



## COMPANIES SHOULD TAKE THE LEAD IN CREATING COLLABORATIVE PROGRAMS TO TRAIN WORKERS.

*by Thomas Kochan, David Finegold, and Paul Osterman*

# WHO CAN FIX THE “MIDDLE- SKILLS” GAP?

**THREE AND A HALF YEARS** after the Great Recession officially ended, unemployment in the United States remains stubbornly high. Yet many employers still struggle to fill certain types of vacancies, especially for so-called middle-skills jobs—in computer technology, nursing, high-skill manufacturing, and other fields—that require postsecondary technical education and training and, in some cases, college math courses or degrees. Currently in the U.S. about **69 million** people work in middle-skills jobs, representing roughly **48%** of the labor force.

No aggregate estimate of the shortage of middle-skills workers exists, but the number is expected to grow substantially as more baby boomers retire. The

problem is most acute in the utilities and aerospace sectors—**50% to 60%** of whose workforces are eligible to retire by 2020 or likely to leave for other reasons—but it afflicts other industries as well. Although the U.S. Bureau of Labor Statistics doesn't publish estimates of job openings by skill category, combining government data on education and training requirements leads labor market experts to estimate that as many as **25 million**, or **47%**, of all new job openings from 2010 to 2020 will fall into the middle-skills range. (See the exhibit "The Middle-Skills Employment Landscape.") Shortages of workers for these types of jobs are already undermining U.S. competitiveness and causing firms to shift their operations

abroad. Figuring out how to train people to fill those well-paid jobs could help remedy the wage stagnation gripping the country and close the growing gap between high- and low-income households.

The big obstacle is execution. For the past three decades, U.S. businesses and government have focused on overhauling K-12 science, math, and reading education and on addressing persistently high dropout rates in inner cities (see "Rethinking School," HBR March 2012). We certainly recognize the need for such reforms, but progress has been too slow to remedy the looming skills shortages.

With political gridlock and a focus on deficit reduction likely to continue in Congress, the federal government probably won't launch major new education and training initiatives anytime soon. It's more likely that Congress will cut already-limited

job-training and other nonentitlement programs. This would extend the weakness in federal support for job training since 1995—Indeed, as the U.S. population has grown since then, funding on a per capita basis has sharply declined.

We think that companies can and should take the lead in training workers to fill the middle-skills gap. Realistically, that can happen on a large enough scale only if business leaders cooperate with one another, unions, and educational institutions, both regionally and nationally. The key words are *cooperate* and *nationally*.

Credible data on what businesses spend on training are scarce, but companies are known to target HR investments first when cutting budgets. Many firms fear that if they invest in training on their own, competitors that don't make similar investments will lure away their workers. Collaborative programs reduce that risk. Several models are already proving effective in the U.S. and in countries with similar economies, such as the UK, Australia, and Sweden (see "Enriching the Ecosystem," HBR March 2012).

Our article has two aims: to help business leaders understand these models so that they can choose the right one for their organization, and to highlight best practices from programs that have achieved a measure of success. We believe that the solution to the middle-skills gap is to learn from local and state efforts and to use carefully targeted federal-funding incentives to aggressively expand their numbers and size. We focus on the U.S., but some models we discuss are being—or could be—used in other countries.

## The Skills Landscape Has Changed

For most of the 20th century, people obtained marketable skills and achieved prosperity in one of two ways. The first was on the job. By promoting from within, firms enabled workers to progress to higher-level occupations. Unions negotiated career ladders that were linked to skills and seniority, and they joined employers at an occupation or industry level to host apprenticeship and other training programs. That system ensured an adequate flow of new talent equipped with state-of-the-art skills.

But as unions declined, so did apprenticeships, other union-employer training programs, and promotion from within. (Only 12% of the total U.S. workforce and 7% of the private-sector workforce is now unionized.) At the same time, the kinds of skills needed by employers changed from incremental new ones that can easily be learned on the

## The Middle-Skills Employment Landscape

Here's a small sampling of middle-skills jobs in six occupational groups in the United States.

