

**A Publication of**

National Academy of Sciences  
National Academy of Engineering  
Institute of Medicine  
University of Texas at Dallas

[HOME](#)[BACK ISSUES](#)[SEARCH ALL ISSUES](#)

[GO](#)**PERMISSIONS**

[For more information regarding reproduction of this article, please click here.](#)

**Leadership Skill**

Improve Skills in Project Mgmt, IT, Business & More. Try it Now!

## THE PATH NOT STUDIED

[◀ PREVIOUS](#)[TABLE OF CONTENTS](#)[NEXT ▶](#)

ROBERT I. LERMAN

### Building a Wider Skills Net for Workers

**A range of skills beyond conventional schooling are critical to success in the job market, and new educational approaches should reflect these noncognitive skills and occupational qualifications.**

The skills of workers in the United States are critical to their own economic performance as well as to that of society at large. But today, despite the nation's generally healthy economic growth in recent decades, workers face serious challenges. Less-educated workers have seen their wages stagnate or decline. The share of workers covered by pensions and health insurance has declined. Immigration, outsourcing, and the expanding labor force in India, China, and other less-developed countries have increased the competition for jobs in a world labor market.

Yet to right these workplace problems, policymakers are, for the most part, looking in the wrong direction. They should be paying more attention to what skills workers really need to succeed, rather than focusing on an assumed set of skills that may not be so critical after all.

Economists widely see the job market as generating a rising demand for skills that is outpacing the supply, thereby widening wage differences between the skilled and unskilled. They favor expanding the share of skilled workers to improve economic growth, increasing the number of workers obtaining good-paying jobs, and lowering wage differentials. In translating a skills strategy into concrete actions, policymakers have focused almost exclusively on adding schooling, partly because the common definition and measure of skills is educational attainment, sometimes supplemented by reading and math test scores.

As evidence for their case, policymakers often cite statistics

showing that U.S. workers no longer lead the world in formal education. They also note that employers report difficulty in recruiting workers with adequate skills. Over half of manufacturing firms reported that the shortage of available skills is affecting their ability to serve customers, and 84% of the firms say that the K-12 school system is not doing a good job preparing students for the workplace. In response, federal and state governments have increased spending on elementary, secondary, and postsecondary schools, mandated test-based performance measures that hold schools accountable for student performance, expanded competition and school choice, and offered subsidies to help students attend college.

But the current approach ignores the presence of a multiplicity of skills required for successful careers. Although reading, math, and writing capabilities are in high demand and are relevant to most jobs, so too are occupation-specific and other generic skills, including communication, responsibility, teamwork, allocating resources, problem-solving, and finding information. Unfortunately, it is difficult to conceptualize and measure the broad array of skills critical to career success. When the policymakers, educators, and the public lack information on critical occupational and generic skills, they find it difficult to diagnose trends, identify skill gaps, learn about the skill limitations of different subgroups, understand the skills in most demand, and determine the best mechanisms for teaching skills.

The problem is compounded when it comes to projecting future skills. But the evidence indicates that skill requirements will be heterogeneous and most job openings will be in careers that do not require a bachelor's degree or higher. In defining high-, medium-, and low-skill positions, the U.S. Bureau of Labor Statistics relies on formal educational requirements, the share of workers at each educational level, and the amount of specialized training required for a given occupation. Given these criteria, the past two decades have witnessed somewhat higher growth in high-skill and low-skill occupational categories than in middle-skill jobs. Still, middle-skill occupations account for nearly half of all jobs, with high-skill categories at 35% and low-skill fields at 16%.

Changes in specific occupations illustrate this pattern. At the high end of the schooling distribution, examples of growing occupations include teachers, financial managers, health managers, and accountants and auditors. Many middle-skill jobs, such as registered nurses and health technicians, have shown rapid increases in employment as well. Jobs in construction occupations, many of which require substantial classroom and on-the-job training, have expanded by about 4 million since 1986.

In the coming decade, according to projections by the Bureau of Labor Statistics, 47% of all job openings will be in heterogeneous middle-skill positions, whereas high-skill occupational categories will account for about one-third of job openings. Past patterns and current expectations suggest that most jobs in the foreseeable future will not require a bachelor's degree but that half will demand a varied array of skills generally gained through community colleges, occupational training, and work experience.

