—and the way to do it is now clear.

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Photo: Pathways in Technology Early College High School (P-TECH) in Brooklyn, created by IBM and the New York City Board of Education to offer vocational training (BOB GOLDBERG/FEATURE PHOTO SERVICE/NEWSCOM)

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