<b>COMPUTERS AND IT</b>		
COMPUTER SUPPORT SPECIALISTS		
<b>607,100</b>		<b>\$46,260</b>
NUMBER OF JOBS		MEDIAN ANNUAL PAY
<b>ENGINEERING</b>		
ELECTRICAL TECHNICIANS		
<b>151,100</b>		<b>\$56,040</b>
INDUSTRIAL ENGINEERING TECHNICIANS		
<b>62,500</b>		<b>\$48,210</b>
<b>HEALTH CARE SUPPORT</b>		
CARDIOVASCULAR TECHNICIANS		
<b>49,400</b>		<b>\$49,410</b>
RESPIRATORY THERAPISTS		
<b>112,700</b>		<b>\$54,280</b>
<b>INSTALLATION, MAINTENANCE, AND REPAIR</b>		
HVAC INSTALLERS		
<b>267,800</b>		<b>\$42,530</b>
TELECOMMUNICATIONS INSTALLERS		
<b>194,900</b>		<b>\$54,710</b>
<b>LIFE, PHYSICAL, AND SOCIAL SCIENCES</b>		
FOOD SCIENCE TECHNICIANS		
<b>21,300</b>		<b>\$32,760</b>
ENVIRONMENTAL SCIENCE TECHNICIANS		
<b>29,600</b>		<b>\$41,380</b>
<b>PRODUCTION</b>		
SEMICONDUCTOR PROCESSORS		
<b>21,100</b>		<b>\$33,130</b>

SOURCE OCCUPATIONAL OUTLOOK HANDBOOK (U.S. BUREAU OF LABOR STATISTICS, 2010)

## Idea in Brief

An acute shortage of trained people to fill millions of openings for technical jobs is undermining U.S. competitiveness and worsening income disparity. Companies fear that if they invest in training on their own, competitors that don't make similar investments will lure away their workers.

The remedy: collaborative programs that involve multiple employers in a region or industry sector, educational institutions, and other players such as unions and governments. Program models that are being tested—and often proving to be successful—include at least one of the following practices:

**EMPLOYERS ARE INVOLVED** in designing and funding the programs and in finding jobs for graduates.

**CLASSROOM EDUCATION** is integrated with opportunities to apply new concepts and skills in actual or simulated work settings.

**GRADUATES ARE PLACED** in positions that start them down a career path rather than lead to a dead end.

job to those that require advanced technical and behavioral skills (in problem solving, communication, teamwork, and leadership) that existing production and employment paradigms lacked.

The second path to skills acquisition was through college. Young people were told that the key to the American dream was to play by the rules and major in a field that suited your interests and talents. But demand for people with liberal arts degrees has dropped sharply. Only **15%** of U.S. college graduates major in science, technology, engineering, or math—a percentage that has remained constant for two decades even as demand for these skills has grown.

Consequently, the capacity of the U.S. system to nurture midlevel skills is in decline, just as a shift to flatter, team-based structures is increasing the need for them and automation is reducing the demand for less-skilled workers. Nevertheless, forward-looking local initiatives are making progress in addressing the skills gaps in their regions. They embody at least one of the following attributes:

1. Multiple employers in the region or industry sector cooperate with one another and with educational institutions to design and fund initiatives and to train and hire graduates.

2. Classroom education is integrated with opportunities to apply new concepts and skills in actual or simulated work settings—an approach proven to be the way adults learn best.

3. Training focuses on offering workers career pathways, not just skills for the initial job.

Let's examine the practices that have made several types of programs effective.

### Apprenticeships and Other Union-Employer Programs

Apprenticeships—the vast majority of which are at unionized companies and are jointly run by unions and management—are the most trial-tested way for firms to address their current and future skills needs.

