

## Readiness for the Learning Economy

*Insights from OECD's Survey of Adult Skills  
on Workforce Readiness and Preparation*

Louis Soares and  
Laura W. Perna



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**Louis Soares**

*Vice President for Policy  
Research and Strategy  
American Council on  
Education*

and

**Laura W. Perna**

*Professor, Higher  
Education Division,  
Graduate School of  
Education*

*Co-Director of the  
Alliance for Higher  
Education and  
Democracy (AHEAD)  
University of  
Pennsylvania*

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## Introduction

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In today's global, technology-driven economy, education is critical to national competitiveness and individual opportunity. Literacy, numeracy, and problem-solving skills are the foundation for how adults engage in the workplace, at home, and in the community. In fact, these skills are now the basis for success in today's learning economy—a world in which the need to use knowledge undergirds all aspects of daily life (Lundvall 2000). In a learning economy, skill development, measurement, and use determine the well-being of individuals, businesses, and nations alike.

The Survey of Adult Skills, a new data collection effort led by the Organisation for Economic Co-operation and Development (OECD), provides useful insights for understanding the characteristics of the learning economy and the readiness of adults to prosper in this learning economy. OECD's Survey of Adult Skills, published in November of 2013, enhances understanding of workplace readiness by offering assessments of proficiency (from low to high) on measures of literacy, numeracy, and problem solving with information-technology (IT) tools—critical cognitive and workplace skills—for individuals in 24 participating countries and sub-national regions (OECD 2013a). As such, the findings have important implications for policy and practice.

The survey reveals that relatively small shares of adults in the United States have strong literacy and numeracy skills, and higher shares of adults in

the United States than in many other nations have weak literacy and numeracy skills. On measures of problem solving, the performance of U.S. adults more closely mirrors the average performance of adults in other participating nations. The survey also reveals that, although proficiency levels in literacy, numeracy, and problem solving in general rise as education levels rise, proficiency levels in literacy, numeracy, and problem solving with information tools vary within education levels.

The relatively low proficiency of adults in the United States compared with other nations has garnered notable—and appropriate—attention from the public and from education leaders. Yet the greatest contribution of the Survey of Adult Skills may be the light it sheds on the increasingly complex and interrelated connections between formal education and credentials and the use of particular skills in work, home, and community settings. The survey also underscores the importance of these skills to individual and national well-being, as higher-level skills are associated with better labor-market outcomes, including higher wages, higher likelihood of employment, and other valued outcomes.

In this report, we first discuss the importance of education and skills in the twenty-first century. Then we briefly describe the methodology for the survey and present key findings, focusing on skills of adults in the United States. We conclude by identifying implications of the survey and its findings for policy and practice.

# The Learning Economy: The Intersection of the Knowledge Economy and Human Capital Development

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Throughout much of the twentieth century, technological improvements in agriculture and industry enabled people with few skills to be economically prosperous. The development of mass production allowed low-skilled farmers to move to the city, get jobs in factories, and produce remarkably high output. These workers typically made more money than they ever had on the farm, and eventually some of their children were able to get enough education to find more enjoyable and higher-paying work. In that period of dramatic change, it was the highly skilled craftsperson who was vulnerable to a permanent loss of wealth. Economists speak of the middle part of the twentieth century as the “Great Compression”—the time when the income of the unskilled approached the income of the skilled.

In the twenty-first century, technology is having the opposite impact. Technological advancement and innovation are creating profound change in the information-processing, academic, and technical skills required not only for newly created jobs, but also for existing jobs. A learning economy is emerging in which success requires knowledge and adaptation to changing workplace processes. In a January/February 2012 article in *The Atlantic*, Adam Davidson poignantly describes the shift in the nature of work in U.S. factories by juxtaposing the status and experiences of two co-workers, one with postsecondary education (Luke) and one who has earned only a high school diploma (Maddie):

Skilled workers now are required only to do what computers can’t do (at least not yet): use their human judgment. This change is evident in the layout of a factory. In the pre-computer age, machines were laid out in long rows, each machine tended constantly by one worker who was considered skilled if he knew the temperament of his one, ornery ward. There was a quality-assurance department, typically in a lab off the factory floor, whose workers occasionally checked to make sure the machinists were do-

ing things right. At Standard [one U.S. factory], today, as at most U.S. factories, machines are laid out in cells. One skilled operator, like Luke, oversees several machines, performing on-the-spot quality checks and making appropriate adjustments as needed.

While Luke, a skilled machinist (or “Level 2” worker), earns “a decent wage” and has some degree of job security, unskilled (“Level 1”) workers like Maddie (a high school graduate) are “interchangeable and fairly easy to replace.” In Davidson’s words:

For Maddie to achieve her dreams—to own her own home, to take her family on vacation to the coast, to have enough saved up so her children can go to college—she’d need to become one of the advanced Level 2s. A decade ago, a smart, hard-working Level 1 might have persuaded management to provide on-the-job training in Level-2 skills. But these days, the gap between a Level 1 and a 2 is so wide that it doesn’t make financial sense for Standard to spend years training someone who might not be able to pick up the skills or might take that training to a competing factory.

Maddie faces a reality increasingly common in the global knowledge economy: daily life, as represented by the characteristics of available work as well as activities at home and community, is becoming more “learning intensive.” Learning is clearly fundamental to more and more daily activities, from troubleshooting machine tools at work to managing diabetes at home. Luke recognizes the importance of fundamental skills, explaining:

“I’m very good at math,” he says. “I’m not going to lie to you. I got formulas written down in my head.” He studied algebra, trigonometry, and calculus. “If you know calculus, you definitely can be a machine operator or programmer.” He was quite good at the programming language commonly used in manufacturing

machines all over the country, and had a facility for three-dimensional visualization—seeing, in your mind, what’s happening inside the machine—a skill, probably innate, that is required for any great operator. It was a two-year program, but Luke was the only student with no factory experience or vocational school, so he spent two summers taking extra classes to catch up.

Luke uses his literacy, numeracy, and problem-solving-with-information-technology skills every day in real-world contexts. In today’s learning economy, those with lower skill levels, and those who do not update their skills and learn continuously, are falling—and will continue to fall even further—behind. OECD scholars label this phenomenon the emergence of the learning economy (Lundvall 2000). Clearly this new reality poses challenges for individuals, communities, and nations.

Employers, policymakers, educators, and researchers disagree about the appropriate definition of workforce readiness in the learning economy (Barghaus, Bradlow, McMaken, and Rikoon 2012; Perna 2012). Despite this disagreement, and despite regular reports of business leaders’ dissatisfaction with the workforce preparation and skills of available workers,<sup>1</sup> it is clear that employers increasingly need workers with stronger skills (Osterman 2008; Perna 2012; Zumeta 2010).

One proxy for valued skills is the level of formal educational attainment. Drawing on data from the Bureau of Labor Statistics and on assumptions about the continued “upskilling” of current jobs (Zumeta 2010), Anthony Carnevale, Nicole Smith, and Jeff Strohl (2010) quantify the growth in the educational attainment of current and future jobs in their report, *Help Wanted: Projections of Jobs and Education Requirements Through 2018*. They project that 63 percent of jobs in 2018 will require education beyond high school, up from just 28 percent in 1973. Carnevale and colleagues also esti-

mate that, at the current rate of degree production, the demand for workers with at least an associate degree will exceed the supply by 3 million by 2018. According to their estimates, meeting the projected demand for college-educated workers will require a 10 percent annual increase in degree production (Carnevale, Smith, and Strohl 2010).