What skill strategies will work best to prepare these and other workers? Economists commonly distinguish between general skills (capabilities that increase a worker's productivity in a range of firms) and specific skills (capabilities that increase productivity within one firm). Firms are less likely to pay to expand general skills because they are unlikely to recoup their investments, since competing firms will bid up the wages of newly trained workers to match their enhanced productivity. Partly for this reason, the burden of financing general skill development falls mainly on governments and individuals. In contrast, firms can earn a return on investments in specific training because the added skill will be useful to the current firm but will probably not command higher wages from other firms.

Though useful and effective in predicting a range of outcomes, the human capital perspective ignores some motivational factors that affect the accumulation and effective use of skills. Not all learning is for instrumental purposes. People often learn in order to satisfy their curiosity or to gain a sense of accomplishment. The ability to learn a skill conveys a sense of pride, and the effective use of skills in an occupation often brings workers a sense of identity. Skills rarely raise productivity in isolation; increases in productivity typically result when workers use their skills to complement the work of others in an appropriate setting within the organization.

The human capital framework offers little guidance about which general, specific, or occupational skills are valuable in any given labor market. One approach is to use educational attainment as a proxy for skills. Another is to estimate the gains in earnings associated with specific cognitive skills. Although economists have found that years of schooling and scores on math and verbal tests are positively correlated with earnings, these measures account for only a modest amount of the variation in earnings among workers, thus indicating that other attributes or skills are relevant to job performance. To identify these attributes, a commission sponsored by the U.S. Department of Labor studied what effective workers require to succeed on specific jobs. The commission's report documented many important skills not directly taught in

school, such as the ability to allocate time and resources, to acquire and evaluate information, to participate effectively as a member of a team, to teach others, to negotiate differences, to listen and communicate with customers and supervisors, to understand the functioning of organizational systems, to select technology, and to apply technology to relevant tasks. Context also matters. Responsibility and attention to detail are necessary for mowing lawns and for nursing as well, but the required levels differ enormously.

Employer hiring practices are consistent with the commission reports. Surveys find that employers view such personal qualities as responsibility, integrity, and self-management as being as important or even more important than basic skills. In a survey of over 3,300 businesses, employers ranked attitude, communication skills, previous work experience, employer recommendations, and industry-based credentials above years of schooling, grades, and test scores. Other research shows that workers gain high wage returns from occupation-specific and industry-specific work experience.

Many skills must be learned in the context of a work environment or through joining experienced workers in a “community of practice,” or both. Workplaces not only require formal knowledge—facts, principles, theories, and math and writing skills—but also informal knowledge, embodied in heuristics, work styles, and contextualized understanding of tools and techniques. A revealing study found that auto repair workers needed social skills to succeed in learning informal knowledge, as captured in stories, advice, and guided practice. Other studies of the schooling and job market experience of a cohort of workers showed that except for college graduates, noncognitive skills (as measured by indices of locus of control and self-esteem) have at least as high and probably a higher impact on job market outcomes than do cognitive skills.

The importance of noncognitive skills does not mean that verbal, math, and writing skills are irrelevant or unnecessary for the vast majority of positions. When employers emphasize personal qualities, they may be assuming that workers have at least some basic academic skills and that once some threshold level is reached, noncognitive skills become a

Reforms should include offering students the option of attaining rigorous occupational qualifications through programs that incorporate academic, occupational, and other workplace skills.

priority. On the other hand, few workers use many of the academic skills that educators view as vital to success. In a survey of a representative sample of workers, only 9% reported using the capabilities learned in basic algebra, and only 13% or fewer workers below the upper white collar job level ever write anything five pages or longer.