More than 360,000 people are registered in apprenticeship programs that combine classroom learning with on-the-job experience and that are designated by the U.S. Department of Labor or a state-agency equivalent as meeting agreed-upon standards. Unfortunately, the number of apprenticeship programs in the U.S. has shrunk by **36%** since **1998**, and enrollments have dropped by 16% since a peak in **2003**—in large part because of declining union membership.

Completing a registered apprenticeship program pays off substantially for both workers and employers. The most recent studies estimate that graduates enjoy a \$250,000 increase in lifetime earnings and that employers get a **38%** return on their investment in the form of lower recruitment costs and a reduced need for expensive contractors. Employers also consistently report high satisfaction with graduates' skills, performance, and reliability.

Some industries—especially those facing the imminent retirement of a large proportion of their workforces—have been embracing apprenticeship programs. The programs are most successful when a group of companies in an industry collaborate with one or more unions or when a company is a dominant employer in its industry or region and therefore doesn't have to worry that other companies will poach its workers.

One example of such cooperation is a collection of training programs created under the auspices of the Center for Energy Workforce Development (CEWD). Formed in 2006 to deal with the utility industry's pending demographic cliff, the CEWD is a nonprofit consortium formed by the electric, natural gas, and nuclear utilities; their trade associations; and the International Brotherhood of Electrical Workers. Firms leading this effort—including Duke Energy, Pacific Gas and Electric, and Georgia Power—report that their collaborative programs are creating a pipeline of workers to fill line-technician and other skilled positions. The result: reduced costs for hiring

The number of apprenticeship programs in the U.S. has shrunk by **36%** since 1998.

## FEDERAL EXPENDITURES ON TRAINING

Spending per capita  
(U.S. population)



SOURCE: WHITE HOUSE OFFICE OF MANAGEMENT AND BUDGET

and training. (See the exhibit "Streamlining Recruitment and Training.")

The training programs of the Aerospace Joint Apprenticeship Committee (AJAC) in Washington State show how the efforts of one leading company and a union can leverage state resources to strengthen a regional supply base. In 1988 Boeing and the International Association of Machinists and Aerospace Workers (IAMAW) together studied other best-practice joint training programs and then set aside 14 cents per work hour in the union contract to build a joint training fund. That program blossomed to feed Boeing's need for machinists, tool-and-die workers, computer technicians, and other jobs. In 2009 Boeing and the IAMAW linked with the state of Washington, regional community colleges, and local employers in its supply base to form the AJAC. Together these parties have developed common certification standards and curricula for each critical category of workers. The program plans to expand enrollment from 200 to 500 in the next two years, thereby helping to offset retirements and allowing Boeing and its suppliers to expand operations in the Puget Sound area.

Although not registered as formal apprenticeship programs, other union-management training efforts have built on this model. In the health care industry, two prominent programs are negotiated and jointly administered: one by the 1199 Service Employees International Union and New York City's League of Voluntary Hospitals, and the other by Kaiser Permanente and the Coalition of Kaiser Permanente Unions. These programs give people the skills for hard-to-fill nursing and other technical jobs, and provide time off and replacement income for trainees.

The Kaiser program, launched in 2005, is an example of coordination between a large single employer (with about 60,000 workers) and unions—in this case, nine unions that represent service employees, technicians, and nurses. Kaiser and the union coalition now offer 79 programs in nursing, health-technician training, and basic language, math, and communications skills to more than 2,000 people. Program participants who advanced from licensed practical nurse to registered nurse achieved a wage increase that was 18% higher, on average, than the across-the-board increase for all employees. In addition to providing the skills that Kaiser needs, the program has made it easier to retain workers. For example, 95% of the RNs produced by the program were retained for more than two years after graduation (versus 85% of newly hired RNs).

Graduates of apprenticeship programs enjoy an estimated **\$250,000** increase in lifetime earnings, and employers get a 38% return on their investment.

The lesson is clear: Firms with similar challenges should recruit others in their industry or regional supply base to join them. Big unionized firms that, like Kaiser, pay industry-leading wages don't have to worry that others will poach their employees. However, they must create a common fund with unions and occupational groups to get buy-in from all parties for upgrading workers' skills.