Given the changes in the characteristics of available jobs, it is not surprising that individuals in the United States with no education beyond high school (such as Maddie) are increasingly being left behind. Not only are median earnings higher for those with more education, but the earnings advantage that comes with attaining more education is growing (Baum, Ma, and Payea 2010; Carnevale, Smith, and Strohl 2010). In 2010, median annual earnings of year-round, full-time workers were 79 percent higher for men and 74 percent higher for women who had attained at least a bachelor’s degree (\$71,780 and \$51,940, respectively) than for men and women who had finished only high school (\$40,060 and \$29,680, respectively) (National Center for Education Statistics 2012). By comparison, in 1990, the wage premium was 60 percent for men and 66 percent for women. Among full-time, year-round workers, lifetime earnings (i.e., over a 40-year period) are expected to be about 66 percent higher for bachelor’s degree recipients than for high school graduates (Baum, Ma, and Payea 2010). Moreover, the benefits of higher education to economic and social well-being persist even in an economic downturn. During the Great Recession, unemployment rates increased regardless of educational attainment. Yet the likelihood of being unemployed was still substantially lower for those with at least some college education than for those with no education beyond high school (Baum, Ma, and Payea 2010).

President Obama, college and university presidents, leaders of national foundations, and others have stressed the need to raise the educational

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1 For instance, the majority of U.S. CEOs responding to a 2006 survey reported both that “education and workforce preparedness is a ‘very important’ or ‘most important’ policy issue” (57 percent) and that they experience challenges identifying “qualified workers” (73 percent) (Casner-Lotto and Benner 2006, p. 12).



attainment of the U.S. population in order to ensure the nation's continued economic competitiveness in a global, technology-driven economy. As data from the OECD (2013b) show, the United States has fallen behind other nations in the educational attainment of its population. The United States now ranks below Korea, Japan, Canada, Russia, Ireland, the United Kingdom, and other nations in the percentage of its population that has attained a tertiary education. Essentially, educational attainment has increased dramatically in some other nations (e.g., Korea and Japan) while stagnating in the United States (OECD 2013b).

Yet possession of a postsecondary credential is only part of the story. As the use of technology gives rise to new organizational models and team-based production methods, employers are also now demanding workers who are able to adapt to continually changing approaches to delivering value to customers. A review of the literature on expertise development, high-performance work, and innovation suggests that literacy, numeracy, and problem-solving skills are at the foundation for success in such workplace environments (Levy 2010; Van Opstal 2008). In its 2008 report, the Council on Competitiveness (Van Opstal 2008) noted the growing global competition for skilled workers and stressed the need to improve the skills of scientists and engineers (to be more integrative, entrepreneurial, and business savvy) and to develop more workers for the sustainability sector (e.g., energy). The report also stressed the need to improve the skills of the many individuals working in two other areas: middle-skilled jobs and the service sector. Middle-skilled jobs are those that “require training, technical sophistication and initiative” but not necessarily a college degree (p. 5). More new jobs are middle-skilled than low- or high-skilled (Van Opstal 2008). Attention to service-sector jobs is also important, as jobs in this sector that earn high wages are not low-skill. Instead, these service sector jobs increasingly require “complex and creative skill sets—including problem solving, communications, entrepreneurship, computational analysis,

collaboration, and teamwork” (p. 5). The report concludes that the United States must create “a workforce that is able and empowered to act on insight and experience, and an innovation system that is continually poised to deploy great ideas,” and “be more strategic about charting the path of future opportunities for workers, prioritizing around skills that do not offshore easily and are hard-to-replicate, that enable a faster pace of innovation, and that are emerging with new technologies and industries” (pp. 11–12).

In a global learning economy where “technology can change the nature of work faster than people can change their skills” (Levy 2010, p. 4), a strong foundation of numeracy, literacy, and problem-solving skills is clearly essential to economic and social prosperity. While attention to the preparation provided along the traditional educational pipeline is necessary, ensuring the readiness of workers for this global learning economy must include particular consideration of the skills of adults. Other sources have documented that the United States cannot reach the levels of education that are required to meet employers' needs or achieve international competitiveness without also raising the educational attainment of adults. The National Commission on Adult Literacy (2008) reports that, in 2006, “more than 88 million adults have at least one major educational barrier,” as “18.2 million English-speaking adults lack a high school diploma, more than 51.3 million English-speaking adults hold a high school diploma but have not been to college, and 18.4 million have limited English skills” (pp. 2–3). The magnitude of these numbers is quite worrisome, as the total U.S. adult (age 16 and older) labor force numbers just 150 million (National Commission on Adult Literacy 2008).

OECD's Survey of Adult Skills builds on this conclusion to illustrate that our nation must do more than increase the formal educational attainment of adults. To ensure global competitiveness and economic and social well-being in a learning economy, we must also improve the literacy, numeracy, and problem-solving skills of U.S. adults.

# Programme for the International Assessment of Adult Competencies

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New data from OECD's Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC), enhance our understanding of the workforce skills of adults in the United States and document the extent to which U.S. adults have the competencies required for today's learning economy. A number of surveys and reports describe the *perception* that adult workers lack necessary skills.<sup>2</sup> In contrast, the Survey of Adult Skills documents the literacy, numeracy, and information-processing skills that adults around the world actually have and are using in today's technology-rich world. As such, data from this survey have important implications for adult education and workforce training.

Sponsored by the OECD, the Survey of Adult Skills is designed to measure "the key cognitive and workplace skills needed for individuals to participate in society and for economies to prosper" (OECD 2013a). Understanding the skills that adults have and use in "a digital world" is critically important to economic and social well-being, given the growing presence of technology in all aspects of life. As Massachusetts Institute of Technology Professor Emeritus Frank Levy (2010) argues, "The largest technological force now shaping work is the computer" (p. 4). The majority of households and workplaces in the United States and most other OECD nations have access to computers and the Internet (OECD 2013c). Although average earnings increase with the level of education attained (as described above), earnings are higher—at all levels of education—for workers who use computers than for those who do not (Carnevale, Smith, and Strohl 2010).<sup>3</sup>

With data collected between August 2011 and March 2012, OECD's Survey of Adult Skills is not the first assessment designed to provide cross-national and cross-cultural comparisons of the knowledge and skills of adults. Coordinated by Statistics Canada and an international steering committee, that included the U.S. National Center for Education Statistics, the Adult Literacy and Lifeskills Survey (ALL) was also designed to measure the knowledge and skills of adults between the ages of 16 and 65. Data were collected in 2003 and then between 2006 and 2008. The ALL built on the International Adult Literacy Survey (IALS), which provided an international comparison of the skills of adults in three areas of literacy: prose, document, and quantitative. First administered in 1994, the IALS built on the 1985 Young Adult Literacy Survey and the 1992 National Adult Literacy Survey, a national-level assessment of adult literacy conducted in the United States, as well as the 1989 Canadian Survey of Literacy Skills Used in Daily Activities (Thorn 2009).

