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AMERICA'S SKILLS CHALLENGE:
Millennials and the Future

THE ETS CENTER FOR
RESEARCH ON HUMAN CAPITAL AND EDUCATION

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PREFACE

This report, the first in a series to be produced by Educational Testing Service using data from the Programme for the International Assessment of Adult Competencies (PIAAC), is an attempt to focus attention on a topic of interest to a broad range of constituencies. The subject of this report is our nation's millennials, those young adults born after 1980 who were 16–34 years of age at the time of the assessment. The authors chose to center attention on this cohort for several key reasons. First, these young adults include the most recent products of our educational systems. Second, according to recent reports, they have attained the most years of schooling of any cohort in American history. And, finally, millennials will shape the economic and social landscape of our country for many years to come.

One central message that emerges from this report is that, despite having the highest levels of educational attainment of any previous American generation, these young adults on average demonstrate relatively weak skills in literacy, numeracy, and problem solving in technology-rich environments compared to their international peers. These findings hold true when looking at millennials overall, our best performing and most educated, those who are native born, and those from the highest socioeconomic background. Equally troubling is that these findings represent a decrease in literacy and numeracy skills for U.S. adults when compared with results from previous adult surveys.

This report explores the growing importance of education and skills in the context of the larger technological, economic, social, and political forces that have been reshaping America for the past 40 years. To put it bluntly, we no longer share the growth and prosperity of the nation the way we did in the decades between 1940 and 1980. Since around 1975, those who have acquired the highest levels of education and skills have become the big winners, while those with the lowest levels of education and skills have fared the worst. Millions of hard-working Americans who believed they were strongly anchored in the middle class have fallen into joblessness and economic insecurity. As the authors note, these changes have both immediate and long-term consequences for families, communities, and the nation as a whole.

The findings also offer a clear caution to anyone who believes that our policies around education should focus primarily on years of schooling or trusts that the conferring of credentials and certificates alone is enough. While it is true that, on average, the more years of schooling one completes, the more skills one acquires, this report suggests that far too many are graduating high school and completing postsecondary educational programs without receiving adequate skills. If we expect to have a better educated population and a more competitive workforce, policy makers and other stakeholders will need to shift the conversation from one of educational attainment to one that acknowledges the growing importance of skills and examines these more critically. How are skills distributed in the population and how do they relate to important social and economic outcomes? How can we ensure that students earning a high school diploma and a postsecondary degree acquire the necessary skills to fully participate in our society?

Some may argue that we need not pay attention to these findings, that comparative international assessments such as PIAAC do not yield valid results. If PIAAC was the only study to raise a cause for concern, then perhaps that case could be made. The fact is that other educational surveys, including the National Assessment of Educational Progress (NAEP), have reported similar results for our high school seniors. In 2013, NAEP reported that 74 percent of the nation's twelfth graders were below proficient in mathematics and 62 percent were below proficient in reading. In addition, organizations such as ACT, which evaluates the college and career readiness of the young adult population in the United States, recently reported that nearly one out of three high school graduates (31%) taking its exam failed to meet any of the four college readiness benchmarks in English, math, reading, and science, suggesting they are not well prepared for first-year college coursework. Similarly, the College Board reported in 2013 that 57 percent of SAT takers failed to qualify as "college ready." The PIAAC data, therefore, is not anomalous; in fact, it forms part of a broader picture of America's skills challenge.

To be sure, the skills challenge we face is complex and multifaceted, but we need to first acknowledge there is a problem. I believe we are at a crossroads. As a nation, we can to decide to accept the current levels of mediocrity and inequality or we can decide to address the skills challenge head on. The choices we make will provide a vivid reflection of what our nation values.

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EXECUTIVE SUMMARY

Millennials may be on track to be our most educated generation ever, but they consistently score below many of their international peers in literacy, numeracy, and problem solving in technology-rich environments (PS-TRE). The results of this report help shed light on the growing inequality of opportunity in the U.S. and the impact this has on both skills acquisition and outcomes for both current and future generations.

In an effort to develop a clearer picture of the distribution of skills demanded by modern societies, the Organisation for Economic Co-operation and Development (OECD) undertook the Programme for the International Assessment of Adult Competencies (PIAAC), a new survey of adult skills. Unlike school-based surveys, which focus on specific ages or grades of in-school students, PIAAC was designed as a household study of nationally representative samples of adults age 16 to 65.[1] This report disaggregates the PIAAC data for millennials—the cohort born after 1980. Key findings are summarized below and detailed supporting data can be found in the full report. All differences noted are statistically significant.

How do the average scores of U.S. millennials compare with those in other participating countries?

- In literacy, U.S. millennials scored lower than 15 of the 22 participating countries. Only millennials in Spain and Italy had lower scores.
- In numeracy, U.S. millennials ranked last, along with Italy and Spain.
- In PS-TRE, U.S. millennials also ranked last, along with the Slovak Republic, Ireland, and Poland.
- The youngest segment of the U.S. millennial cohort (16- to 24-year-olds), who could be in the labor force for the next 50 years, ranked last in numeracy along with Italy and among the bottom countries in PS-TRE. In literacy, they scored higher than their peers in Italy and Spain.

How do U.S. top-performing and lower-performing millennials compare to their international peers? What is the degree of inequality in the score distribution?[2]

- Top-scoring U.S. millennials (those at the 90th percentile) scored lower than top-scoring millennials in 15 of the 22 participating countries, and only scored higher than their peers in Spain.
- Low-scoring U.S. millennials (those at the 10th percentile) ranked last along with Italy and England/Northern Ireland and scored lower than millennials in 19 participating countries.
- The gap in scores (139 points) between U.S. millennials at the 90th and 10th percentiles was higher than the gap in 14 of the participating countries and was not significantly different than the gap in the remaining countries, signaling a high degree of inequality in the distribution of scores.

[1] Twenty-four countries participated in the PIAAC assessment for literacy and numeracy. This report does not include data for the Russian Federation or Cyprus. Only 19 countries participated in the PS-TRE assessment. For more information about the PIAAC assessment, see appendix A.

[2] Detailed disaggregated data are provided only for the numeracy results.

How do millennials with different levels of educational attainment perform over time and in relation to their peers internationally?

- Although a greater percentage of young adults in the U.S. are attaining higher levels of education since 2003, the numeracy scores of U.S. millennials whose highest level of education is *high school* and *above high school* have declined.
- Since 2003, the percentages of U.S. millennials scoring below level 3 in numeracy (the minimum standard) increased at all levels of educational attainment.
- U.S. millennials with a four-year bachelor's degree scored higher in numeracy than their counterparts in only two countries: Poland and Spain.
- The scores of U.S. millennials whose highest level of educational attainment was either *less than high school* or *high school* were lower than those of their counterparts in almost every other participating country.
- Our best-educated millennials—those with a master's or research degree—only scored higher than their peers in Ireland, Poland, and Spain.

What impact do demographic characteristics have on the performance of U.S. millennials?

- Among all countries, there was a strong relationship between parental levels of educational attainment and skills; across all levels of parental educational attainment, there was no country where millennials scored lower than those in the United States.
- The gap in scores between U.S. millennials with the highest level of parental educational attainment and those with the lowest was among the largest of the participating countries.
- In most countries, native-born millennials scored higher than foreign-born millennials; however, native-born U.S. millennials did not perform higher than their peers in any other country.

These results should be considered against a backdrop of larger social, economic, technological, and political forces that are shaping our society. In addition, the PIAAC data suggest that simply providing more education may not hold all the answers. If, despite investments and reforms in K-12 education over the past decades, America continues to lose ground in terms of the developed skills of its adult population and workforce, then we need to better appreciate the ways in which education can perpetuate inequalities of opportunity at all educational levels, as well as help redress this problem. As a country, we need to confront not only how we can compete in a global economy, but also what kind of future we can construct when a sizable segment of our future workforce is not equipped with the skills necessary for higher-level employment and meaningful participation in our democratic institutions.

INTRODUCTION

> *Historically, the main equalizing force — both between and within countries — has been the diffusion of knowledge and skills. However, this virtuous process cannot work properly without inclusive educational institutions and continuous investment in skills. This is a major challenge for all countries in the century underway.*[3]
>
> *Thomas Piketty*

In the fall of 2013, the Organisation for Economic Co-operation and Development (OECD) published a report entitled *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*.[4] The report documented the relative performance of U.S. adults (age 16–65) on a comprehensive survey of skills known as the Programme for the International Assessment of Adult Competencies (PIAAC). PIAAC measures adult skills across three domains: literacy, numeracy, and problem solving in a technology-rich environment (PS-TRE). The report revealed that the skill levels of U.S. adults compared to those of 21 other participating OECD countries were dismal across the board.[5] The authors of a subsequent OECD report on the U.S. results, *Time for the U.S. to Reskill*, leveled a blunt evaluation of the U.S. performance, describing it as "weak on literacy, very poor on numeracy," and slightly worse than average on PS-TRE. "Broadly speaking," the report concluded, "the weakness affects the entire skills distribution, so that the U.S. has proportionately more people with weak skills than some other countries and fewer people with strong skills."[6]

Among the 22 participating PIAAC countries, there are 12 where adults age 16–65 scored higher in literacy and 17 where they scored higher in numeracy than their peers in the United States. Among the 19 countries that participated in an assessment of the PS-TRE domain, there are 14 where adults scored higher than those in the United States (figure 1 and table C-1). Given the strong association that research has shown exists between the reading literacy and numeracy skills of a country's population and the well-being and economic competitiveness of its people, such results are alarming. This is especially true when one considers the most vulnerable members of our society: those without post-secondary education or a high school credential, certain racial/ethnic subgroups, and those less advantaged socioeconomically.[7]

Some trust that our best performers still compare favorably with the best educated and skilled in other countries. Others contend that the number of top performing students in the U.S. may be sufficient to fill the need for high-skilled talent in the coming years. Still others believe that, because U.S. millennials (those born after 1980) are the most educated generation we have ever produced,

[3] Eduardo Porter, "Q&A: Thomas Piketty on the Wealth Divide," *The New York Times*, March 11, 2014, **http://economix.blogs.nytimes.com/2014/03/11/qa-thomas-piketty-on-the-wealth-divide/**.

[4] Organisation for Economic Co-operation and Development, *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills* (Paris: OECD Publishing, 2013), **http://dx.doi.org/10.1787/9789264204256-en**.

[5] See appendix A for more information about the PIAAC assessment and a list of participating countries. Nineteen of the 22 countries participated in the PS-TRE assessment.

[6] OECD, *Time for the U.S. to Reskill?: What the Survey of Adult Skills Says* (Paris: OECD Skills Studies, OECD Publishing 2013), **http://dx.doi.org/10.1787/9789264204904-en**.

[7] Noah Berger and Peter Fisher, "A Well-Educated Workforce Is Key to State Prosperity," EARN (2014).

they are poised to set us on the right trajectory and help brighten our future. The U.S. PIAAC results put these convictions to the test, and also help us identify more clearly the challenges we face.

Although evident in the 1990s, shifts in the nature of work and demands for skilled vs. unskilled labor have made it even more apparent today that individuals' economic security and prosperity rest in large measure on the acquisition of specific skills as well as the ability to augment skill proficiency throughout one's lifetime. Competency in domains such as reading literacy, numeracy, and problem solving are critical for success in the increasingly complex economies and societies of the

FIGURE 1.