### Sector-Based Regional Initiatives

Nonunionized businesses can develop workers' skills by cooperating with other local employers in their industry sector. Unlike Germany, Singapore, and the UK, the United States has generally failed to develop widely accepted skills standards for particular sectors. However, recent local and regional experiments—many funded by the National Network of Sector Partners (NNSP), a nonprofit alliance of state and local policy makers, businesses, labor groups, researchers, and other stakeholders—suggest that sector-based strategies can succeed in the U.S. The evidence points to the potential for improving disadvantaged workers' career prospects more than traditional offerings from the U.S. public workforce-development system do. Here are four examples:

The Bay Area Workforce Funding Collaborative, founded in 2004, unites local governments, community colleges, and businesses in the San Francisco area. It has trained more than 700 unskilled and displaced workers for well-paid jobs with defined career ladders in the biotech and health care sectors.

Boston-based SkillWorks, founded in 2001, has placed more than half of the 500 displaced workers it has trained in new jobs. It has also upgraded the skills of more than 1,000 incumbent workers in the health care, hospitality, property services, automotive services, and green industries.

New York and Chicago have recently created "one-stop career centers" in the transportation, construction, services, and manufacturing sectors to meet specialized skills-training needs. One-stops are the main federal vehicle for assisting unemployed workers, but they typically lack the resources or capabilities to focus on sector-specific needs.

The Wisconsin Regional Training Partnership of unions, companies, and educational institutions provides 40- to 160-hour programs in technical and general-skills training for manufacturing, construction, and health care jobs. An experiment found that people who took part in WRTP or other similar sector-based training had better outcomes than those in a control group of comparable people who were not in the WRTP: The WRTP participants were more likely to find steady jobs, work more hours, and earn a higher hourly wage. Indeed, they earned 29% more, on average, in the year after the training than the controls did.

From such sector-based experiments in the U.S. (and similar ones in Australia, Scotland, and Sweden), important lessons about how to build sustainable skills ecosystems have emerged:

**Start from positions of strength—and common pain and interest.** It's hard to get every stakeholder in a local area to collaborate. Chances of success are greatest in a sector where firms believe their biggest competitors for talent are elsewhere in the world rather than local.