Like ALL, the Survey of Adult Skills assesses proficiency in literacy, numeracy, and problem solving.<sup>4</sup> Scores, which range from zero to 500 in each domain, correspond to six proficiency levels (Levels 1 through 5, plus "below Level 1") for literacy and numeracy and four levels (Levels 1 through 3, plus below Level 1) for problem solving. Each proficiency level is represented by a set of tasks; individuals with a given level of proficiency would be expected to be able to accomplish the tasks at that level two-thirds of the time. The Survey of Adult Skills differs from ALL in that it combines prose and document

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2 For instance, about half (48 percent) of adults responding to an August 2013 poll agreed that colleges are not adequately preparing students for the current labor market (Northeastern University 2013). See also Casner-Lotto and Benner 2006.

3 For instance, Carnevale, Smith, and Strohl (2010) report that, during the 1990s, wages were 17.5 percent higher, on average, for high school graduates who used a computer in their job than for high school graduates who did not. For workers with some college education, but no degree, the wage premium associated with using computers was 20.6 percent.

4 The U.S. administration of the ALL included a background questionnaire and two of the three domain assessments: the prose and document literacy and the numeracy components. The United States did not include the problem-solving component, although other nations or territories did so (e.g., Australia, Bermuda, Canada, Hungary, Italy, New Zealand, the Netherlands, Norway, and Switzerland).

literacy into a single scale, includes attention to reading digital texts, assesses problem solving in environments rich in information and communications technology (ICT), rather than problem solving more generally, and includes greater attention to the use of generic skills in the workplace (Thorn 2012). The Survey of Adult Skills also collects data describing participants' educational and social background, health, political and civic engagement, employment, and income.

Both the Survey of Adult Skills and ALL were administered to nationally representative samples of 16- to 65-year-olds.<sup>5</sup> Whereas data for the ALL were collected via a paper-and-pencil assessment administered by trained interviewers who visited participants' homes, data for the Survey of Adult Skills were collected via a computer-adaptive assessment. Participants with no experience with or no access to computers completed paper versions of the questionnaires that assessed literacy, numeracy, and reading skills but did not include items related to problem solving in technology-rich environments. Although some may argue that the number of participants per country is small, the Survey of Adult Skills included a larger number of participants per country than the ALL (5,000 versus 3,420).

Like the ALL and IALS, the Survey of Adult Skills is designed to identify and compare skills of adults within and across nations. The survey does not assess the proficiency of individuals, as each participant completes only a subset of questions (Thorn 2009). Instead, the Survey of Adult Skills identifies “the level and distribution of the skills of the adult population” (Thorn 2009, p. 8). The survey is also designed with the goal of providing valid international and cross-national comparisons, with measures that are “culturally and linguistically unbiased” and appropriate across nations, languages, and cultures (Thorn 2009, p. 8).

Differing but overlapping sets of nations have participated in these surveys. The United States, along with 23 other nations and sub-national regions, participated in the first administration of the Survey of Adult Skills, with data in most countries collected between August 1, 2011 and March 31, 2012. Data for nine additional nations will be collected in 2014 and available in 2016 (OECD 2013c). Seven nations (including the United States) participated in the 2003 administration of the ALL, and five nations participated in the 2006 administration. IALS was administered in 22 nations (including the United States) over three administrations (1994, 1996, and 1998) (Thorn 2009).

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5 Participants include non-institutionalized individuals living in the country, regardless of nationality, citizenship, or language status (OECD 2013c).

# The Skills and Competencies of U.S. Adults

The Survey of Adult Skills has a number of important findings pertaining to the readiness of U.S. adults to succeed in today's learning economy.

## The United States Lags Behind Other Nations in the Skill Levels of Its Adult Population

Data from the Survey of Adult Skills confirm the pattern established by OECD's 2013 *Education at a Glance*: The United States lags behind a number of other developed nations in terms of the workforce readiness of its population. Mean scores for adults in the United States are below the average for all participating nations on literacy, numeracy, and problem solving in technology-rich environments. The average literacy (270) and numeracy (253) scores for adults in the United States (see **Table 1**) reflect proficiency at only the second on the scale of five levels of proficiency.

In the United States, relatively small shares of adults demonstrate the highest levels of proficiency. The share of U.S. adults with literacy proficiency at or above Level 3 was smaller the share of all participating nations (45.7 percent versus 50.2 percent) and considerably lower than the shares of adults in Japan, Finland, the Netherlands, Australia, and several other nations. Only 38 percent of adults age 16 to 24 in the United States, on the Level 1 (lower proficiency) thru Level 3 (higher proficiency) scale, achieve at the second or third of the three levels of proficiency on the assessment of problem solving in technology-rich environments, compared with 51 percent of adults age 16 to 24 in all participating OECD nations and more than 60 percent of adults in Korea, Finland, and Sweden (OECD 2013d). At the same time, sizeable shares of adults in the United States demonstrate low proficiency (below Level 2) on measures of literacy (17.5 percent) and numeracy (28.7 percent) and scored below Level 1 on the assessment of problem solving in technology-rich environments (15.8 percent).

This pattern of lower performance for U.S. adults than for adults in other nations was also found in

**Table 1: Mean scores by participating nations for adults aged 16–65**

Country	Literacy Mean Score	Numeracy Mean Score
Average	272.8	268.7
Japan	296.2	288.2
Finland	287.5	282.2
Netherlands	284	280.3
Australia	280.4	267.6
Sweden	279.2	279.1
Norway	278.4	278.3
Estonia	275.9	273.1
Flanders (Belgium)	275.5	280.4
Czech Republic	274	275.7
Slovak Republic	273.8	275.8
Canada	273.5	265.5
Korea	272.6	263.4
England (UK)	272.6	261.8
England/N. Ireland (UK)	272.5	261.7
Denmark	270.8	278.3
Germany	269.8	271.7
United States	269.8	252.8
Austria	269.5	275
N. Ireland (UK)	268.7	259.2
Poland	266.9	259.8
Ireland	266.5	255.6
France	262.1	254.2
Spain	251.8	245.8
Italy	250.5	247.1

Source: OECD 2013c, Table A2.2a, Table A2.6a

the ALL. In 2003, average literacy and numeracy scores were higher on the ALL for adults in the United States than for adults in Italy, but lower than for adults in Bermuda, Canada, Norway, and Switzerland. Fewer than half of U.S. adults scored at skill Levels of 3, 4, or 5 on the 2003 ALL (47 percent