Participating countries/regions listed in descending order of average scores on the PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales for adults age 16–65: 2012

Literacy	Numeracy	PS-TRE
Japan*	Japan*	Japan*
Finland*	Finland*	Finland*
Netherlands*	Flanders (Belgium)*	Australia*
Australia*	Netherlands*	Sweden*
Sweden*	Sweden*	Norway*
Norway*	Norway*	Netherlands*
Estonia*	Denmark*	Austria*
Flanders (Belgium)*	Slovak Republic*	OECD Average*
Czech Republic*	Czech Republic*	Denmark*
Slovak Republic*	Austria*	Czech Republic*
Canada*	Estonia*	Republic of Korea*
OECD Average*	Germany*	Germany*
Republic of Korea*	OECD Average*	Canada*
England and N. Ireland (UK)	Australia*	Slovak Republic*
Denmark	Canada*	Flanders (Belgium)*
Germany	Republic of Korea*	England and N. Ireland (UK)
United States	England and N. Ireland (UK)*	Estonia
Austria	Poland*	**United States**
Poland*	Ireland	Ireland
Ireland*	France	Poland
France*	**United States**	
Spain*	Italy*	
Italy*	Spain*	

* Significantly different ($p < .05$) from United States.

NOTE: Please see table C-1 for complete data.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

21st century.[8] Given fundamental shifts in the economy over the last four decades, a picture of our society is emerging where fewer individuals are winners—those at the very top. Those individuals without skills, or the opportunity to build skills, have the odds stacked against them. Our goal is to consider these issues in light of the skills performance of U.S. millennials.

The trend data on adult skills in the United States also provide evidence of an (albeit relatively recent) decline in adult skill levels.[9] That is, in both comparative and absolute terms, there is clear cause for concern. The average score for U.S. adults in literacy has declined since 1994 (figure 2). In numeracy, average scores for adults have declined since 2003 (figure 3). Although the gap between our higher (those at the 90th percentile) and lower (those at the 10th percentile) performers has narrowed slightly in literacy since 1994, this is largely the result of marginal gains made by our very lowest performers (those at the 10th percentile) and declines for almost everyone else (except those performing at the 25th percentile). In numeracy, the story is even more distressing. Here, the overall average score declined by 9 points. This decline was evident at every percentile of performance except the 90th, where the changes since 2003 were not statistically significant. If we continue on this path, there could be serious consequences for America's economy and the future prosperity of our workforce.

The individual and societal costs of having a large proportion of the population with low skills (both compared to previous years and to the percentages in other countries for the PIAAC assessment) should not be underestimated. In addition to economic costs in terms of the competitiveness of the labor force in a global economy, there are also more subtle, no-less-important consequences of having a population with deeply divided skill levels. Such societies risk becoming increasingly polarized, fragmented, and divided. Social cohesion suffers, and civic engagement becomes more sporadic and tenuous.[10] Cross-country comparisons of the PIAAC results by OECD reveal some important and clear patterns and correlations: Adults with higher skills are more likely to report better health, have more trust in political institutions, and demonstrate increased rates of volunteerism. Lower skilled adults, on the other hand, represent the most vulnerable members of society—those at risk of having restricted access to basic services and less than full participation in democratic practices and educational opportunities. Skills are also strongly associated with access to labor participation and training opportunities. Other research suggests that the distribution of skills of a country's population is inextricably—albeit complicatedly—linked to the distribution of its income and wealth.[11]

[8] Andrew Sum, Ishwar Khatiwada, Walter McHugh, and Sheila Palma, *The Widening Socioeconomic Divergence in the U.S. Labor Market* (Prepared for Educational Testing Service, Opportunity in America, forthcoming); Claudia Goldin and Lawrence F. Katz, *The Race Between Education and Technology*, (Cambridge, MA: Harvard University Press, 2008); David Autor, *The Polarization of Job Opportunities in the U.S. Labor Market* (Center for American Progress and The Hamilton Project, 2010).

[9] PIAAC data was analyzed so that trends could be compared to previous adult literacy assessments. In literacy, comparisons are made between PIAAC (2012) and both the Adult Literacy and Life Skills (ALL) survey (2003–2008) and the International Adult Literacy Survey (1994–1998). In numeracy, trend comparisons are made between PIAAC (2012) and ALL (2003–2008). In both the literacy and numeracy domains, approximately 60 percent of the items are common between PIAAC and previous international surveys to ensure the comparability of these domains.

[10] Thomas Piketty, *Capital in the 21st Century* (Cambridge, MA: Harvard University Press, 2014); Joseph E. Stiglitz, *The Price of Inequality* (Bristol, England: Allen Lane, 2012); Richard G. Wilkinson and Kate Pickett, *The Spirit Level: Why Greater Equality Makes Societies Stronger* (New York: Bloomsbury Press, 2010).

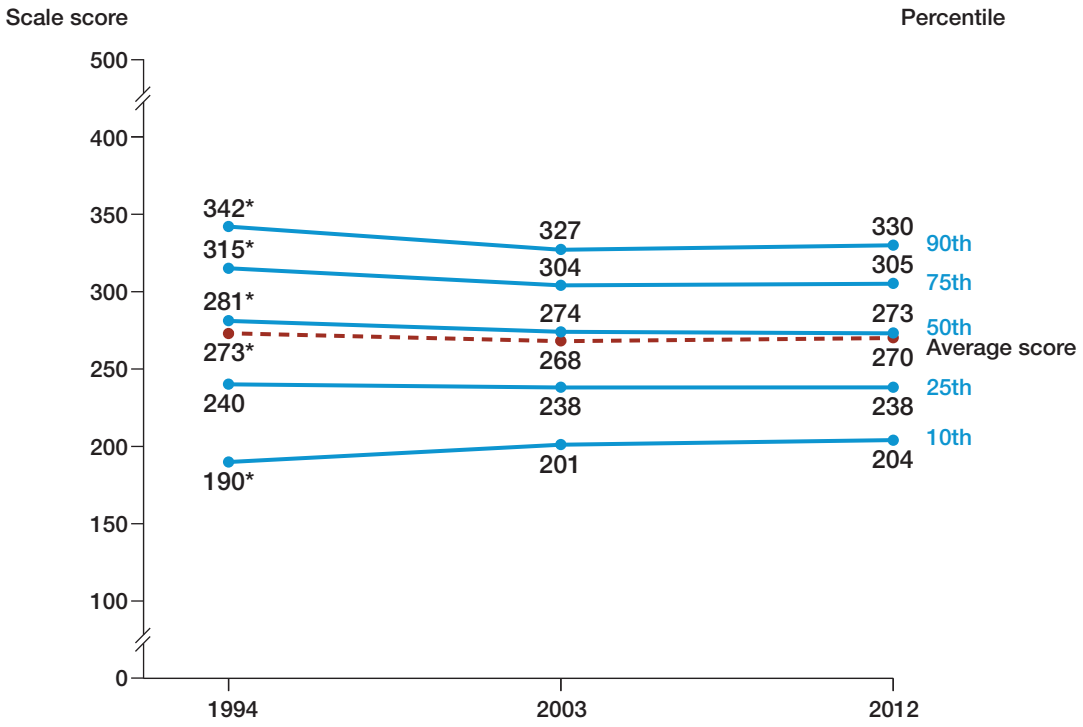
[11] OECD, *OECD Skills Outlook* 2013.

Having large segments of the population without adequate skills poses a challenge beyond the immediate need to help improve the lives of those who struggle to find adequate and sustainable employment. The ripple effects can also be felt in terms of increased income and wealth inequality. In fact, the entire society is affected by a cycle that perpetuates and exacerbates inequalities and brings into question whether we are offering individuals an equal opportunity to succeed. As the economist Joseph Stiglitz has pointedly acknowledged, an economic and political system that is perceived to favor some citizens over others is not sustainable in the long run. "Eventually," Stiglitz warns, "faith in democracy and the market economy will erode, and the legitimacy of existing institutions and arrangements will be called into question."[12] Although the nature of the relationship among the distribution of skills, economic inequality, and challenges to sustaining a coherent participatory democracy is part of a complex story with many narrative threads, it is an important one to explore and understand.

One might reasonably ask whether the aggregate PIAAC results mask important differences across key segments of our population. Can we presume that the skills of our younger population provide

FIGURE 2.

Trend in average scores and percentile scores on the IALS, ALL, and PIAAC literacy scale for U.S. adults age 16–65: 1994, 2003, and 2012



* Significantly different ($p < .05$) from PIAAC (2012).

SOURCE: Organisation for Economic Co-operation and Development (OECD), International Adult Literacy Survey (IALS), 1994–98, Adult Literacy and Lifeskills Survey (ALL), 2003–08, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

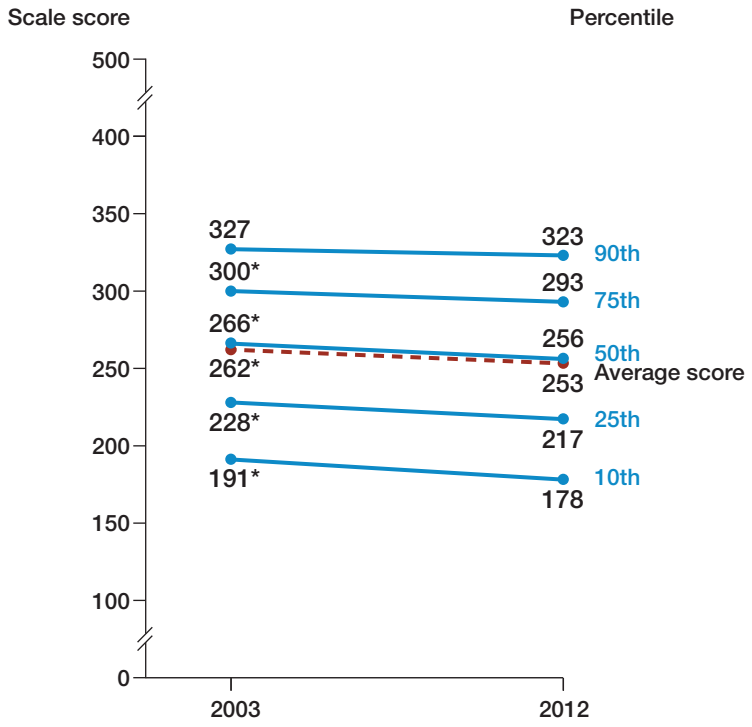
[12] Joseph Stiglitz, "Climate Change and Poverty Have Not Gone Away," *The Guardian*, January 7, 2013, http://www.theguardian.com/business/2013/jan/07/climate-change-poverty-inequality.

some optimism for the future? Perhaps our more educated, younger adults (millennials)—especially those with post-secondary education—possess the skills or human capital that will help us "grow" our way out of the problem.