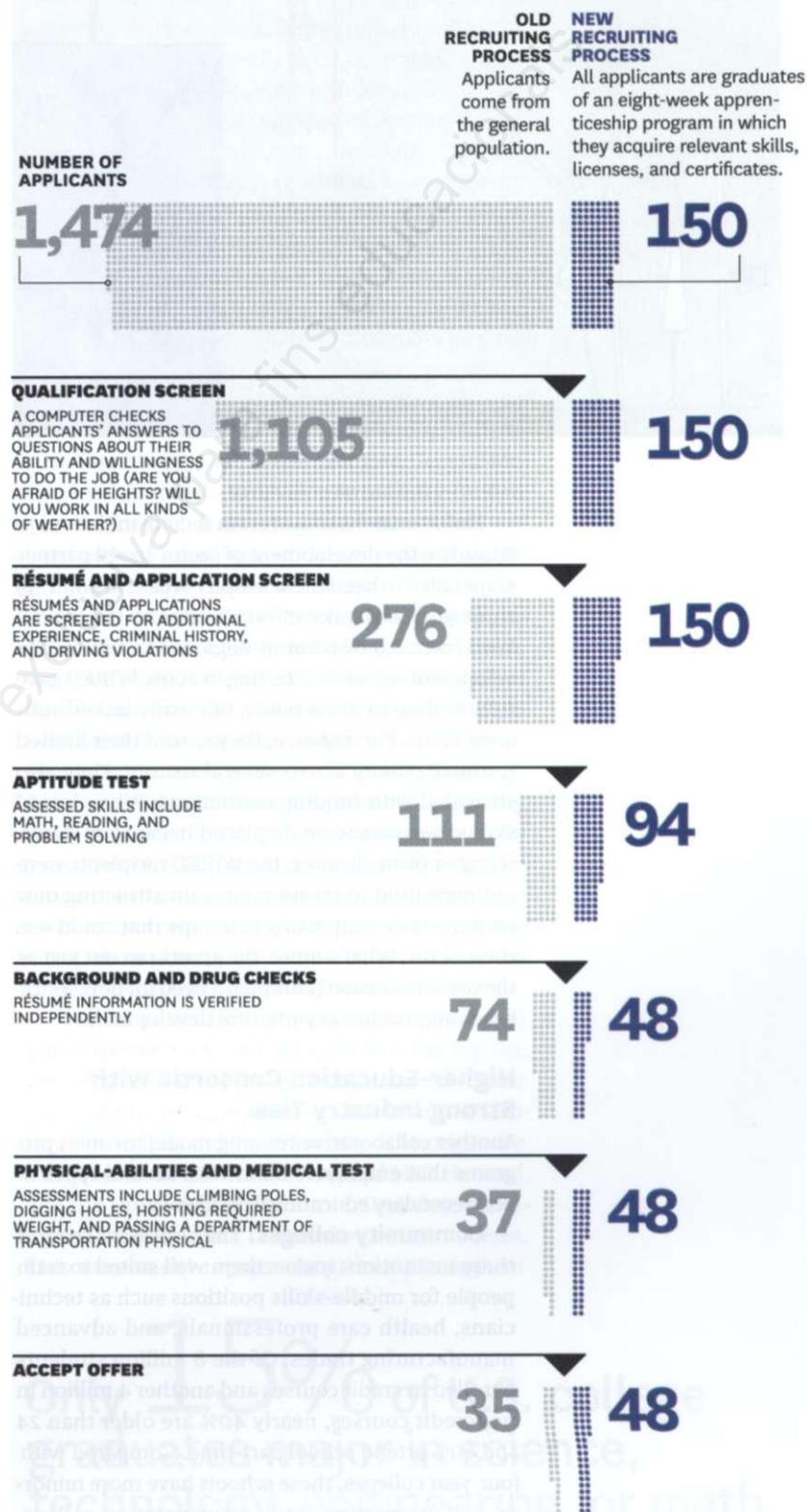
The problem is often not skills supply. Some pilot experiments have revealed that persistent skills shortages—for example, in nursing and other medical specialties—sometimes were due not to a lack of qualified professionals but rather to ways of organizing work that led to high turnover. Redesigning jobs to attract a new generation of employees significantly improved retention.

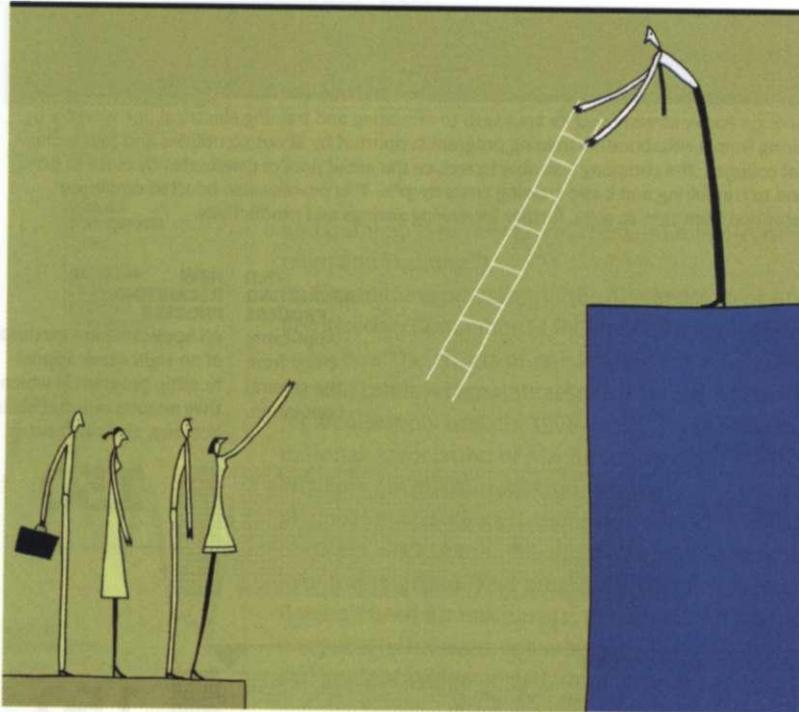
**Identify a network integrator.** Perhaps the key factor in establishing skills ecosystems is to find one person in an organization who can unite a wide range of stakeholders, including companies, local policy makers, and skills providers (such as community colleges, vocational schools, universities, and private training organizations). That person must have strong credibility with the various actors and a proven track record in fostering cooperation.