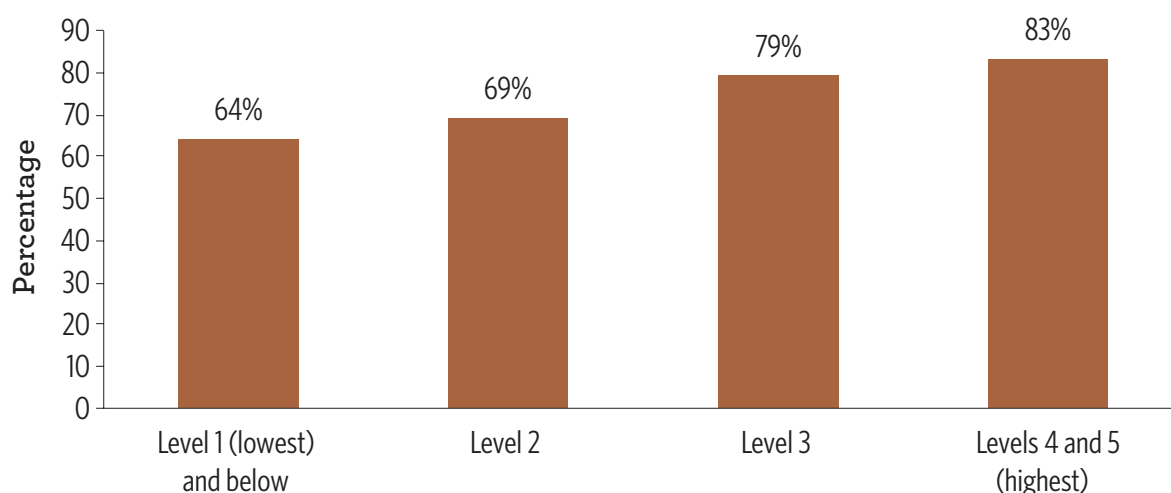
scored in this range of levels for prose literacy; 48 percent for document literacy; and 41 percent for numeracy).

## Higher Levels of Skills are Associated with Greater Individual and Societal Prosperity

Like numerous other data showing the positive relationship between educational attainment and such workforce outcomes as earnings, employment rates, and other economic and social outcomes (e.g., Baum, Ma, and Payea 2010), data from the

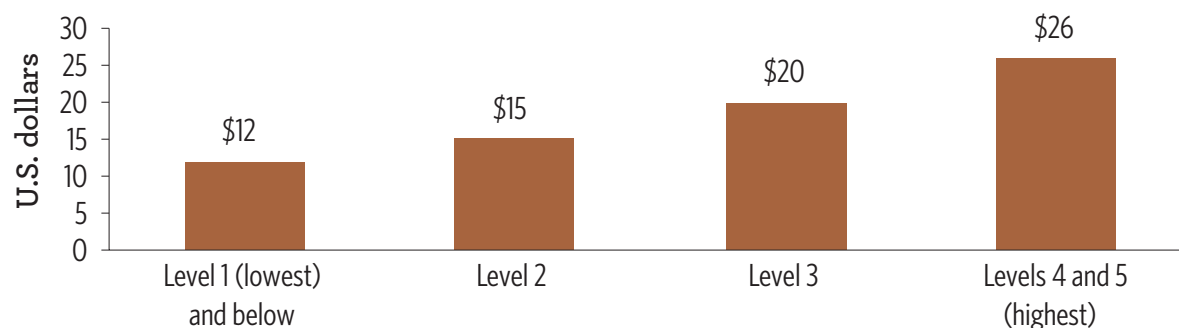
Survey of Adult Skills show the positive relationship between literacy, numeracy, and other skills and labor market participation and employment (Figures 1 and 2). These positive relationships persist even after controlling for educational attainment and other background characteristics (OECD 2013d). Moreover, the positive relationship between numeracy skills and wages is stronger in the United States than in several other nations, including Australia, Germany, the Netherlands, Korea, Finland, and Italy (OECD 2013c).

**Figure 1: Percentage of U.S. adults employed, by literacy proficiency level**



Source: OECD 2013c, Table A6.3

**Figure 2: Average distribution of wages among U.S. employed adults, by literacy proficiency level**



Source: OECD 2013c, Table A6.4

With greater skill proficiency also come other

desirable outcomes for individuals and society,

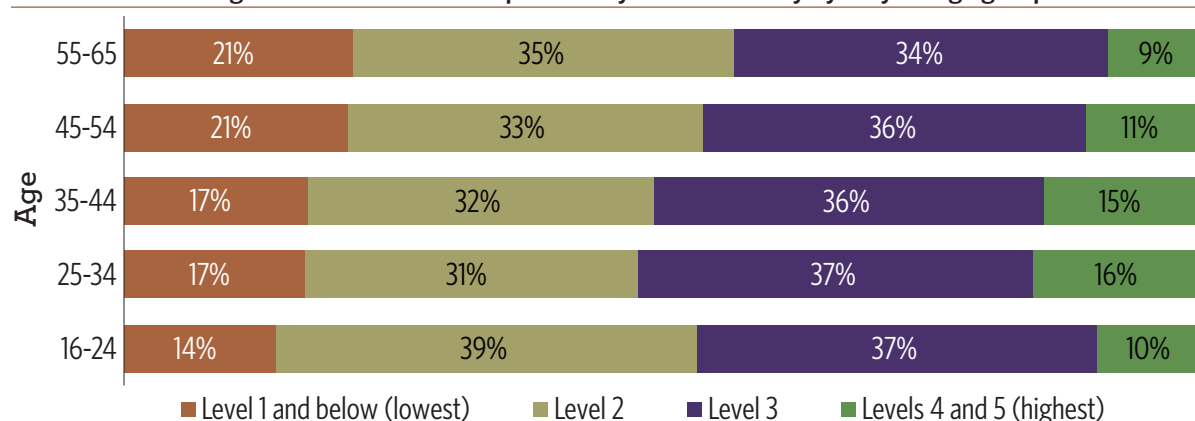
including better health, higher levels of political efficacy, greater participation in volunteer activities, and greater trust in others. Notably, the positive relationships between literacy skills and health, political efficacy, and volunteering are stronger in the United States than in most other nations.

### Skills Have Not Improved over Time

Comparing the skill levels of older and younger adults suggests that, over the past several decades, the United States has made very little progress ensuring that younger adults have necessary literacy, numeracy, and problem solving skills.

Whereas skill levels are considerably higher for younger than older adults in Korea, Spain, Finland, the Netherlands, and some other nations, average literacy and numeracy scores are comparable for younger and older adults in the United States. As the OECD (2013c) notes, the comparable levels of skills for older and younger adults in the United States may reflect the growing diversity of the U.S. population (including the nation's relatively high numbers of foreign-language immigrants). Nonetheless, the lack of improvement is worrisome given the growing demand for skilled workers (OECD 2013c).