With these questions in mind, this report disaggregates the skills data for U.S. millennials (those under 35) with respect to key demographic and other factors (i.e., educational attainment, parental educational attainment levels, nativity, and race/ethnicity), and where possible, compares the results of U.S. millennials to their peers in the other OECD countries and to previous assessments of adult skills. The results of these analyses are then discussed within the context of the growing inequality of opportunity in the U.S. and the impact this has on skills acquisition and outcomes for both current and future generations. Our aim is to address the current skill level of our young adults, but also to suggest essential ways in which skills interact with broader social and economic forces. In so doing, the primary concern here is not to bemoan the nation's declining status. Instead, our central point is this: The PIAAC results highlight deeper social issues concerning not only how we compete in a global economy, but also what kind of future we can construct when a sizable adult population—especially the millennials—lacks the skills necessary for higher-level employment and meaningful participation in our democratic institutions.

FIGURE 3.

Trend in average scores and percentile scores on the ALL and PIAAC numeracy scale for U.S. adults age 16–65: 2003 and 2012



* Significantly different ($p < .05$) from PIAAC (2012).

SOURCE: Organisation for Economic Co-operation and Development (OECD), Adult Literacy and Lifeskills Survey (ALL), 2003–08, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

MILLENNIALS

Millennials are a cohort of the population born after 1980 who were in their teens to early 30s during the 2012 round of PIAAC.[13] They comprised 26.2 percent (82 million) of the estimated U.S. population (313 million) and 35 percent of the U.S. civilian non-institutional labor force in 2012.[14] The rationale for the focus on millennials is simple: This generation of American workers and citizens will largely determine the shape of the American economic and social landscape of the future.

Figure 4 displays the average scores of U.S. millennials, as well as the youngest 10-year segment of this cohort (16- to 24-year-olds) for the three PIAAC domains: literacy, numeracy, and PS-TRE (see table C-2 for complete data). Across all three scales, the scores for U.S. millennials are disappointing. In literacy, millennials in 15 of the other 21 countries scored higher than those in the U.S.; only millennials in Spain and Italy had lower average literacy scores than their peers in the U.S. In numeracy, U.S. millennials ranked last (though their score was not statistically different from that of Spanish and Italian millennials). In PS-TRE, where one might expect a competitive advantage for this cohort, U.S. millennials did not score higher than those in any of the PIAAC participating countries. The very youngest of this cohort (16- to 24-year-olds), who could be in the labor force until at least 2065, ranked dead last in numeracy and among the bottom in PS-TRE.

Another way to look at and understand the performance of millennials is to compare percentages across countries at key proficiency levels. For both literacy and numeracy, there were five levels of proficiency (below level 1, level 1, level 2, level 3, and level 4/5) and four levels for PS-TRE (below level 1, level 1, level 2, and level 3).[15] Performance at level 3 is considered the minimum standard for literacy and numeracy; performance at level 2 is considered the minimum standard for PS-TRE.[16] Various indices converge to suggest that individuals with level 3 skills in literacy and numeracy and level 2 skills in PS-TRE have greater access to multiple social, economic, and educational benefits.[17] Table 1 shows the percentage of millennials as well as adults age 16–65 on all three scales who performed below this minimum standard for these domains.

Here, too, the results are cause for concern. Fully one half (50%) of America's millennials failed to reach level 3 in literacy and nearly two-thirds (64%) failed to reach this minimum level in numeracy. In literacy, only Italy (60%) and Spain (59%) had a greater percentage of millennials that scored below level 3 than the U.S., while other countries, such as Finland and Japan, had percentages as low as 23 percent and 19 percent, respectively. In numeracy, no country had a greater percentage of millennials below this minimum standard (64%, although the percentages of millennials below level 3 in Italy and Spain were not statistically different from that of the U.S.). These data reveal that

[13] "On Pay Gap, Millennial Women Near Parity – For Now," *Pew Research Center*, December 11, 2013, **http://www.pewsocialtrends.org/2013/12/11/on-pay-gap-millennial-women-near-parity-for-now/**.

[14] U.S. Census Bureau, American Community Survey, "2012 American Community Survey 1-Year Estimates," data generated using American FactFinder, **http://factfinder2.census.gov**; U.S. Bureau of Labor Statistics, Current Population Survey, "Employment Status of the Civilian Noninstitutional Population by Age, Sex, and Race," Household Data Annual Averages, Table 3, 2012, accessed January 2013.

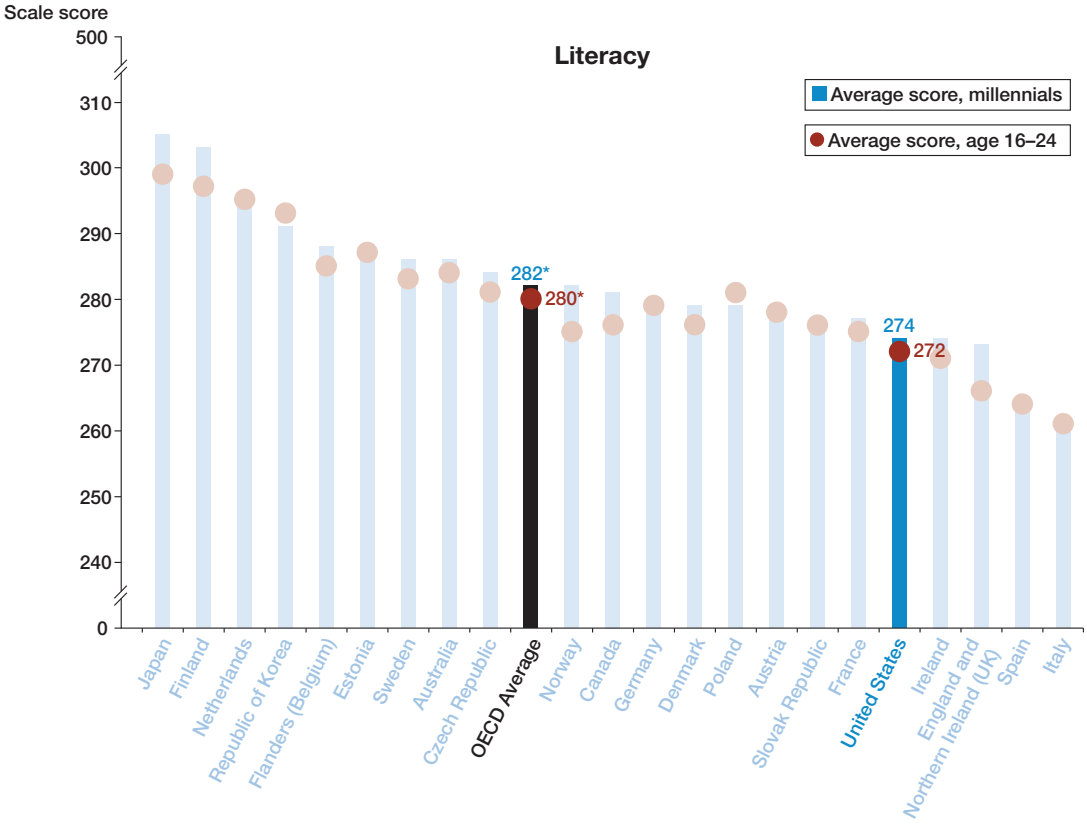
[15] For more information on PIAAC proficiency levels, see appendix B.

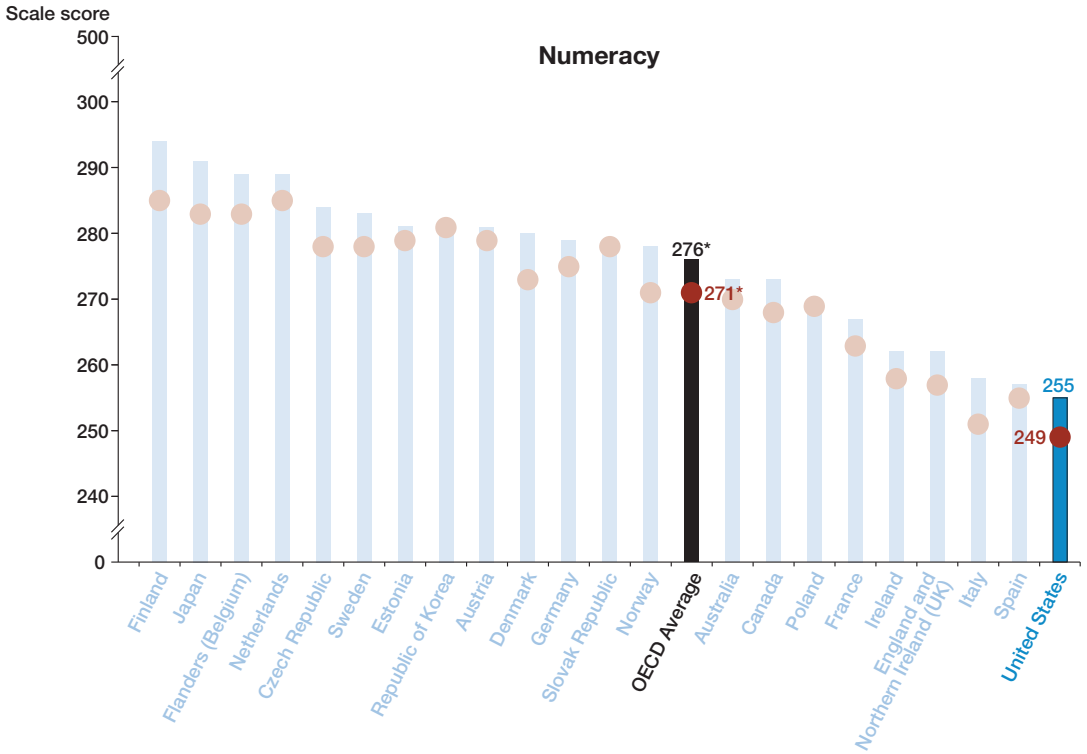
[16] Andrew Sum, Irwin Kirsch, and Robert Taggart, *The Twin Challenges of Mediocrity and Inequality – Literacy in the U.S. From an International Perspective* (Princeton, NJ: Policy Information Center, Educational Testing Service, 2002).

[17] OECD, *OECD Skills Outlook 2013*.

FIGURE 4.