**Building skills ecosystems takes time.** Solutions involve more than designing a few new courses. They may not be very expensive to create, but they require at least three to five years of steady funding.

## Streamlining Recruitment and Training

Georgia Power streamlined its approach to recruiting and training electrical line workers by hiring from a collaborative training program supported by about 50 utilities and four technical colleges. The company was able to reduce the initial pool of candidates by close to 90% and to trim hiring and basic-training costs by 31%. This process also boosted employee retention from 75% to 93%, further increasing savings and productivity.





An associate's degree increases earnings by an average of

**13%**  
for men and

**39%**  
for women.

Unfortunately, some recent federal initiatives to stimulate the development of sector-based partnerships failed to heed these lessons. A case in point: **39** three-year local pilot efforts funded by the federal Workforce Innovation in Regional Economic Development initiative. Starting in 2006, WIRED gave \$325 million to those pilots, but many lacked sufficient focus. For instance, they spread their limited resources thinly across several sectors. They also struggled with funding restrictions: When lots of skilled workers were displaced because of downsizing or plant closures, the WIRED recipients were not permitted to spend money on attracting new employers or supporting start-ups that could use these skills. What's more, the grants ran out just as the Great Recession prompted a need for new sector-based approaches to workforce development.

### Higher-Education Consortia with Strong Industry Ties

Another collaborative training model involves programs that employers build with several types of postsecondary educational entities.

**Community colleges.** The enormous scale of these institutions makes them well suited to train people for middle-skills positions such as technicians, health care professionals, and advanced manufacturing trades. Of the **8** million students enrolled in credit courses and another **4** million in noncredit courses, nearly **40%** are older than **24** and **60%** attend school part-time. Compared with four-year colleges, these schools have more minority, self-supporting, and first-generation college

students. Obtaining an associate's degree increases earnings, on average, by **13%** for men and a remarkable **39%** for women. The challenge is that nationally only **15.5%** of the students complete their programs within three years of initial enrollment, and nearly half never receive any degree or certificate. That's a wasted opportunity, both for the students and for employers in need of talent.

To avoid these losses, employers must work intensively with students and faculty at community colleges. Two programs that have achieved high retention, completion, and placement rates in this way are Project Quest, a network of programs linked to the Industrial Areas Foundation in Texas and Arizona, and BioWorks, a consortium of life-sciences firms and community colleges in North Carolina.

Project Quest, which the Aspen Institute and Harvard's John F. Kennedy School of Government have singled out as a potential national model, helps people land their first middle-skills jobs at member companies. Its hallmarks are the high level of personal support that it provides and the strong collaboration among community groups, churches, businesses, and community colleges that it fosters. The programs in the network collaborate with local firms to identify job openings. Employers also provide information about their evolving staffing requirements, cooperate in curriculum development, and offer financial or other support to the trainees and the colleges.