**FIGURE 3: Percentage of U.S. adults at each proficiency level in literacy by 10-year age groups**



*Note: Detail may not sum to totals because of rounding.*

Source: Goodman, Finnegan, Mohadjer, Krenzke, and Hogan 2013, Figure 3-A

## Skill Levels Vary Across Demographic Groups

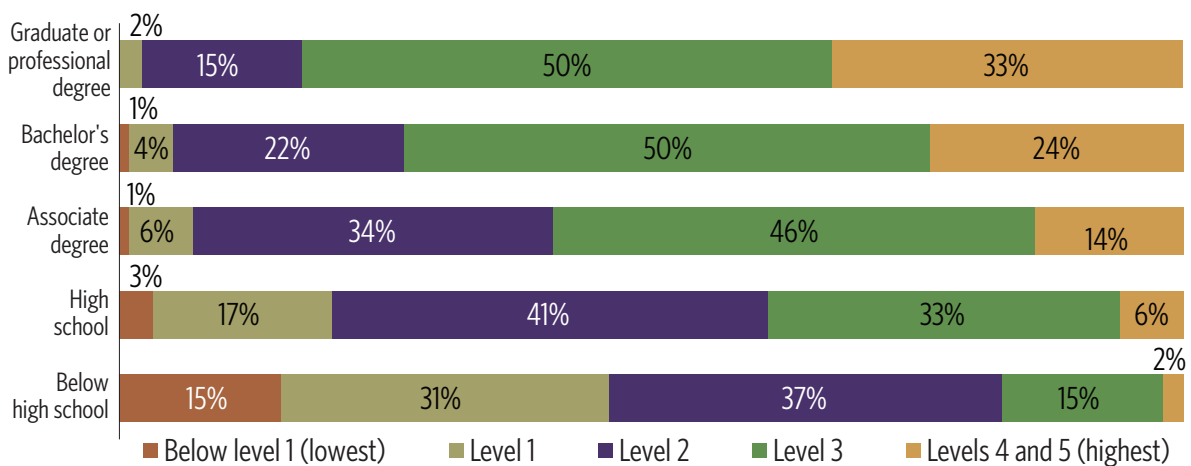
The OECD (2013c) concludes that, although many adults in most countries (although not in Japan and Finland) have low skills, “most of the variation in skills proficiency is observed within, not between, countries” (p. 4). Educational attainment is the strongest predictor of literacy and numeracy skills (**Figure 4**). This relationship persists even after controlling for immigration and language background, age, occupation, and gender.

As in France, Germany, and Poland, literacy skills in the United States are not only below the average of participating nations but also highly unequal across socioeconomic (as measured by parents’ education) groups. In contrast, in Japan, Australia, the Netherlands, Norway, Australia, and Sweden,

average skills are not only considerably higher than in the United States but also more equal across groups.

As the OECD (2013d) notes, the data do offer a glimmer of hope that the importance of socioeconomic background to skill acquisition may be declining over time. More specifically, the difference in proficiency based on parents’ educational attainment is smaller in the United States among younger adults than among their elders. Mean literacy scores were 36.4 points higher for U.S. adults age 16 to 24 who had at least one parent who had attained tertiary education than for those U.S. adults whose parents had not attained an upper secondary education. By comparison, the gap was 57.2 points for U.S. adults age 16 to 65 (OECD 2013d, Figure F.11).

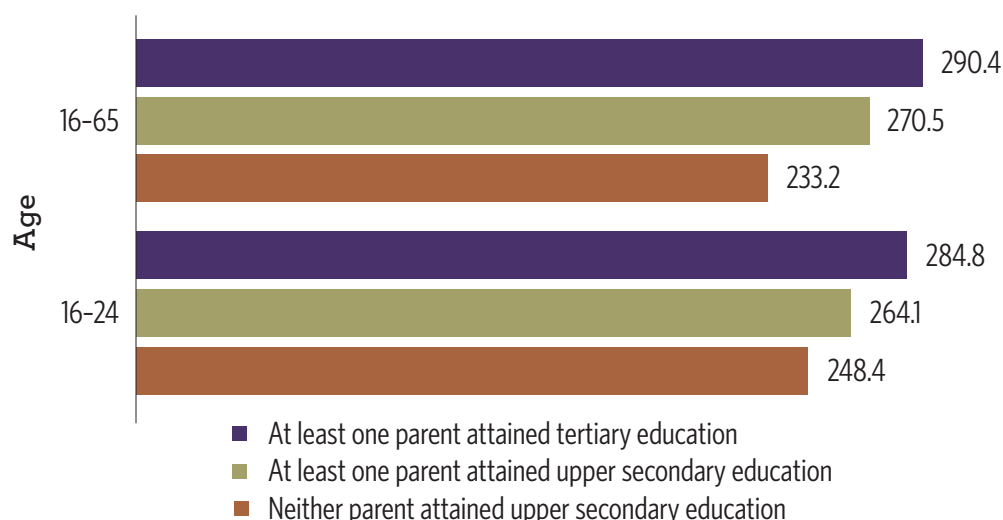
**FIGURE 4: Percentage of adults aged 16–65 at each level of proficiency on the literacy scale, by highest level of educational attainment, 2012**



*Note: Detail may not sum to totals because of rounding.*

Source: Goodman et al. 2013, Figure 6-A

**FIGURE 5: Mean literacy proficiency by parents' educational attainment, for U.S. adults**

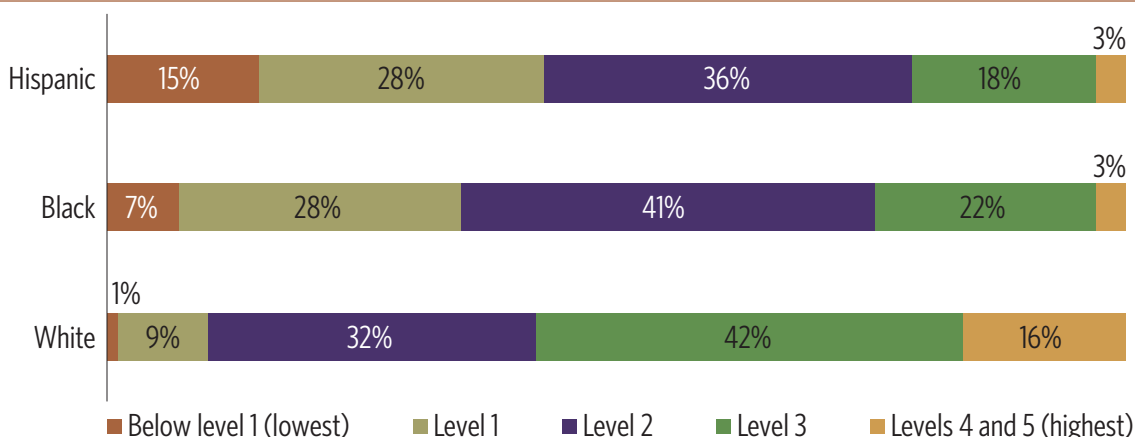


Source: OECD 2013d, Figure F-11

As with other measures of educational attainment and academic achievement, skill levels also vary considerably across racial/ethnic groups in the United States. **Figure 6** shows that substantially higher shares of blacks and Hispanics than whites demonstrated low skills (proficiency below Level 2) on the literacy and numeracy assessments. Specifically, more than a third of blacks (35 percent)

and Hispanics (43 percent) age 16 to 65 had low levels of literacy, compared with only 10 percent of whites. More than half of blacks (59 percent) and Hispanics (56 percent) had low numeracy skills, compared with only 19 percent of whites. Moreover, average literacy scores are lower for blacks and Hispanics than for whites even after controlling for educational attainment.

**FIGURE 6: Percentage of U.S. adults aged 16 to 65 scoring at each proficiency level on the literacy scale, by race/ethnicity**



Note: Black includes African American, and Hispanic includes Latino. Race categories exclude Hispanic origin. Detail may not sum to totals because of rounding of percentages.