Average scores on the PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales for adults age 16–34 (millennials) and adults age 16–24, by participating country/region: 2012

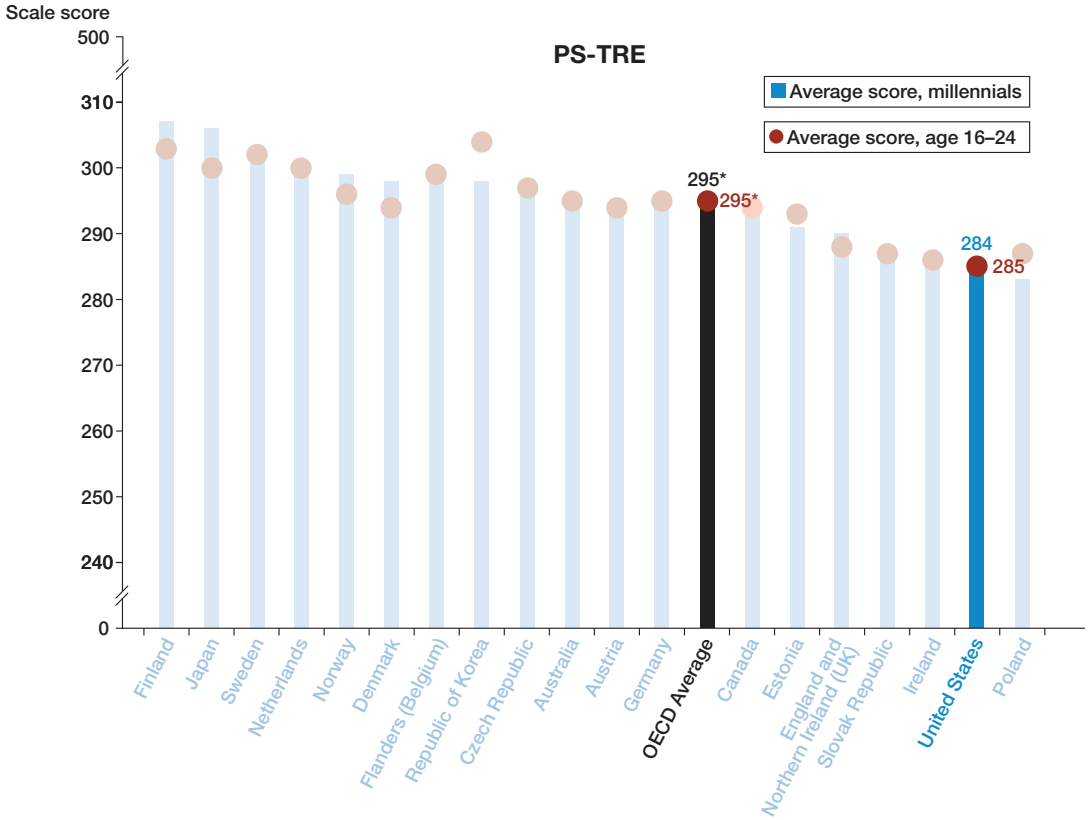




See notes at end of figure.

FIGURE 4.—Continued

Average scores on the PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales for adults age 16–34 (millennials) and adults age 16–24, by participating country/region: 2012—Continued



* Significantly different ($p < .05$) from United States.

NOTE: The countries/regions are listed in descending order based on average scores for adults age 16–34 on the PIAAC literacy, numeracy, and problem solving in technology-rich environments scales. Please see appendix C-2 for complete data.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

a relatively large percentage of our young adults cannot perform literacy tasks that ask them to "identify, interpret, or evaluate one or more pieces of information and often require varying levels of inferencing," or numeracy tasks that "require several steps and may involve the choice of problem solving strategies or relevant information."[18] A similar pattern of results was revealed in PS-TRE, a new assessment of problem-solving skills that focused on how well adults in participating countries understood and could interact effectively with digital technology: 56 percent of millennials performed below level 2, which was one of the highest percentages among all participating countries.

The comparatively low skill level of U.S. millennials is likely to test our international competitiveness over the coming decades. If our future rests in part on the skills of this cohort—as these individuals represent the workforce, parents, educators, and our political bedrock—then that future looks bleak.

[18] OECD, *Literacy, Numeracy, and Problem Solving in Technology-Rich Environments – Framework for the OECD Survey of Adult Skills* (Paris: OECD Skills Studies, OECD Publishing 2013).

TABLE 1.

Percentage of adults age 16–34 performing below the minimum standard of proficiency level on PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales, by participating country/region: 2012

Country/region	Literacy, % below level 3	Numeracy, % below level 3	PS-TRE, % below level 2
OECD average	41*	47*	44*
Australia	38*	51*	43*
Austria	43*	42*	43*
Canada	43*	50*	45*
Czech Republic	39*	40*	42*
Denmark	42*	43*	40*
England and Northern Ireland (UK)	49	58*	50*
Estonia	37*	43*	48*
Finland	23*	32*	32*
Flanders (Belgium)	34*	35*	40*
France	46	54*	—
Germany	42*	44*	43*
Ireland	50	59*	54
Italy	60*	63	—
Japan	19*	33*	33*
Netherlands	28*	36*	38*
Norway	39*	43*	38*
Poland	45*	53*	55
Republic of Korea	30*	42*	40*
Slovak Republic	44*	43*	54
Spain	59*	65	—
Sweden	35*	40*	35*
United States	50	64	56

— Not available.

* Significantly different ($p < .05$) from United States.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Having examined the pattern of performance for millennials across the domains of literacy, numeracy, and PS-TRE, the remainder of the report will explore in more detail some of the disaggregated data to probe how levels of educational attainment, socioeconomic status, nativity, and race/ethnicity are related to the performance of U.S. millennials. In addition, we will examine performance at the top and bottom ends of the score distribution.

We will focus solely on the numeracy scale in our examination. We do so for the following reasons. First, a number of reports on U.S. performance have already covered the ground on literacy.[19] Second, the PS-TRE assessment—while an innovative and important measure of problem-solving skills—has a more limited number of participating countries, a more restricted sample of participants overall, and (because the measure is new) no trend data.[20] Third, researchers have found that numeracy is a robust predictor of labor market success.[21] Finally, the relatively poor performance of the U.S. on the numeracy scale—compared to the previous assessment year and in relation to other countries in 2012—calls for greater scrutiny of how different demographic subgroups in the U.S. performed on this measure and what these patterns might suggest in terms of policy recommendations.

[19] Louis Soares and Laura W. Perna, *Readiness for the Learning Economy* (Washington, DC: American Council on Education, 2014); OECD, *Time for the U.S. to Reskill?*

[20] The PIAAC assessment design was developed to route respondents to the most appropriate delivery mode as a means to help assure the most reliable, valid, and comparable assessment of skills. The scores for respondents who had no computer experience, failed the information and communications technology skills test, or refused the computer-based assessment did not contribute to the estimation of the item parameters for the PS-TRE domain.

[21] David Autor, "Skills, Education, and the Rise of Earnings Inequality Among the 'Other 99 Percent.'" *Science Magazine*, May 23, 2014, 843-51. **http://dx.doi.org/10.1126/science.1251868**.

COMPARING OUR HIGHER AND LOWER PERFORMERS

In a report published in 2007, Kirsch, Yamamoto, Braun, and Sum argued "our nation is in the midst of a perfect storm—the result of a confluence of three powerful forces—that is having a considerable impact on our country."[22] The authors identified the "widespread disparity" in the literacy and numeracy skills of America's adult population as one of these three forces (the other two being changes in the economy and distribution of wealth, and sweeping demographic transformations in terms of immigration and population growth) contributing to this storm. There is growing recognition that the disparity in skills and the increasingly large percentage of the adult population without adequate skills contributes to a continued cycle of income inequality that may, in turn, diminish growth.[23]

Examining how our higher (those at the 90th percentile) and lower (those at the 10th percentile) performers compare to those in other countries provides us crucial insight often lacking when viewing performance from only a national perspective. National, state, and even district-level assessments such as the National Assessment of Educational Progress (NAEP) provide benchmarks as to how well American schoolchildren at specific grade levels perform in key subjects. In reporting these results, however, we risk becoming focused on small gains; international comparisons provide us an opportunity to compare the knowledge and skills of similar groups to gain a broader perspective on our overall performance. In addition, examining the gap in performance between our lower and higher performers allows us to gauge the distribution of skills and compare it to that in other countries.

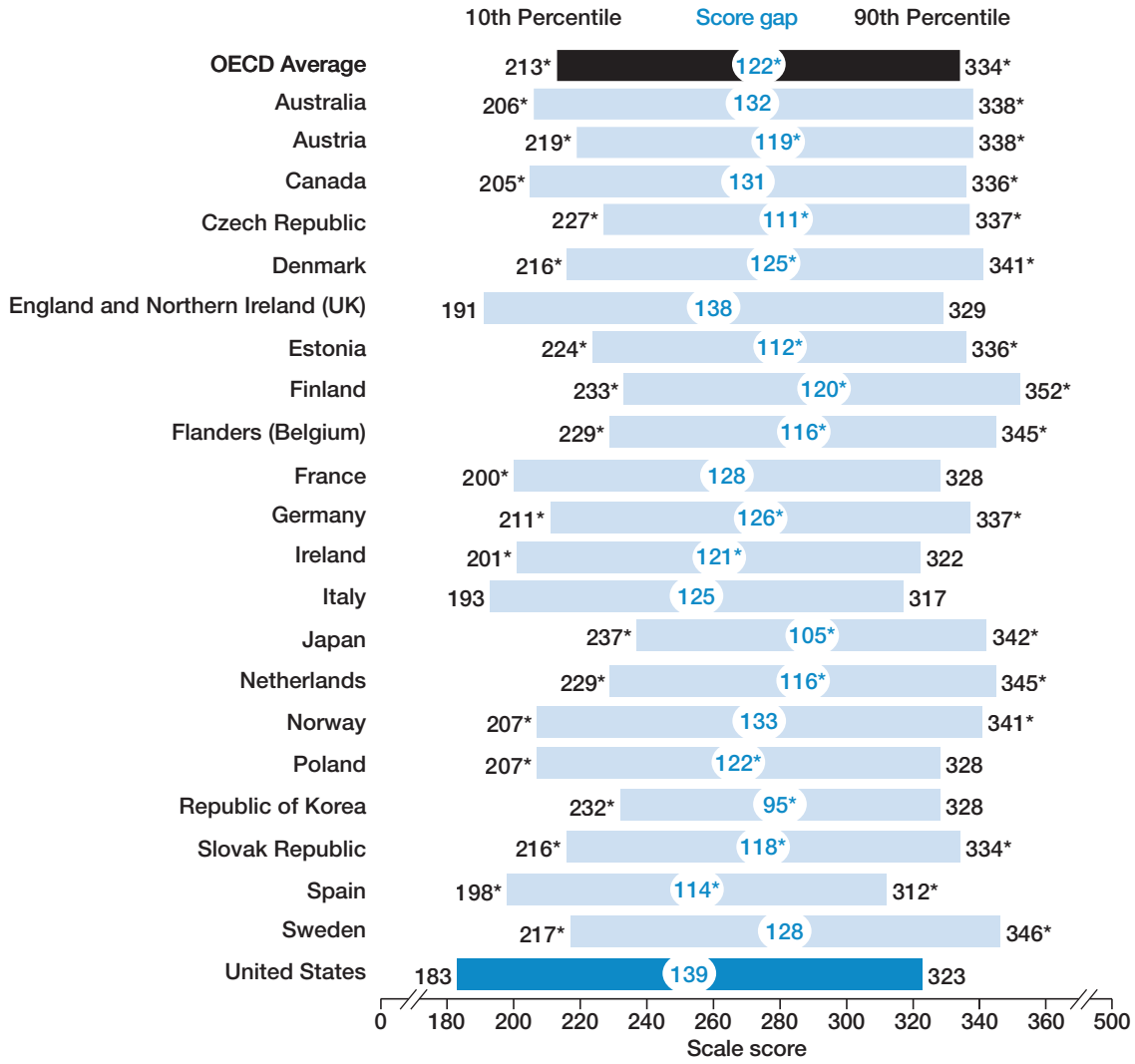
Figure 5 shows the scores for millennials at the 10th and 90th percentiles and the gap in performance between these ends of the score distribution. Among the OECD countries that participated in PIAAC, the United States has a high degree of inequality in the distribution of its numeracy skills (in fact, the highest) coupled with very low rankings at both ends of the distribution. At the lower end of the performance distribution (the 10th percentile), there was no other country where millennials scored lower than those in the U.S. The score for U.S. millennials at the 90th percentile was higher than that of their counterparts in only one country: Spain. The best performing millennials in 14 of the other 21 participating countries—nearly three-quarters—out performed our best. Figure 5 shows not only the absolute size of the gap in each country between performers at the 10th and 90th percentiles, but also how that gap manifests itself in relative terms when comparing among countries. For example, while the U.S. has a gap (139 points) comparable to that of Australia (132), Canada (131), and Sweden (128), the distribution of scores

[22] Irwin Kirsch, Kentaro Yamamoto, Henry Braun, and Andy Sum, *America's Perfect Storm* (Princeton, NJ: Educational Testing Service, 2007).