Project Quest's dropout rates are low (about **10%**), because counselors from the community organizations stay in touch with the schools and try to ad-

dress students' challenges early, in part with tutoring services and mandatory motivational group sessions called VIP meetings (for vision, initiative, and persistence). Counselors track the progress of students, give them updates, advise them on budgeting their resources, make them aware of other available private and public aid, and administer support (for tuition, books, child care, transportation, and emergency aid for other living expenses). The combination of strong employer commitment, cooperation with community colleges, and student support has led to considerable wage gains for participants. An evaluation by one of us (Osterman) found that the earnings of people who completed a Quest-backed community college program rose by an average of \$5,000 a year; if they landed middle-skills jobs, the figure rose to \$10,000 a year.

In North Carolina, the community colleges in the BioWorks consortium train workers for initial jobs at more than **200** member firms in the life-sciences industry and also help retrain those companies' existing employees. The program has helped to attract new companies to the state.

Key to its success are the state-of-the-art equipment and space for satellite training labs provided to the colleges by leading firms such as Novo Nordisk, Hospira, and Talecris. In return, these companies send some of their current workers to the programs for specialized training during scheduled maintenance shutdowns—a win-win-win arrangement for the employees, businesses, and schools. Proximity also allows company managers and engineers to visit classes, advise students on career opportunities, and discuss technical and organizational issues that students will face when they finish the programs. This intensive and extensive exchange of ideas, equipment, and personnel helps these programs keep up with new and constantly changing skills requirements.

#### **Internships and cooperative education.**

One of the best ways to ensure that new university graduates can meet the needs of employers is to build well-designed internships or cooperative degree programs (called co-ops). This "try before we buy" approach allows many employers to assess the skills, work ethic, and attitudes of prospective workers and to give them training tailored to firms' specific needs. Internships and co-ops help students earn credit toward graduation, relevant work experience, and a chance to apply classroom learning in the real world.

A handful of universities have built international reputations for their superb co-op programs. For example, Northeastern, in metropolitan Boston, enrolls **93%** of its students in co-op programs with 2,500 companies in 69 countries. Indeed, Northeastern is now expanding its program by opening its first campus outside Massachusetts—in Charlotte, North Carolina. Online education, which allows students to do internships far from campus, has made it easier for co-op programs to thrive.

MIT's Leaders for Global Operations program sets its sights higher than middle-skills jobs, but it nonetheless illustrates how industry leaders can help initiate and sustain a university-industry consortium. Inspired by MIT's Made in America project, MIT faculty in the 1980s reached out to several major firms—including Boeing, United Technologies, General Motors, Intel, and Dell—to develop an industry-funded joint engineering and management curriculum, tailored to those firms' state-of-the-art production, HR, and product-development practices. Companies now nominate employees to enroll in the MIT program, host interns for six-month projects and thesis work, and have first dibs on recruiting students not already employed by a partner company. (MIT retains the right to make final selections and to admit people with no ties to the participating firms.) Industry executives serve on the program's governing board and operating committee, and alumni actively recruit, mentor, and supervise student interns. The program has produced more than **1,000** graduates since its inception, and more than half of the students who had no previous ties to the participating companies have been hired by them.

**Online education.** For-profit, nonprofit, and public universities, including those in the top tier, are offering or developing exclusively web-based degree and certificate programs. For example, Stanford, Princeton, and the University of Michigan are members of for-profit Coursera, and MIT, Harvard, and the University of California, Berkeley, are involved in edX, which creates free online courses. This movement represents a breakthrough in

only **15%** of U.S. college graduates major in science, technology, engineering, or math.

People who completed a Quest-backed community college program and landed a middle-skills job raised their annual earnings by an average of **\$10,000**

broadening access to education worldwide, and employers should seize the chance to help shape it to meet their needs.