Nonetheless, schooling remains the nation's primary skill-development vehicle, with expenditures of nearly \$1 trillion on 72 million students, including 17 million in postsecondary programs. Despite the high and rising expenditures per student, national reports, public officials, and the general public have expressed great dissatisfaction with the ability of the educational system to help students gain adequate skills. Still, the economic rates of return from completing high school and college are 13 and 10%, respectively, suggesting that schools are doing something right. However, schools are unable to retain as many as one in four students through high school. Nearly half of the dropouts attribute their school-leaving to boredom and lack of interest in classes. Employers report great dissatisfaction with the quality of high-school graduates. In one survey, firms reported that 60% of applicants with a high-school diploma or GED were poorly prepared for the typical entry job in the firm. Finally, the observed high rates of return from completing high school and college do not reveal whether alternative approaches might be more cost-effective in improving earnings and occupational outcomes.

### **Boosting career-focused training**

Increasingly, state standards are driving school curricula, but not necessarily in directions that best prepare students for careers. At the high-school level, the standards typically require that all students take academic courses that meet college requirements. There is little discussion about how the requirements respond to the heterogeneous skills required for careers. Education and political leaders seem to view "ready for work" as implying that students complete college-prep academic courses, assuming that students will learn occupational and other workplace skills on the job or in community colleges.

Although some of the nation's skill-building efforts are explicitly career-focused, they have declined relative to formal schooling. Yet many vocational programs remain, including career and technical education programs in high schools and community colleges, occupational programs provided through for-profit proprietary schools, and publicly supported job-training programs. The record of these programs is mixed. Vocational high-school programs, though much maligned, appear to raise the earnings of students sufficiently to yield a solid rate of return. Taking several

career and technical education courses leads to substantial gains in employment and earnings gains about eight years after normal high-school graduation. The gains are especially high among at-risk and minority students. Work-based learning through cooperative education adds to the earnings effects. Career academies are schools within schools that often have an industry focus, such as finance, tourism, or health. An experiment in eight cities indicates that career academies lead to increased earnings for male students, especially those with a high risk of dropping out of high school.

In the case of community colleges, the earnings gains are higher for completing a vocational program than for completing an academic program. Some studies indicate that men achieve no gains in earnings after a year of academic community college work or an academic associate's degree but that women gain from both programs.

Studies generally find that education programs with close links to the world of work improve earnings. The earnings gains are especially solid for students unlikely to attend or complete college. Cooperative education, school enterprises, and internship or apprenticeship increased employment and lowered the share of young men who are idle after high school. Women unlikely to attend college also achieved earnings gains from the internship or apprenticeship components of high school programs.

Youth apprenticeships go beyond school internships by providing in-depth work-based learning combined with related course work. In the late 1980s and early 1990s, the federal government sponsored demonstration projects, and some states began youth apprenticeship programs. But by the mid-1990s, government officials administering the School-to-Work Opportunities Act of 1994 were deemphasizing youth apprenticeship in favor of less intensive interventions. Today, youth apprenticeships play a very minor role, though Wisconsin, Georgia, and some other states still have solid youth apprenticeship programs.

Outcomes from other public and private training programs vary widely. Publicly sponsored job-training programs generally provide only short-term training. Although they generate sufficient gains for women to offset their costs, the gains for adult men and for young people are low. Even Job Corps, an intensive program for young workers that yields earnings gains for at-risk youth, fails to pass a standard cost/benefit test.

Many workers learn productive skills through formal employer-led training, informal training, and work experience. Some employer-led training introduces workers to operations,

safety aspects of the job, and organizational goals. Other training aims at raising the basic skills of workers and their capability to implement new technologies or organizational methods. Some long-term training improves the occupational skills of workers in diverse professions such as medicine, nursing, law, and plumbing. Employer-led training generally occurs in the context of a work environment.

Much of the employer-led training is short-term but yields high rates of return. One recent study found that 60 hours of employer training increased wage rates by about 5%, indicating rates of return on an annualized basis of at least 40 to 50%. The skill development that takes place informally on the job is productive as well, yielding returns for workers and firms.