[23] Kirsch et al., *America's Perfect Storm*; Standard & Poor's Financial Services LLC, "How Increasing Income Inequality Is Dampening U.S. Economic Growth, and Possible Ways to Change the Tide" (Standard & Poor's, 2014), **https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1351366&SctArtId=255732&from=CM&nsl_code=LIME&sourceObjectId=8741033&sourceRevId=1&fee_ind=N&exp_date=20240804-19:41:13**.

FIGURE 5.

Scores and score gaps for 10th and 90th percentiles on the PIAAC numeracy scale for adults age 16–34, by participating country/region: 2012



* Significantly different ($p < .05$) from United States.

NOTE: Score gaps are calculated based on differences between unrounded scores.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

in those countries is quite dissimilar to the U.S. In the other three countries, those at the lower and upper ends of the distribution outperform their U.S. counterparts. In England/Northern Ireland, Italy, and Spain, both our score distributions and gaps are more similar.

There are important ramifications in the pattern of the U.S. skills distribution and its connection to social and economic outcomes. As Kirsch et al. indicate: "…educational attainment and skills

are strongly and positively associated with annual earnings and access to the more highly skilled professional and management positions in the U.S. labor market." Reducing inequality in the distribution of skills does not solve all aspects of economic and social inequality; however, it clearly plays an important role. Without improving the skill level of those at all points in the distribution, there is little chance of meaningfully altering the economic outlook for many.[24]

The PIAAC data expose two equally alarming issues about the distribution of the performance of our millennials compared to those of other countries: Both our lower and higher performers score at the bottom with respect to their peers, and our inequality is among the highest of all participating countries. These findings obviously raise questions about the quality of our educational system at the K-16 level, but they compel us to consider issues beyond that. Because skills are more closely bound to success in the labor market, skill inequalities will lead to increasing polarization and greater economic inequalities. These in turn will tend to have a reinforcing effect on the broader society, creating deeper divisions between the haves and have-nots. The following sections will explore how educational attainment relates to skills acquisition and explore these issues in more detail.

[24] Kirsch et al., *America's Perfect Storm*, 23.

EDUCATION AND SKILLS

In 1983, the National Commission on Excellence in Education issued a report that assessed the quality of education in the U.S. Authors of the report declared that the state of America's education made it "a nation at risk." The report went even further to assert that while the American people "can take justifiable pride in what our schools and colleges have historically accomplished and contributed to the United States and the well-being of its people, the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people." They concluded: "What was unimaginable a generation ago has begun to occur—others are matching and surpassing our educational attainments."[25] From our current vantage point, it is impossible not to see this statement as prophetic.

The relationship between educational attainment and skills acquisition appears obvious and reasonable: As the primary vehicle by which we learn literacy and numeracy skills, formal education enhances skill levels. Those with greater levels of educational attainment naturally have higher skill levels. The PIAAC data provide us with an opportunity to probe beneath the story and examine whether and how the narrative shifts when considering comparable international data. By exploring both in absolute and relative terms the skills associated with different levels of educational attainment, these data shed light on both the *quantity* of education our young adults have received and some evidence about the *quality* of our secondary and post-secondary educational institutions.

Increasingly throughout much of the 20th century, education was viewed as a powerful equalizing force for social mobility, deeply connected to the idea that greater attainment of skills would beget economic prosperity. Goldin and Katz, in their seminal work on educational attainment and wage structures in the U.S., refer to the era as the "Human Capital Century," a period that helped define the U.S. as a global leader in terms of the investments made in the skills of its workforce. The establishment of mass public secondary schooling in the early decades of the century, and what they term a "flexible" higher education system, was closely tied to a long period of economic growth in the U.S. In their words:

> *That the twentieth century was both the American Century* and *the Human Capital Century is no historical accident. Economic growth in the more modern period requires educated workers, managers, entrepreneurs, and citizens. Modern technology must be invented, innovated, put in place, and maintained. They must have capable workers at the helm… Because the American people were the most educated in the world, they were in the best position to invest, be entrepreneurial, and produce goods and services using advanced technologies.* [26]

[25] *A Nation At Risk: The Imperative For Educational Reform*. Report to the nation and the Secretary of Education prepared by the National Commission on Excellence in Education (Washington, DC, April 1983).

[26] Goldin and Katz, "Race Between Education and Technology," 1-2.

Moreover, as Goldin and Katz attest, "a greater level of education in the entire nation tends to foster a higher rate of aggregate growth."[27] Given this assumption, when technological progress is aligned with an increase in quality education, economic inequalities will be reduced. This scenario characterizes much of the growth of both GDP and per-capita income from 1940–1970, a time sandwiched between periods of relatively high income inequality.

Throughout much of the 20th century, in fact, the U.S. led industrialized nations in the educational attainment levels of its citizens. This is no longer the case. In 2010, the U.S. ranked third of 22 PIAAC participating countries in its percentage of 25- to 64-year-olds with a tertiary (or post-secondary) education[28]; Japan and Canada both exceeded the U.S. on this measure (see table C-3 for complete data). When we look exclusively at the younger population, that is, those between 25–34 in 2010 (and part of our "millennials"), the U.S. ranking drops to 10th. Millennials in Korea, Japan, Canada, Ireland, Norway, the UK, Australia, Flanders/Belgium, and France are more likely to have attained a tertiary degree than U.S. millennials. Figure 6 displays the dramatic difference in both the levels of educational attainment between younger and older adults across countries, as well as the comparative advantage that the younger generations in some countries appear to have in terms of their educational attainment levels vis-à-vis the United States.

The interplay between technological innovations on the one hand, and education and skills acquisition on the other, is part of a complex and multifaceted process. A number of studies by economists and policy advisors have highlighted the interaction of income and educational attainment as technology and globalization have converged to influence economic changes over the past 40 years. For example, in 1963, college graduates earned 1.5 times the hourly wage of high school graduates; by 2009, this ratio had risen to 1.95, with nearly half of the increase (45 percentage points) occurring after 1980. This increase does not even take into account critical nonwage benefits (e.g., sick and vacation pay, employer-paid health insurance, and retirement contributions), and thereby likely *underestimates* the real income differential between high school and college graduates in the U.S. Moreover, it should be noted that much of the increase is the result of a decrease in the real earnings for those with only a high school education.[29]

Underlying these now well-documented facts about America's economic rise in the post-World War II era is the supposition that human capital—skills, competencies, and attitudes—has become a critical aspect of a country's economic growth and an increasingly critical prerequisite to success in the labor market. Therefore, understanding how we gain skills, and what levels of skills we have—not just in K-12 education, but also in formal higher post-secondary institutions and informal education—is critical to grasping how our economy functions and how individuals within our society rise and fall with the shifting demands of the global marketplace. These are not just

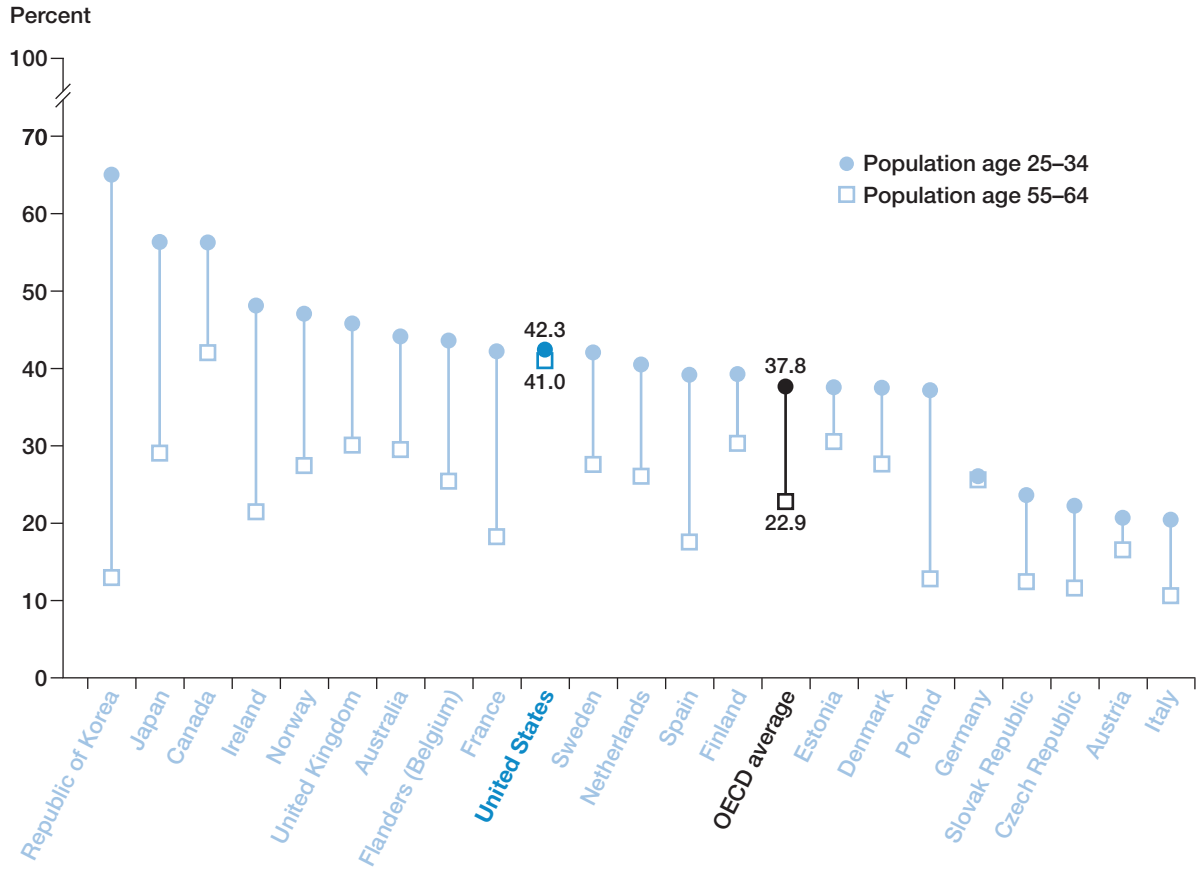
[27] Goldin & Katz, "Race Between Education and Technology"; 2. See also Michael Greenstone, Adam Looney, Jeremy Patashnik, and Muxin Yu, *Thirteen Economic Facts About Social Mobility and the Role of Education* (Washington, DC: The Hamilton Project, 2013); Frank Levy and Richard Murnane, *Dancing with Robots, Human Skills for Computerized Work* (Washington, DC: Third Way, 2013).