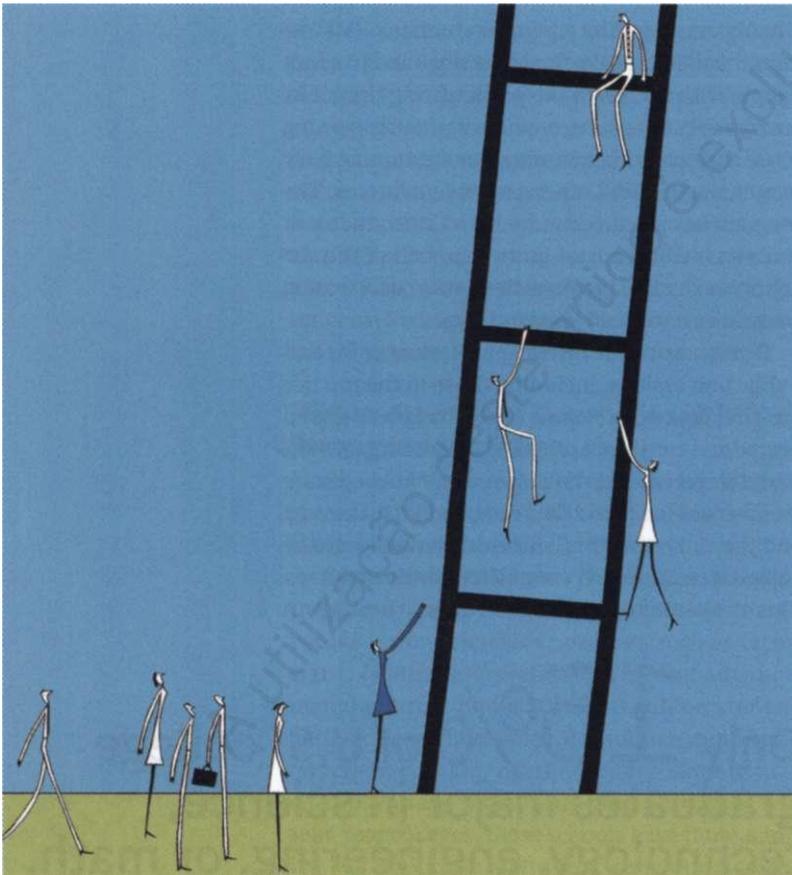
Employers with workforce shortages of critical skills could partner with universities to provide online courses for entry-level professionals and on-the-job opportunities to apply the new skills. This approach would offer a powerful second chance for underemployed or unemployed graduates with non-technical degrees who have the intellectual capacity to learn the basic engineering, math, and IT skills that are in short supply. Employers would simply need to collaborate with these new online entities in the same way that manufacturing firms have worked with MIT since the 1980s.

### From Best Practices To a National Strategy

A national, one-size-fits-all training system will not work in a country as diverse as the United States. But the approaches highlighted in this article provide many options that collectively could train enough people to fill the growing number of openings for middle-skills jobs. The challenge is to scale up sufficiently. We believe that the federal government has not only a role to play but also a model to use: its current Race to the Top funding incentives for K-12 education reform. Such a model could seed funding for consortia of businesses, educational institutions, unions, community groups, worker centers, and other labor-market intermediaries to develop the specific skills that employers verify are in short supply in their region or industry.

Toward that end, the U.S. Commerce Department has invited regional consortia of employers, educational institutions, and nonprofits to bid for a \$30 million grant to test the Obama administration's proposal to invest \$1 billion in a National Network for Manufacturing Innovation. The grant specifically calls for the types of engagement and coordinated efforts we have described—to educate people, place them in jobs, and provide them with ongoing career-related training in advanced manufacturing skills.

The bottom line: The U.S. can—and must—close the middle-skills gap to remain competitive, remedy wage stagnation, and raise living standards. That will take leadership and innovation from various constituencies—business (individual firms, but especially industry associations), education, and labor—and targeted federal funding and incentives. Government incentives, informed by examples that have already demonstrated proof of concept, can serve as a catalyst to spread innovation, but success ultimately depends on leadership and cooperation from the private sector.  **HBR Reprint R1212F**



 **Thomas Kochan** is the George Maverick Bunker Professor of Management at MIT's Sloan School. **David Finegold** is the senior vice president for lifelong learning and strategic growth at Rutgers University. **Paul Osterman** is the Nanyang Technological University Professor of Human Resources and Management at MIT's Sloan School.