Source: OECD 2013d, Figure F.13; Goodman et al. 2013, Figure 7-A



In the United States (as well as in Belgium, France, the Netherlands, and Sweden), skill levels are also particularly low for foreign-language immigrants with low educational attainment. The likelihood of low literacy skills (on an English-language assessment) is about 10 times higher for foreign-language immigrants whose parents have not attained upper secondary education than for native-born/native-language adults with at least one parent who has attained at least upper secondary education (OECD 2013d, p. 233; OECD 2013c, p. 30). “Low-skilled adults” (that is, adults with literacy proficiency below Level 2) in the United States are disproportionately immigrants, black or Hispanic, male, in poor health, and earning low wages.

### The Overlap Between Education and Skills Is Imperfect

Education is one of the most important predictors of literacy (Desjardins 2003). On average, skills proficiency increases as the level of formal education increases (Figure 4). Yet data from the Survey of Adult Skills show variations across nations in the proficiency of individuals with comparable levels of education. More specifically, the United States and other countries such as Italy and Spain “rank much higher internationally in the proportion of 25- to 34-year-olds with tertiary attainment than they do in literacy or numeracy proficiency among the same age group” (p. 8). This finding suggests that higher education institutions in the United States may be less effective than institutions in other nations at ensuring that adults acquire these foundational skills. This variation between formal education and skills also suggests that the United States may have a limited understanding of its stock and deployment of human capital.

Results from the Survey of Adult Skills also shed light on the degree of mismatch between the education and skills of workers and the education and skills required by jobs. In the United States about 20 percent of workers believe they are “over-qualified” for their jobs, meaning that they perceive their

educational attainment to be higher than what is required for their job, and 12 percent of U.S. workers perceive they are “under-qualified,” meaning that believe that their educational attainment is lower than what is required for their job. The Survey of Adult Skills suggests, however, that attention only to educational qualifications is insufficient.

The Survey of Adult Skills provides a more complete understanding of the skills mismatch by comparing an individual’s proficiency score with the minimum and maximum scores of workers who believe that they possess the necessary skills for their jobs. The data reveal that in the United States, about 9 percent of workers are over-skilled and 4 percent are under-skilled in measures of literacy. The data also reveal that perceptions of educational qualifications provide an imperfect assessment of skills mismatch, as about 80 percent of U.S. workers who are “under-qualified” or “over-qualified” in terms of educational attainment are actually well-matched in terms of their literacy skills. Moreover, many of those who are “under-qualified” in terms of formal education actually have higher literacy-proficiency scores than their well-matched peers, whereas many of those who are “over-qualified” have lower literacy proficiency.

The variance between skills proficiency by occupation and educational attainment is playing out in labor markets of today’s learning economy. In “They’re Watching You at Work,” published in the December 2013 issue of *The Atlantic*, author Don Peck documents the rise in use of “people analytics”—a suite of technology-enabled assessments of skills—by corporations in hiring decisions. No longer content with educational attainment and prior experience as screens, firms such as Xerox are using online assessments of personality traits, cognitive skills, and problem solving to identify top job applicants. Employers assert that this approach leads not only to better hires, but also to remarkable increases in productivity and decreases in attrition for key positions.

## Use of Skills Reinforces Skill Proficiency

As might be expected, those who have higher levels of education tend to have higher levels of skills. Those with stronger skills tend to participate in more education and training and engage in other activities that further promote skill development. As the OECD (2013c) asserts, “Practice reinforces proficiency, and proficiency facilitates practice” (p. 5.26). At the same time, those with low levels of education have lower skills, and those with lower skills tend to have fewer opportunities to strengthen their skills (OECD 2013c). These patterns suggest the perpetuation and even further stratification of skill development between those with the lowest and highest levels of education.

Data from the Survey of Adult Skills show that, regardless of educational attainment, use of skills at both work and outside of work is positively related to skill proficiency. Literacy skills are considerably higher for adults who frequently use ICT at and outside of work than for those who do not. Reading outside of work is positively related to literacy proficiency, while engaging in activities related to numeracy is positively related to numeracy proficiency.

The structure of jobs within a nation also appears to contribute to the reinforcing cycle of skill proficiency and skill use. Nations with higher shares of workers in professional, managerial, and technical jobs tend to have higher literacy proficiency than other nations. Workers in professional and managerial jobs tend to use information-processing skills

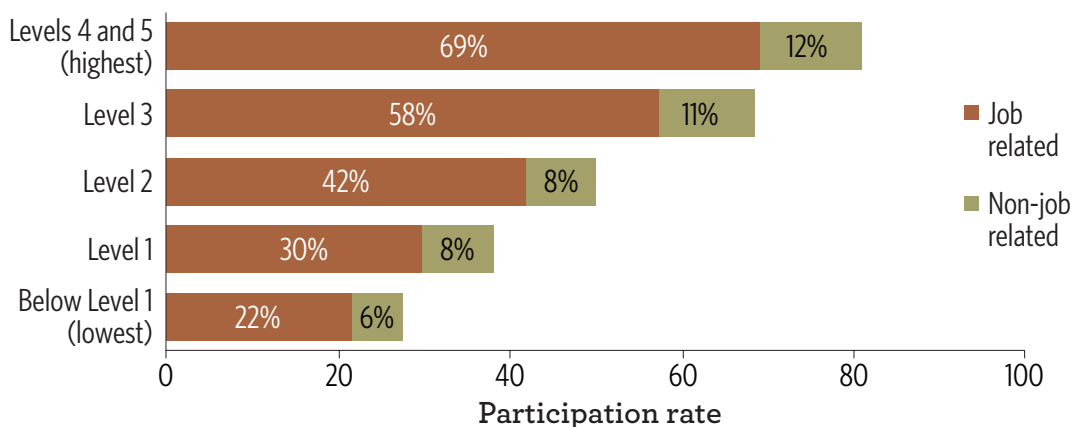
more frequently than those in elementary occupations. Occupation is a stronger predictor of skill use at work than any other individual characteristic, including level of educational attainment or type of employment contract (temporary or permanent).

In the learning economy, skill use and development occurs beyond the boundary of formal education environments. In fact, the job that an individual has—and how that job is structured—plays a key role in sustaining his or her proficiency level in literacy and problem solving with IT skills.

## Adult Education and Training Can Promote Skill Development

Workforce training may be a particularly effective approach to promoting foundational skills among adults in the United States, given that nearly two-thirds (63 percent) of “low-skilled adults in the U.S. are in employment,” a higher share than in other participating nations (OECD 2013d, p. 12). The OECD (2013c) offers a number of recommendations for promoting workforce readiness, including: “develop links between the world of learning and the world of work,” “provide training for workers,” “ensure that training is relevant,” “allow workers to adapt their learning to their lives,” “identify those most at risk of poor skills proficiency,” “show how adults can benefit from better skills,” “provide easy-to-find information about adult education activities,” and “recognize and certify skills proficiency” (p. 35).

**FIGURE 7: Percentage of U.S. adults who participated in adult education and training during year prior to survey, by level of literacy proficiency**



*Note: The participation rate in adult education and training is calculated by excluding students who are considered to still be in their first formal cycle of studies.*

Source: OECD 2013c, Table A5.7

Across nations, literacy scores are positively related to participation in adult education. This relationship, like the relationship between educational attainment and skill proficiency, reflects a reinforcing cycle: Interest in adult education is greater among those with greater skills. The OECD (2013c)

identifies three reasons for this positive relationship: Those with higher-level skills “have the skills that facilitate learning, they are more likely to be in jobs that demand ongoing training, and they have higher levels of education” (p. 5.24).