[28] Tertiary education broadly refers to all post-secondary education, including but not limited to universities. Colleges, technical training institutes, community colleges, nursing schools, research laboratories and others constitute tertiary institutions.

[29] Autor, *Polarization of Job Opportunities*; Goldin and Katz, "Race Between Education and Technology"; Paul Taylor, "The Rising Cost of Not Going to College," *Pew Research Center*, 2014; Greenstone et al., *Thirteen Economic Facts about Social Mobility.*

FIGURE 6.

Percentage of population age 25–34 and population age 55–64 with tertiary education, by participating country/region: 2010



NOTE: The countries/regions are listed in descending order based on the percentage of population age 25–34 with tertiary education. See table C-3 for complete data.

SOURCE: OECD (2013), "Educational attainment", in OECD, OECD Factbook 2013: Economic, Environmental and Social Statistics, OECD Publishing. DOI: 10.1787/factbook-2013-77-en.

abstract concerns, though the large-scale shifts can often appear that way. They affect how much individuals can earn and what economic prospects and educational opportunities are available to them (as well as their children) over their lifetimes. In more subtle yet still critical ways, these forces also influence how connected individuals feel to their communities and society.[30]

It is clear that the cost of not going to college, or gaining skills in a post-secondary educational setting, is steeper than it has ever been. Yet key questions remain: What is the skill level and economic prospects for both our college educated young adults, and those with a secondary, or other non-baccalaureate, post-secondary degree? How susceptible are members of society with the lowest levels of education, or groups who are receiving subpar post-secondary education, to lasting periods of unemployment or underemployment? What is the risk that they will not be able to earn a livable wage to support themselves and their families? And finally, if a large percentage of our

[30] Henry Braun, "The Dynamics of Opportunity in America: A Working Framework" (Prepared for Educational Testing Service, Opportunity in America, forthcoming); Greenstone et al., *Thirteen Economic Facts about Social Mobility*; Wilkinson & Pickett, *The Spirit Level*.

adults are receiving post-secondary education but still do not demonstrate that they possess adequate skills, what benefit does that education provide and at what cost?

Thirty years after the publication of *A Nation at Risk*, trend data from international surveys on adult skills and educational attainment in the U.S. raise questions about the quality of our educational systems.[31] Although a greater percentage of young adults (between the ages of 20–34)[32] are attaining higher levels of education since 2003, their average numeracy scores declined at the high school and above high school levels (figure 7).[33] The percentages of these U.S. millennials below level 3 (the minimum standard for numeracy) increased at *all* educational levels, and the percentage of millennials at the highest level of proficiency (level 4/5) decreased for those with post-secondary degrees.

While one expects high percentages below level 3 for those with the least amount of education, these numbers are noteworthy: 97 percent of millennials without a high school education and 72 percent of millennials whose highest level of education was high school are below the minimum standard in numeracy. In other words, just 28 percent of those who indicated that their highest level of educational attainment was high school scored at level 3 or above. In addition, although the percentages of millennials who had at least some post-secondary education increased 12 percentage points, so did the percentage of those who did not meet minimum standards for proficiency (i.e., those below level 3), signaling that a growing proportion of our more highly educated millennials lack necessary foundational skills in numeracy.

PIAAC data on U.S. adult skill levels and educational attainment mesh well with overall economic and labor market trends that underscore the increasing importance of educational attainment in skills acquisition. U.S. millennials who only have a high school credential score 54 points (more than one standard deviation) below their peers in the U.S. who have a four-year bachelor's degree (figure 8 and table C-4).[34] Those with some post-secondary education score 24 points below those with a four-year bachelor's degree. The picture *within* the U.S. certainly looks more hopeful for individuals who obtain higher levels of educational attainment.

[31] Trend analyses for the numeracy scale have been computed between the PIAAC and ALL, administered in 2003–2008.

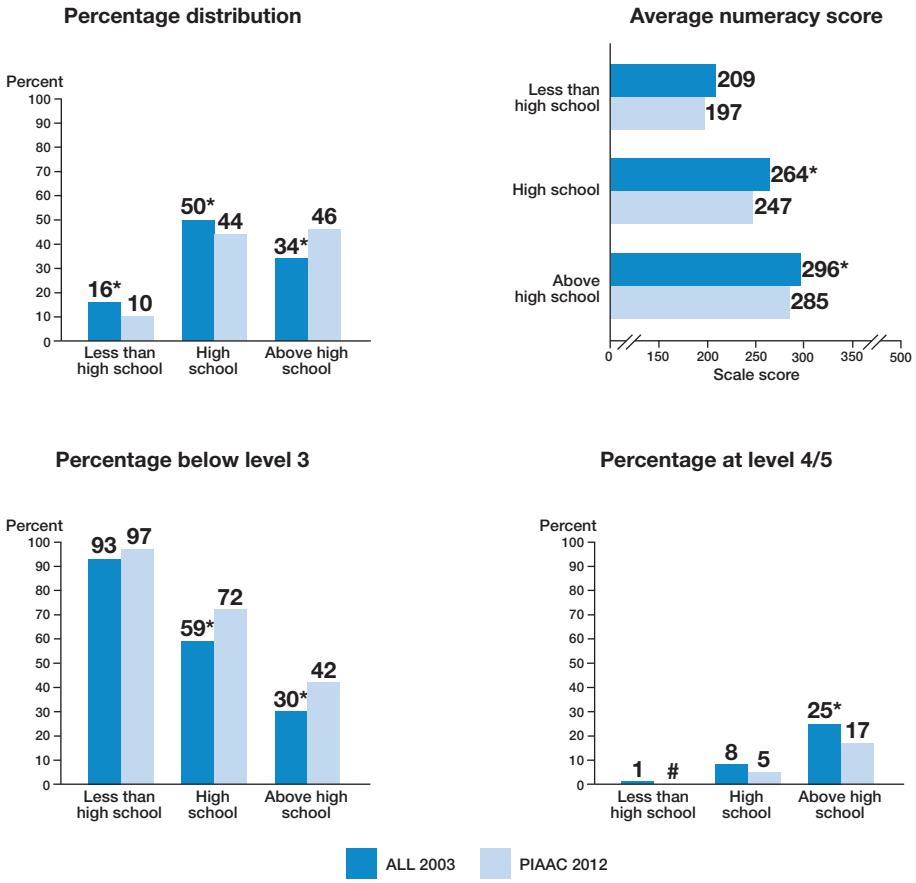
[32] For this portion of the analysis, we have adjusted our age group from the millennials (ages 16–34) that we examine in other portions of the paper. Research (both national and international) defines age of completion of upper secondary school at 20–25, depending on the country. In order to both accurately reflect the skill level of millennials and adjust for limited sample sizes in the PIAAC and ALL data for specific age segments of the population, we focus on 20- to 34-year-olds for the U.S. trend data, ages 25–34 in comparing different levels of education across countries, and ages 20–34 in any crosstabulations that use educational attainment data. This allows us to adjust the data to account for the fact that 16- to 19-year-olds have generally not yet completed high school (or upper secondary school) because they are currently enrolled in some form of post-secondary education (e.g., artificially inflated the percentage – and often the score – for this educational attainment category). It also allows for an accurate reflection of the percentages and skills of millennials who have attained additional levels of post-secondary education. See OECD, Education at a Glance 2014 (Paris: OECD Indicators, OECD Publishing, 2014), **http://dx.doi.org/10.1787/eag-2014-e** for a discussion of educational attainment and age.

[33] This analysis compares the numeracy scores and proficiency levels of adults using the following three educational attainment levels:
- Those who did not complete a secondary-level education (i.e., lacking a high school diploma)
- Those who completed secondary-level education but no level of post-secondary training
- Those who obtained post-secondary education (though not necessarily a degree)

[34] For this analysis, we are able to look at the following five levels of educational attainment (noted with corresponding International Standard Classification of Education [ISCED] levels):
- Those who did not complete a secondary-level education (i.e., lacking a high school credential) – ISCED 1, 2, 3C short or less
- Those who completed secondary-level education but no level of post-secondary training – ISCED 3A-B/C long
- Those with some post-secondary education, professional but not a bachelor's degree – ISCED 4A, B, C/5B
- Those who obtained a bachelor's degree – ISCED 5A
- Those who obtained a graduate or professional degree – ISCED 5A/6

FIGURE 7.

Trend in percentage distribution, average scores, and proficiency level results on the ALL and PIAAC numeracy scale for U.S. adults age 20–34, by educational attainment: 2003 and 2012



Rounds to zero.

* Significantly different ($p < .05$) from PIAAC (2012).

NOTE: Detail may not sum to totals because of rounding.

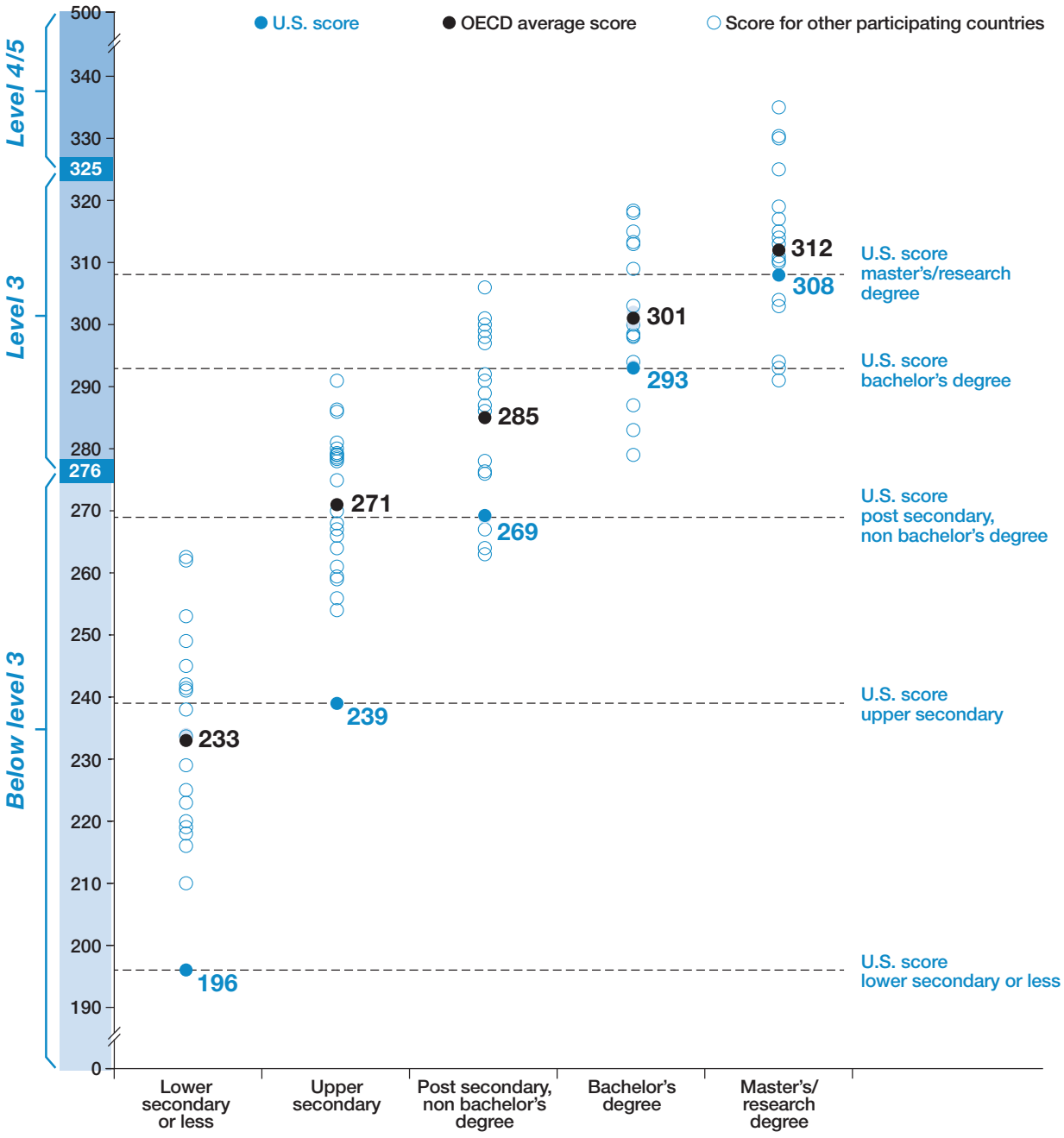
SOURCE: Organisation for Economic Co-operation and Development (OECD), Adult Literacy and Lifeskills Survey (ALL), 2003–08, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Comparing the scores of U.S. millennials with those of their peers in other countries, however, reveals a different and troubling picture. The scores of U.S. millennials whose highest level of educational attainment was either less than a high school credential or a high school credential are lower than those of their counterparts in *every* other country measured by PIAAC except France, where the scores for those with less than a high school credential were not significantly different.