One long-term component of employer-led training is apprenticeship, a highly structured approach that combines three to four years of learning on the job with theoretical and practical courses related to a profession. These programs require apprentices to demonstrate mastery of the full complement of skills required for a skilled worker in the relevant occupation. Employers are responsible for documenting the ability of apprentices to use occupational skills in the context of the productive process. The Department of Labor's Office of Apprenticeship administers the registered apprenticeship system by approving firm-based or industry-based programs, tracking apprentices, providing a certification to completers, and monitoring compliance with antidiscrimination laws. Approximately 450,000 workers are registered apprentices as of 2008. Evidence from national household surveys suggests that substantially more workers are in apprenticeship programs that are not formally registered. The limited research on gains from apprenticeship indicate that completing apprenticeships yields gains that are substantially higher than comparably estimated gains for individuals graduating with a vocational degree from community colleges.

What are the implications of the evidence on programs and skill requirements for public policy? How can the United States best improve worker capabilities and qualifications for productive careers? Policymakers concerned about these questions generally focus on educational goals, particularly raising verbal, math, and science scores and widening access to college. Less emphasized are policies that help potential workers attain a broad range of skills required in the workplace, that acknowledge the diversity of learning styles and skill requirements, that recognize the importance of retaining and using skills, that limit the costs experienced by students and government, and that increase student motivation.

Consider the widely stated goal of assuring that “all students should leave high school ready for college or work.” The implicit goal is to prepare everyone for college, as indicated by the fact that state high school standards increasingly require that all students take a college-prep curriculum. There is little discussion or analysis of what is meant by “ready for work.” Officials setting standards provide little documentation about why the college prep curriculum is universally required to be work-ready. Although more learning is desirable, not every content standard in literature, math, science, and social science is central to qualifying workers for productive careers. Current academic content standards may prevent students from taking courses that may be more helpful to their careers or may worsen the dropout problem, or both.

### **Toward sensible reforms**

What, then, are sensible high-school reforms that can create a better-qualified work force? A good start is to recognize the diversity of skills and learning styles required for success in the workplace. Reforms should include offering students the option of attaining rigorous occupational qualifications through programs that incorporate academic, occupational, and other workplace skills and that combine school-based instruction with well-structured work-based learning. Students would learn work discipline and make practical use of their reading, writing, math, and science skills in the context of achieving a demanding occupational standard. Many students who drop out because classes are not interesting could be more engaged in programs that provide learning at work, pay, and an occupational certification.

This approach of using workplaces as learning environments is supported by several strands of research. It builds on evidence of the importance of occupational skills and other noncognitive skills. It is consistent with evidence on the effectiveness of sectoral approaches and of employer-based training, including on-the-job training. It offers good options for meeting such youth-development goals as personal autonomy, motivation, and knowledge of vocations. It helps link the supply mix of skills to the composition of demands by employers. It helps students develop an occupational identity, a professional ethic, and self-esteem based on accomplishment.

One initiative that combines high standards, projectbased learning, and an occupational focus is Project Lead the Way. The program offers engineering and biomedical science curricula to high-school students in over 1,500 schools, often through career and technical education programs. It emphasizes project-based learning and the application of

math and science to subjects such as electronics, civil engineering, and architecture. The project also incorporates noncognitive skills, such as working in and leading a team, public speaking, and managing time, resources, and projects. Careeracademy and other technical preparation programs also offer starting points for expanding occupational skills and noncognitive workplace skills.

To help diffuse these approaches among schools, states should expand their educational standards to include the noncognitive skills highlighted in national studies, and they should take steps to encourage the development of career-focused qualifications linked with real careers. One barrier to recognizing these skills is the disparate nature of occupational skill qualifications. States typically have a plethora of standards for certification and licensing requirements, often influenced by current members of the occupation. At one time, the National Skill Standards Board tried to make these standards more coherent. The board failed, but it is time for another try. The federal government and state governments should modernize and broaden their occupational profiles to ensure that individuals obtain qualifications that extend beyond a narrow category of occupations. Once sound standards are in place and schools see themselves and their students judged on the basis of these broader competencies, they may be more receptive to approaches that build these skills.

For adults, public and private activities to increase job-related skills are increasingly turning to employer-led or employer-linked training initiatives. The initiatives often select an industry sector, create coalitions, assess the skill requirements for existing positions, project skills required to upgrade jobs, recruit and target potential trainees, develop training modules, and obtain a mix of public and private funding. The focus on industry needs and close linkages with employers is sound, but so far, the programs are ad hoc arrangements and not a systemic part of the landscape.