## Implications

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In the context of the long-standing debate over the most appropriate definition of workforce readiness, the most important contribution of OECD's Survey of Adult Skills may be the framework it provides for understanding the skills and competencies that adults both possess and require for success at work, at home, and in the community. With its focus on assessing literacy, numeracy, and problem solving with information technology skills at different education attainment levels as well as in workplace settings, the Survey of Adult Skills suggests the utility of a competency or learning-outcomes approach to promoting human-capital development in today's learning economy. This framework shifts attention beyond mere attainment of a particular credential or qualification to a more nuanced understanding of the skills and competencies an individual has acquired and the foundational requirements for success in the learning economy.

Other initiatives, including the Bologna Process in Europe and the Degree Qualifications Profile and Tuning Initiatives in the United States, also reflect a competency or learning-outcomes approach. These efforts emphasize the alignment of educational offerings with the mastery of stated competencies pertaining to literacy, numeracy, and problem solving, as well as various discipline-specific competencies. Reflecting a similar orientation, the emergent Common Core State Standards initiative seeks to assess the skills and competencies required for college and career readiness.

Career-competency models that align skills development with career development are also present in recent workforce-development practice and policy. For instance, the U.S. Department of Labor's Competency Model Clearinghouse<sup>6</sup> provides educators, employers, and policymakers with a template for building career pathways based on specific skill acquisition across many industries. The U.S. Department of Labor has also developed a

skills-mapping tool called MySkills, MyFuture<sup>7</sup> that adults may use to compare their current skills with the skills required to achieve their education and employment aspirations, as a means of encouraging human-capital investment strategies.

By documenting the low proficiency of many adults, as well as the variability of proficiency among adults with a given level of education, the survey also highlights areas where proficiency improvements are required. In today's learning economy, individual and societal prosperity depend on the extent to which adults are aware of their skills, are updating their skills, and are using their skills and knowledge to adapt to technological change. As suggested by the rise of LinkedIn, Monster.com, TopCoder, and more, documenting educational qualifications and experience is no longer enough: Employers now demand that adults also document their knowledge and skills profile, as well as communicate their skills and competencies, in real time. Take for example, Knack, a Silicon Valley startup that uses neuroscientists to develop games that measure the skills and propensities of the game players. Royal Dutch Shell is working with the company to go beyond resumes and gain a deep understanding of individuals with the best knowledge and skills to build new businesses. Shell believes this micro-skills measurement approach will improve efficiency and reduce the cost structure of starting new lines of business. Skill awareness and communication may be improved through skills assessment and network building within industries and by researching occupations and labor-market trends.

Individuals require not only a deep understanding of their own stock of human capital, but also regular investment in activities that further develop human capital. Human capital may be developed through on-the-job training, work experience, and formal education and skills training.

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6 <http://www.careeronestop.org/CompetencyModel>

7 <http://www.myskillsmyfuture.org>

Findings from the Survey of Adult Skills illustrate the need to improve both skill awareness and skill competency, particularly among adults with low proficiency and in low-wage jobs. Upgrading the literacy, numeracy, and problem-solving skills of adults already in the labor market is required to ensure national competitiveness and promote individual opportunity. As such, the findings have important implications for both educational programming and public policy.

### Implications for Educational Programming

The Survey of Adult Skills shows that, on average, participating in education and workforce training programs is associated with greater skill proficiency. Yet the data also illustrate the vicious cycle that perpetuates the gap in proficiency between those with high and low skills. Individuals with higher levels of education tend to participate in adult education and other opportunities that further build skills. Those with stronger skills also tend to use these skills in and outside of work. This more frequent use of skills subsequently leads to further skill development. Differences in skill levels across groups contribute to the economic and social stratification of our nation's society, as those without these foundational skills are unlikely to benefit from the growing prevalence of technology in all aspects of life. In short, those with low skill levels are “increasingly likely to be left behind” (OECD 2013b, p. 3).

Improving skill awareness and competency among adults with little formal education and low skill proficiency requires structuring adult education and workforce training programs so as to attract and promote the participation of this population. We know that adults who enroll in college often experience great difficulty trying to simultaneously manage the demands of their schoolwork along with the often competing demands and responsibilities associated with their employment, families, and other commitments (Perna 2010). To ensure that adult working students with low skill proficiencies are successful, adult education and training programs must be structured to ensure that educational activities, in-

structional practices, and academic support services recognize the educational needs and characteristics of adult working students (Perna 2010).

The share of adults participating in adult education and training is higher in the United States than in other nations, suggesting the prevalence and availability of adult education and training options. Available data suggest the interest of low-skilled workers in acquiring additional education and training. For instance, 36 percent of low-skilled adults in the United States who participated in adult education or training during the prior year reported wanting to participate in additional learning activities. Nearly one-fifth (18.5 percent) of low-skilled adults in the United States who did not participate in adult education or training in the prior year reported interest in participating in learning activities (OECD 2013d, Table F.22).

Nonetheless, as in other nations, the rate of participation in adult education and training is lower in the United States for those with lower skills than it is for those with higher skills (OECD 2013d). About 39 percent of U.S. adults with low literacy skills—and 31 percent of adults with low literacy skills in all participating nations—reported participating in adult education or training during the prior year (OECD 2013d, Table F.21).

Numerous entities, including neighborhood-based nonprofits, for-profit technical institutes, community colleges, four-year colleges and universities, and employers, offer opportunities for up-skilling. Much experimentation is occurring with the goal of better engaging low-skilled adults in learning, and good practices are emerging. Successful interventions across adult learning, dropout recovery, and postsecondary education systems incorporate curricula and teaching innovations that support student learning and strengthen adults' connection to employers and local labor markets (Advisory Committee on Student Financial Assistance 2012; Pusser and Levin 2009; Soares 2013; Steigleder and Soares 2012; Harris and Ganzglass 2008). Education and training programs often focus on addressing the needs and characteristics of particular populations (e.g., immi-

grants, non-English-speaking people, people with education deficits, and low-income workers) and develop flexible and articulated pathways into post-secondary educational programs, often with a goal of promoting completion of a certificate, credential, and ultimately a degree. These programs also tend to integrate an occupational training strategy (short-term, intensive training) with academic for-credit tracks that are constructed to follow an occupational or career step.