At least as disturbing is that U.S. millennials with a four-year bachelor's degree scored higher than their counterparts in only two countries: Poland and Spain. Our most educated—those with a master's or research degree—scored higher than their peers only in Ireland, Poland, and Spain. U.S. millennials who have successfully attained undergraduate and graduate degrees demonstrate skill levels below those of all but a few of the participating countries.

FIGURE 8.

Average scores on PIAAC numeracy scale for adults age 25–34, by educational attainment and participating country/region: 2012



NOTE: The scores are only shown for the U.S. and OECD average in the graphic. See table C-4 for the scores for other participating countries.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

In terms of the percentage of the total population that has attained higher levels of education, the U.S. apparently still has an advantage; but much as the *Nation at Risk* report warned in 1983, other countries are exceeding us in terms of skill levels of their populations. For example, only 10 percent of U.S. young adults age 25–34 reported that they did not have a high school credential, compared to the OECD average of 13 percent. This percentage varied widely among OECD countries. In Italy and Spain, 28 percent and 34 percent of their young adults, respectively, reported that they had less than a high school education. In Canada, the Czech Republic, Finland, Flanders/Belgium, Japan, Poland, and the Republic of Korea, less than 10 percent indicated they had this lowest level of educational attainment.[35] Even though our younger population is among the most educated, our average scale score ranking is similar to that of other countries with relatively large percentages of their population with less than a high school credential.

Indeed, while millennials are often portrayed in the media as being on track to be our best educated generation ever, their skill levels are comparatively weak.[36] U.S. adults age 25–34 whose highest level of education is a post-secondary, non-baccalaureate degree had an average score of 269. This score is near the OECD average for this age group that reports its highest level of education is a high school credential (271). In 10 countries, adults age 25–34 reporting their highest level of education as a high school credential scored *higher* than their U.S. peers with a post-secondary, non-baccalaureate degree. U.S. young adults that attain what we consider a high level of post-secondary education—a four-year baccalaureate degree—scored the same as the young adults with only a high school education in three of the top-performing countries: Finland, Japan, and the Netherlands.

The 21st century appears to be one where the U.S. must play catch-up to the gains made by other countries, especially in terms of skills. Among other things, this should persuade us to consider critically the value that higher education in the U.S. is contributing to the skills of our young adults. Moreover, it should encourage us to shift our focus from a discussion of attainment alone to the skill level that our young adult population is acquiring. Because so many millennials are increasingly going in debt to pay for higher education, it behooves us to consider ways that we can make meaningful changes to the policies that govern access to, payment for, and the attainment of skills within these institutions.[37]

[35] Note that many countries (e.g., Norway, Finland, the Netherlands) have secondary education systems that graduate adults at a later age than other countries, which may likely contribute to the larger percentage in this category.

[36] On educational levels of millennials, see: Kevin Carey, "Americans Think We Have the World's Best Colleges. We Don't," *New York Times*, June 28, 2014. **http://www.nytimes.com/2014/06/29/upshot/americans-think-we-have-the-worlds-best-colleges-we-dont.html**; *Millennials: Confident. Connected. Open to Change*, eds. Paul Taylor and Scott Keeter, (Washington, DC: Pew Research Center, February 2010), **http://www.pewsocialtrends.org/files/2010/10/millennials-confident-connected-open-to-change.pdf**; Janet Novack and Samantha Sharf, "The Recession Generation." *Forbes*, August 18, 2014; The Council of Economic Advisers, *15 Economic Facts About Millennials*, October 2014, **http://www.whitehouse.gov/sites/default/files/docs/millennials_report.pdf**.

[37] Suzanne Mettler, *Degrees of Inequality: How the Politics of Higher Education Sabotaged the American Dream* (New York: Basic Books, 2014).

PARENTAL EDUCATION, SOCIOECONOMIC STATUS, AND SKILLS

In 1931, in the depths of the Great Depression, James Truslow Adams published a history of the United States entitled *The Epic of America*. In this book, Adams coined the term "the American dream" as "that dream of a land in which life should be better and richer and fuller for everyone." Adams also identified as part of the dream an inherent notion of equality of opportunity, "a dream of social order in which each man and each woman shall be able to attain to the fullest stature of which they are innately capable, and be recognized by others for what they are, regardless of the fortuitous circumstances of birth or position."[38] The nature of dreams, however, is that they are part of the domain of the imagination. Social scientists, economists, and critics have all acknowledged the extent to which this dream diverges from the reality of life in the United States.[39] Nonetheless, the notion that one has equal access to opportunity and that this access is tied to one's educational attainment is a powerful one for most Americans.

In the 21st century, education is understood to be an essential gateway to opportunity. Indeed, the PIAAC data confirm that higher levels of education are correlated with higher skill levels for adults across all participating PIAAC countries. There is another related and important variable that is strongly associated with skills: parental educational attainment.[40] Large-scale international surveys (Progress in International Reading Literacy Study, the Programme for International Student Assessment, Trends in International Mathematics and Science Study) and national surveys (NAEP) of student achievement consistently confirm the correlation between the level of parental education and the performance of children.[41] These surveys often rely on parental education as an important indicator or proxy for socioeconomic background, or socioeconomic status (SES),[42] though they frequently use other measures as well (such as parental engagement or number of books in the home). Individuals with parents who have lower levels of educational attainment tend to have fewer socioeconomic advantages, and those whose parents have higher levels of educational attainment often have greater socioeconomic advantages. Research studies have documented the extent to which parents with access to capital beyond—though strongly related to—income

[38] James Truslow Adams, *The Epic of America* (Little Brown & Company, 1931). For more on social inequality and skills, see: Dirk Van Damme, *How Closely is the Distribution of Skills Related to Countries' Overall Level of Social Inequality and Economic Prosperity?*, OECD Education Working Papers No. 105 (Paris: OECD Publishing, October 2014), http://dx.doi.org/10.1787/5jxvd5rk3tnx-en.

[39] Raj Chetty, Nathaniel Hendren, Patrick Kline, Emmanuel Saez, and Nicholas Turner. "Is the United States Still a Land of Opportunity? Recent Trends in Intergenerational Mobility," NBER Working Paper 19844 (Cambridge, MA: National Bureau of Economic Research, 2014); Raj Chetty, Nathaniel Hendren, Patrick Kline and Emmanuel Saez. "Where Is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States (June 2014), http://obs.rc.fas.harvard.edu/chetty/mobility_geo.pdf; Greenstone et al., "Thirteen Economic Facts"; Miles Corak, "Inequality and Opportunity: How to Slide Down the Great Gatsby Curve," Presentation given at Ottawa Economics Association, Ottawa Canada, June 6, 2013. http://milescorak.files.wordpress.com/2013/06/social_mobility_summit_v3_for_ottawa_economics_association1.pdf.

[40] *Improving the Measurement of Socioeconomic Status for the National Assessment of Educational Progress: A Theoretical Foundation,* recommendations to the National Center for Education Statistics (Washington, DC: November 2012); http://nces.ed.gov/nationsreportcard/pdf/researchcenter/socioeconomic_factors.pdf; European Commission Directorate-General for Education and Culture. *PISA 2012: EU Performance and First Inferences Regarding Education and Training Policies in Europe*, December 3, 2013, http://ec.europa.eu/education/policy/strategic-framework/doc/pisa2012_en.pdf; Sean Reardon, "Income Inequality Affects Our Children's Educational Opportunities." In *Understanding Whether and How Economic Inequality Affects Economic Growth*, September 2014, eds. Heather Boushey and Ed Paisley, 26–28 http://ms.techprogress.org/ms-content/uploads/sites/10/2014/09/2014-equitablegrowth-conf-rep1.pdf.

[41] U.S. Department of Education, National Center for Education Statistics, *The Condition of Education 2014*, by Grace Kena, Susan Aud, Frank Johnson, Xialoei Wang, Jijun Zhang, Amy Rathbun, Sidney Wilkinson-Flicker, and Paul Kristapovich, NCES 2014-083 (Washington, DC: May 2014), accessed September 30, 2014.

[42] OECD, *OECD Skills Outlook* 2013, 112.

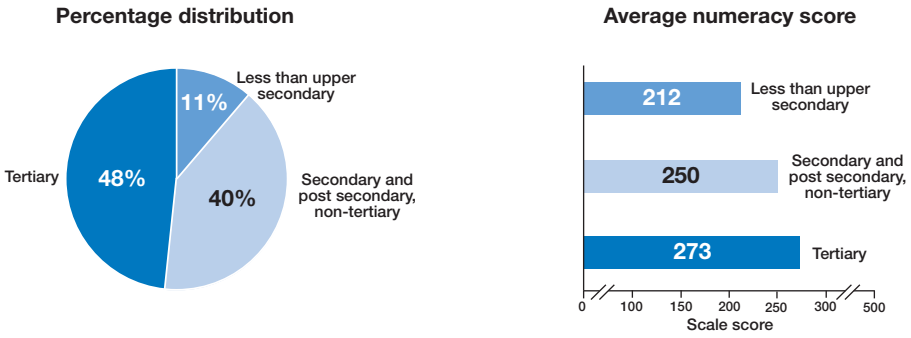
and wealth deeply influences the well-being of their children.[43] These parents have greater material resources to expend on young children and also tend to spend more time interacting with them (for example, by reading to them at an early age) in ways that strongly influence achievement outcomes.[44] Thus, parental education, while in part a proxy for socioeconomic status, may in fact provide a more direct link to the skills attainment of both children and young adults.