Like sectoral programs, apprenticeship training is driven by employer demand, but differs in having more in-depth, long-duration training in classes and at workplaces. Apprenticeship generates high skills for participants, involves extensive work-based learning, requires few or no foregone earnings on the part of participants, builds in wage progression and job ladders, and offers a respected portable certification. The programs provide academic classroom education that is at least equivalent to that in community colleges, as well as training in the tasks, problem-solving, and social interactions of the occupation. The learner can draw on help from experienced adults and from peers trying to succeed in the same career. Apprenticeships are mainstream in Western Europe and in other advanced

economies, providing training for 50 to 70% of young people in Switzerland, Austria, and Germany. It is expanding rapidly in other countries, including Ireland, Australia, and the United Kingdom.

In the United States, the budget to administer, oversee, and promote registered apprenticeships is only \$20 million, a tiny fraction of the cost of training initiatives of similar scale. Added investment in the federal Office of Apprenticeship would likely bear increased fruit. Tripling the current budget, which would cost only \$40 million, could go toward expanding outreach and technical assistance, stimulating more employers to offer apprenticeships, funding development and marketing of new apprenticeship occupations, coordinating skill requirements across programs in the same occupations, and conducting research and evaluations. If the expanded funding generated a 2 to 3% increase in apprentices, it would more than pay for itself. Ideally, apprenticeship programs should work closely with high schools to provide immediate outlets for graduates. These steps could well encourage more students to complete high school and to gain sufficient academic competencies to qualify for the new opportunities.

Expanding apprenticeships is likely to be a highly cost-effective method for skill building. Foregone earnings (and foregone output) are low or zero, depending on the alternative job available to the apprentice. Although no definitive analysis has estimated the returns to apprentices (over, say, highschool graduates with no other certification), the evidence from Washington state indicates earnings gains in the range of \$15,000 to \$17,000 per year. Given these figures, adding apprentices will almost certainly exceed the social returns from adding marginal college students, especially since two-thirds of community college participants do not complete a degree within four years and about 45% of entrants to four-year programs do not complete within six years. Skills learned through apprenticeship are more likely to be retained because they will be used far more often than classroom subjects that are often disconnected from the workplace.

The time has come to base skill-building in the United States on improved measures and more nuanced policies. U.S. residents have long viewed education and training as primary mechanisms for economic mobility. Unfortunately, laudable efforts to promote opportunity have too often become too narrowly focused on raising educational attainment and academic test scores. Years of schooling and test scores certainly are relevant to success in the job market, but so is a range of other skills, including noncognitive skills and occupational qualifications. It is important that the nation develop and use appropriate measures of skills and

qualifications not only to track progress and shortfalls, but also to encourage sound workforce policies. When the public and private sectors begin to assess qualifications using more comprehensive measures, policies to deliver skills will become more effective.

### **Recommended reading**

Michael Eraut, "The Role and Use of Vocational Qualifications," *National Institute Economic Review*, no. 178 (October 2001): 88–98.

Howard Gardner, *Intelligence Reframed: Multiple Intelligences for the 21st Century* (New York: Basic Books 1999).

Stephen Hamilton, *Apprenticeship for Adulthood* (New York: Free Press, 1990).

James Heckman, Jora Stixrud, and Sergio Urzoa, "The Effect of Cognitive and Non-Cognitive Abilities on Labor Market Outcomes and Social Behavior," *Journal of Labor Economics* 24, no. 3 (2006): 411–482.

Harry Holzer and Robert Lerman, *America's Forgotten Middle Skill Jobs* (Washington, DC: The Workforce Alliance, November 2007).

Bonaly Nelson, "Should Social Skills Be in the Vocational Curriculum? Evidence from the Automotive Repair Field," in *Transitions in Work and Learning: Implications for Assessment*, eds. Alan Lesgold, Michael Feuer, and Allison Black (Washington, DC: National Academy Press, 1997).

Cathleen Stasz, "Assessing Skills for Work: Two Perspectives," *Oxford Economic Papers* 53, no. 3 (2001): 385–405.