Educational practices for promoting skills and increasing postsecondary education attainment should include attention to the following:

- **Common framework for adult basic education:** Literacy, numeracy, and problem solving with information technology skills are taught in many different settings with many different partners. Yet within each setting, the approaches that institutions and partners use to assess and develop skills often vary. Through its careful measurement of skills, the Survey of Adults Skills may provide a common framework that may be used across these varied providers.
- **Contextual learning:** Tailoring academic content to occupational goals helps students understand the relevance of what they are learning to their lives and career goals. Many adult education, English as second language, and “bridge” programs reflect attention to contextual learning. One particularly well-regarded example of contextual learning is the Washington State Community College system’s Integrated Basic Education and Skills Training (I-BEST) program, which integrates adult education and occupational training.
- **Modularized curriculum:** Career pathways can be structured as a sequence of compressed modules or mini-courses that enable the learner to move in steps toward increased skills, marketable credentials, and better labor market outcomes. In some cases, modules are tied to entry-level jobs and different levels of industry-recognized credentials. For example, Maricopa Community Colleges in Arizona worked with local health-care providers to develop a series of four credit-bearing courses that lead to an associate degree.
- **Progressive credentialing:** Documenting knowledge and skills attainment incrementally at the sub-degree level is essential. Sometimes called stackable credentials, progressive credentialing allows learners to document what they know even when their education participation is episodic and fluid. One example of progressive credentialing is the North Carolina Community College System’s Code Green Super Curriculum Improvement Project. Code Green assembled a series of curricular offerings across sector areas—building, energy, engineering, environment, and transportation technologies—which allow students to move incrementally toward higher credentials in the green economy while moving in and out of work and education.
- **Intensive instruction:** Compressed and concentrated modules, including short, intensive, remedial “bridge courses,” may accelerate learning, which in turn may reduce the time required to complete courses and attain a marketable credential. The Arkansas Career Pathways Initiative, for example, compressed two semesters of remedial reading, writing, and math into one semester.
- **Flexible scheduling and delivery models:** In addition to breaking down learning into manageable chunks, some programs employ other instructional delivery modes such as distance learning and flexible scheduling to help students meet school, work, and family responsibilities.
- **Learning communities:** Students in “learning communities” or “student cohorts” take linked courses together with the goal of providing mutual support and encouragement. Learning communities may also improve students’ understanding of the interrelationship of course content and promote interaction with their teachers. Evidence on the effectiveness of learning communities is mixed (Bloom and Sommo 2005), but a 2005 study of Kingsborough Com-



munity College of The City University of New York found that students in the learning community program felt more integrated in school and engaged in coursework.

- **Wrap-around supports:** Wrap-around support services such as academic advisement, tutoring, career guidance, assistance in navigating financial aid systems, intensive case management, child care, transportation, and other services may all provide persistence and success, especially among adult students.
- **Leverage technology:** Adaptive software that helps to target specific learning needs of low-skill adults helps to speed skill development and the transition into higher levels of education. This can include both assessment and instructional software. And social media tools that help provide guidance and support to students ensure that they stay on track to persist and complete education experiences. Knewton is one example of an adaptive software product that has become part of adult education numeracy programs around the country and is showing promising results. Knewton partnerships with Arizona State University and University of Nevada have demonstrated efficacy, improving retention and transition-to-college-level-course rates. Persistence Plus, a smart-phone-based social platform for helping students manage their studies, is also showing promising results with students at the University of Washington Tacoma.
- **Partnerships with employers:** Employers can and should play a key role in promoting adult education and workforce training. Employers may encourage learning by developing educational programs, providing funding for program participation, and providing employees with release time in return for program participation. Employers may advance adult education and training through sector partnerships, career pathways programs, work study opportunities, cooperative education, apprenticeships, and on-the-job training.

## Implications for Public Policy

The OECD's Survey of Adult Skills also has important implications for federal and state policymakers. First, the findings illustrate the need to improve educational preparation and achievement at earlier stages in the educational pipeline. For the United States, the pattern of performance among adults on the Survey of Adult Skills mirrors the pattern of performance for 15-year-olds on the Program for International Student Assessment (PISA); on both assessments, literacy, and numeracy scores are lower, on average, in the United States than in many other nations (OECD 2013d). This parallel suggests that deficiencies in our nation's K-12 education system are one cause of the nation's relatively low performance on measures of adult skills.

With a more specific focus on the skills development of low-skill adults, the competency or learning-outcomes framework offered by the Survey of Adult Skills also provides a mechanism that public policymakers may use to guide policy on human-capital development. Federal policymakers could use this framework to review existing federal legislation. A number of federal laws and programs have implications for adult participation in education and training, including the Workforce Investment Act, the Higher Education Act, Temporary Assistance for Needy Families, and the Lifetime Learning Tax Credit. These and other policies could be carefully reviewed to ensure that they are effectively encouraging the development of the literacy, numeracy, and problem-solving skills that are so clearly required in today's learning economy. Simplifying regulation and reporting requirements as well as harmonizing the use of funding streams could be a key focus.

The Survey of Adult Skills also provides a framework for considering state-specific policies for promoting adult skill development. State public policy may play a critical role in promoting skill awareness and development. States currently offer varying approaches to promoting education and training for adults. Both the number of low-skilled adults and current enrollment in adult education

and training programs varies greatly across states. The number of adults without basic prose literacy skills exceeds 1 million in eight states: California (nearly 6 million), New York (3 million), Texas (3 million), Florida (more than 2.5 million), Georgia, Illinois, New Jersey, and Pennsylvania. Yet, of these states, the ratio of the number of adults lacking basic prose literacy skills to enrollment in state-administered adult education programs ranges from 26.3 in New Jersey, 24.1 in New York, 23.6 in Texas, and 22.8 in Pennsylvania to just 10.6 in California, 9.3 in Georgia, and 6.6 in Florida. Nevada has the highest ratio of adults lacking basic literacy skills to enrollment in state-administered adult education programs (35.4) (OECD 2013d, Table F.24).

State policy can play a key role by ensuring that adults and institutional stakeholders are aware of program offerings and how they work. For example, state policy could encourage employer partnerships as ways to both share information about educational programs as well as integrate work and learning experiences.

Further, state policy could ensure that adult education and training offerings are fully integrated into PK-20 council discussions. PK-20 councils, which are formed by states to bring together key education-policy stakeholders from the pre-K through postsecondary levels, could provide an institutional forum to harmonize adult education and training programs with Common Core State Standards, ensure that technology tools used in adult education and training are complementary across institutions and systems,

identify bridges between non-credit and for-credit education offerings, and connect to labor market information and employment opportunities.

To promote literacy, numeracy, and problem solving with information-technology skills, federal and state policymakers should also ensure the collection of data for regularly assessing such skills, align funding, and simplify regulatory requirements to promote the enrollment of individuals in adult education. Particularly important is identifying effective ways to distribute the costs of these programs so that low-proficiency individuals are incentivized to participate.

Finally, public policymakers could leverage research and evaluation efforts across policy areas to maximize understanding of the acquisition and use of skills among adults in domestic and international settings. Deeper research into the domestic best-practice initiatives mentioned above would be a good way to start ensuring that constrained public funding is being deployed through policies and practices designed to improve adult skills. Other nations may also provide important evidence to support practices and policies: The OECD Survey of Adults skills highlights Denmark, Finland, the Netherlands, Norway, and Sweden as providing fruitful examples of effective strategies. Federal and state policymakers should provide funding to encourage the collection of relevant data and production of appropriate research to inform understanding of the most effective policies and practices for promoting skill development.



## Conclusion

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Raising the literacy, numeracy, and problem-solving skills proficiency for adults in the United States will be a team sport, with policy and education leaders working together across federal, state, and institutional boundaries. Creating meaningful improvement requires not only innovative policy approaches, but also coordination among different education providers and systems. Substantially improving these critical foundational skills also

requires attention not only to the relative roles of different education and training providers, but also to other issues, including the relative roles of individuals, government/taxpayers, and employers in paying the costs of the necessary training. Although not without challenge, such efforts are essential to ensuring the economic and social well-being of our population and our society.

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