Hilary Steedman, "Apprenticeship in Europe: 'Fading' or Flourishing?" Centre for Economic Performance Discussion Paper No. 710 (London: London School of Economics, 2005).

---

### **Partnership pays off**

When General Motors (GM) decided to build a new transmission manufacturing plant in Baltimore, Maryland, the company immediately sought a partner to address its training needs. The company faced the huge challenge of developing and implementing a major customized training program to prepare hundreds of experienced GM employees for work at the new plant. It was crucial that the employees be trained to understand the state-of-the-art equipment they would use to fabricate key components with fine tolerances and

assemble them according to customer specifications. At the new plant, employees would use computer numerical control (CNC) machine tools, read and interpret blueprints, and rotate among different jobs as part of 5- to 10-person teams. Their previous experience of up to 30 years in the traditional assembly-line environment of GM's Baltimore truck plant left them unprepared for this new and totally different culture.

GM needed a comprehensive training program including basic skills (reading and algebra), technical skills (metrics, machine parts gauging, computer use, equipment operation, and blueprint reading), and soft skills for the new organizational culture (team building and situational leadership). All of these components had to be tailored to the unique learning needs of the older employees. These complex requirements represented a significant departure from what the Community College of Baltimore County (CCBC) had done in the past.

The college rose to the company's challenge. First, the college resource center administered a "learning-gap analysis" to all of the employees, in which they rated their own abilities and discussed them with a counselor. Then, in April 2000, the formal training began. For three months, while the new plant was under construction, about 150 GM employees attended full-time training at the college campus. The college dedicated 10 instructors to the GM employees and also hired guest experts to teach about topics ranging from gauging and geometric tolerancing to conflict resolution. To maintain the trainees' interest, each day included a mix of activities, beginning with a morning business meeting, followed by classes in basic skills, soft skills, and technical skills.

When the plant opened and launched production, the college provided all employees with specific on-the-job training in the new work environment. In total, 375 hourly and salaried employees were trained. Since that time, CCBC has continued to respond to other plant training needs and to provide personal development courses to employees, many more of whom take advantage of their union-negotiated tuition assistance benefits than had previously.

GM and CCBC have both benefitted from the strong commitment each made to the partnership. The company avoided the costs of locating and hiring a qualified trainer for each different element of the comprehensive training program and buying or leasing training facilities. For example, the college offered computer labs where employees could access various curriculum modules. In addition, because the college was located in the neighborhood of the new plant, conducting the training there increased the visibility of the new GM plant, which was good for business.

More important, the partnership enhances the plant's competitiveness, delivering the additional learning that the workers need in order to provide continuous product and process improvement and to drive safety, quality, and on-time delivery. This success was demonstrated in 2006, when GM selected the Baltimore transmission plant as the site for production of a new hybrid vehicle transmission, investing millions of new dollars and creating more local jobs.

The college has reaped benefits as small and medium-sized manufacturing firms in the area have learned from the partnership and taken a similar approach. The curriculum originally tailored to meet GM's needs has a common core of skills needed in other manufacturing plants, and the college has established larger partnerships, including GM and other manufacturers, to update the curriculum and deliver these skills. The college enjoys a growing reputation, both within the state and nationally. Maryland's Department of Economic Development uses the GM-CCBC partnership as a template for other companies with training needs, and GM headquarters sends launch teams who are planning new plants or products to Baltimore to learn from the plant and the community college. The college's growing success is built on its new approach to working with business developed through the partnership with GM.

Today, the plant is a world class operation that is prepared to meet the competition thanks to the solid baseline of skills developed through our partnership with CCBC.

*Thomas A. Gallagher is plant manager at GMPT  
Baltimore Transmission.*

---

---

*Robert Lerman ([rlerman@ui.urban.org](mailto:rlerman@ui.urban.org)) is a senior fellow in labor and social policy  
at the Urban Institute and a professor of economics at American University.*

◀ PREVIOUS      TABLE OF CONTENTS      NEXT ▶

Copyright © 2008. University of Texas at Dallas. All rights reserved. P.O. Box 830688, Richardson, TX 75083-0688.  
Terms of Use and Privacy Statement