The positive correlation between parental education and skills is readily observed in the PIAAC data. For example, the average numeracy score for U.S. millennials who reported that neither parent had attained an upper secondary degree (i.e., the most disadvantaged) is 212—thirty-eight points lower than millennials who indicated that at least one parent had attained a high school degree (or equivalent) (figure 9) . Moreover, there is a 61-point difference in the average score of millennials whose parents had the lowest and highest levels of educational attainment (that is, the gap in scores between the least and most advantaged millennials).[45]

This correlation between parental educational level and skill is not, on the face of it, especially noteworthy—all major large-scale surveys of student achievement in the United States across grade levels and subjects support this relationship.[46] International surveys of adult skills offer us

FIGURE 9.

Percentage distribution and average scores on PIAAC numeracy scale for U.S. adults age 16–34, by highest level of parental education: 2012



NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

[43] Brian Keeley, *Human Capital: How What You Know Shapes Your Life.* (Paris: OECD Publishing, 2007), **http://dx.doi.org.10.1787/9789264029095-en**; James W. Pellegrino and Margaret L. Hilton, eds., *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century.* (Washington DC: National Academies Press, 2012); Reardon, "Income Inequality."

[44] Paul Barton and Richard Coley, *Parsing the Achievement Gap, II.* (Princeton NJ: Policy Information Center, Educational Testing Service, 2009), **http://www.ets.org/Media/Research/pdf/PICPARSINGII.pdf;** Braun, *Dynamics of Opportunity.*

[45] The PIAAC parental education data classifies three different levels of parental education from adult responses to the background questionnaires:

- Neither parent had a high school (upper secondary) education
- At least one parent had attained secondary and post-secondary, non-tertiary education
- At least one parent has attained tertiary education

[46] U.S. Department of Education, National Center for Education Statistics, *Improving the Measurement of Socioeconomic Status for the National Assessment of Educational Program: A Theoretical Foundation*, by Charles D. Cowan, Robert M. Hauser, Robert A. Kominski, Henry M. Levin, Samuel R. Lucas, Stephen L. Morgan, Margaret Beale Spencer, and Chris Chapman (expert panel) (Washington, DC: 2012), **http://nces.ed.gov/nationsreportcard/pdf/researchcenter/socioeconomic_factors.pdf**; European Commission, Directorate-General for Education and Culture, *PISA 2012: EU Performance and First Inferences Regarding Education and Training Policies in Europe* (Brussels: European Commission, 2013), **http://ec.europa.eu/education/policy/strategic-framework/doc/pisa2012_en.pdf.**

an opportunity, however, to gain more insight into the link between parental education and adult skills acquisition (while not discounting that other factors also contribute to skills outcomes). First, the surveys allow us to examine how parental educational attainment relates to scores within and across countries and see whether the correlation between increased parental educational attainment and children's skills outcome holds even when looking at millennials. Second, by comparing the gap in scores among the millennials whose parents had different levels of educational attainment, we can examine the extent to which parental education influences skill levels differently across countries. Third, the survey data provide an opportunity to compare the scores of millennials whose parents have similar levels of educational attainment.

Across all countries, as in the U.S., increased levels of parental educational attainment are associated with higher skill levels for millennials (table 2). Nonetheless, among countries, the gap in the score between millennials whose parents have the lowest levels of educational attainment and those whose parents have the highest varies considerably. For example, in the U.S., the gap in these scores is among the highest of all the OECD countries (61 points). In other countries, such as the Republic of Korea, Ireland, and Finland, the gap is as low as 20, 27, and 30 points, respectively. This suggests that for U.S. millennials, parental education is a strong indicator of skill level to the extent that it is more closely tied to "…the fortuitous circumstances of [their] birth or position" than for the millennials in most other OECD nations.[47]

The comparative data on skills attainment and parental education highlight another salient point: The scores of U.S. millennials do not compare favorably with those of their international peers who have parents with similar levels of educational attainment. In fact, across all three levels of parental educational attainment, there is no country where millennials score lower than those in the United States.[48] Additionally, while a relatively large percentage of our millennials (and the parents of millennials) have pursued post-secondary education when compared to other countries, on average, the scores for this more advantaged group are still disappointingly low.

Figure 10 charts the relationship between average numeracy score (the dot) for millennials overall and the percentage of millennials indicating that one of their parents obtained a tertiary degree (the vertical bar). If the expected relationship between parental educational level and achievement were to hold, one would anticipate that countries with a high percentage of millennials who have a parent with a tertiary degree would also have higher average scale scores relative to countries where millennials reported a lower percentage of parents with a tertiary degree. In a number of instances, however, this appears to not be the case. In Finland, the Netherlands, Austria, and the Czech Republic, for example, parental education appears to have a weak relationship to overall performance. In these countries, while relatively low percentages of millennials reported having a parent with a tertiary education, the average scores for millennials were relatively high. At the other end of the spectrum, the United States is conspicuous as having a high percentage of millennials

[47] Adams, *The Epic of America*.

[48] This may in part be due to the influence of foreign-born U.S. millennials whose parents do not have a high school education, as their score is 13 points below that of native-born U.S. millennials in this category of parental education. See table C-7 for more information and cross-country comparisons of U.S. millennials by nativity and parental education.

TABLE 2.

Percentage distribution and average scores on PIAAC numeracy scale for adults age 16–34, by highest level of parental education and participating country/region: 2012

Country/region	Neither parent attained upper secondary		At least one parent attained secondary and post-secondary, non-tertiary		At least one parent attained tertiary		Gap between lowest and highest parental education categories
	Percentage	Average score	Percentage	Average score	Percentage	Average score	
OECD average	17*	248*	45*	274*	38*	292*	44*
Australia	26*	254*	31*	271*	44*	292*	38*
Austria	13	247*	60*	281*	28*	298*	50
Canada	8*	246*	34*	267*	58*	282*	36*
Czech Republic	3*	239*	75*	280*	22*	305*	66
Denmark	14*	252*	39	275*	48	293*	42*
England and Northern Ireland (UK)	14	222	49*	267*	37*	289*	67
Estonia	7*	258*	43*	275*	50	294*	36*
Finland	11	278*	51*	291*	38*	307*	30*
Flanders (Belgium)	16*	262*	41	287*	43*	305*	43*
France	21*	247*	47*	267*	32*	292*	45*
Germany	6*	238*	47*	273*	47	295*	57
Ireland	30*	250*	37	263*	33*	277	27*
Italy	49*	246*	39	265*	12*	280	34*
Japan	4*	‡	43	284*	53*	299*	‡
Netherlands	30*	272*	32*	289*	39*	305*	33*
Norway	9*	244*	39	273*	52	290*	46
Poland	6*	244*	72*	266*	22*	293*	48
Republic of Korea	22*	271*	45*	278*	33*	291*	20*
Slovak Republic	12	224*	68*	282*	20*	301*	77*
Spain	53*	246*	26*	263*	20*	278	32*
Sweden	12	261*	33*	281*	54*	293*	32*
United States	11	212	40	250	48	273	61

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding.

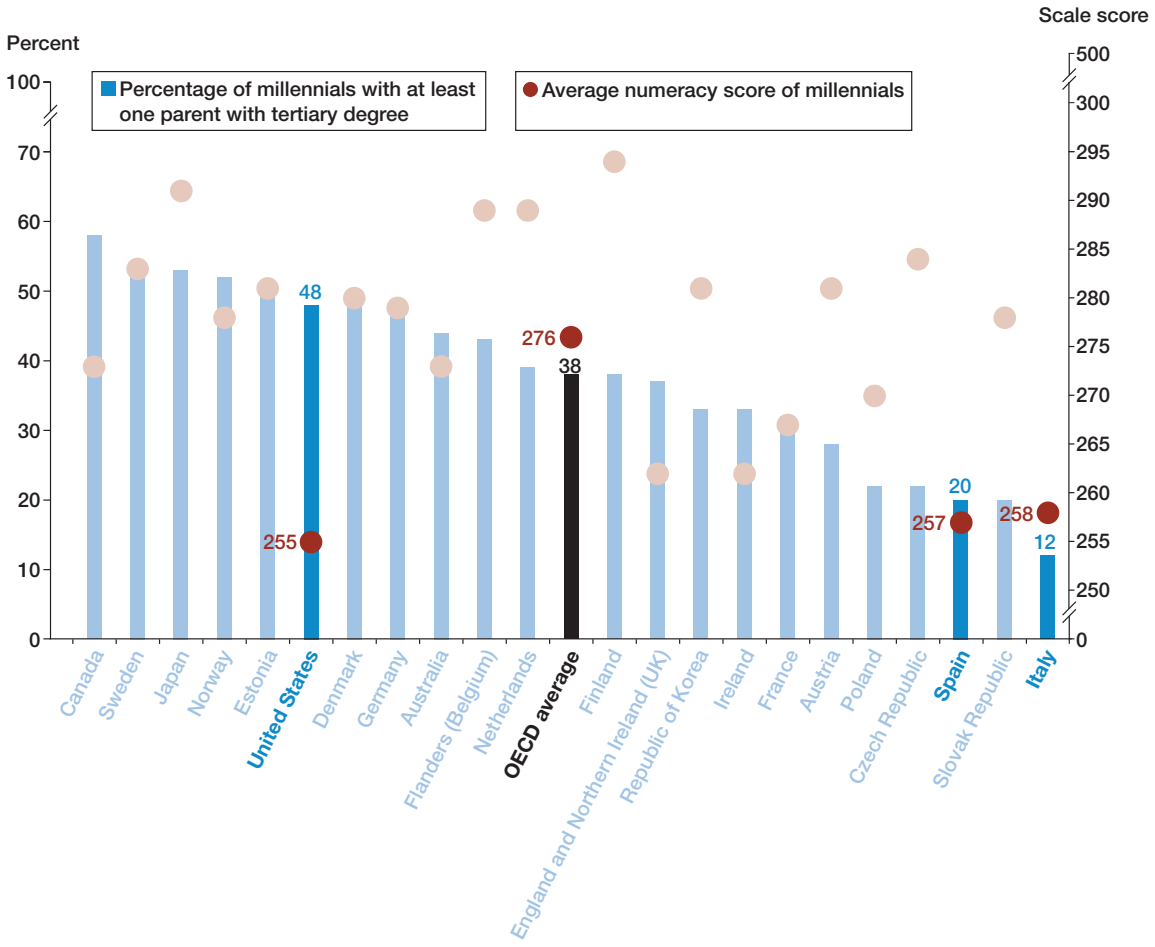
SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

reporting a parent with tertiary education (48%) yet one of the lower overall numeracy scores (255). In addition, while the percentage of U.S. millennials (48%) who report their parents as having a tertiary education was four times that of Italy (12%) and more than twice that of Spain (20%), the overall scores are comparable for these three countries. (See table C-5 for complete data.)

The data on parental educational attainment and skills is provocative for two reasons. The disappointing performance of U.S. millennials across parental education categories when compared to other countries signals a problem: Even millennials with the most educated parents underperform compared to their international peers with similar advantages. In addition, the large gap in skills between U.S. millennials whose parents have the lowest and highest levels of educational attainment points to social and economic inequality between advantaged and less advantaged members of our society that has a multiplying effect over time. Today, in fact, we are living in an era of increased economic inequality, likely unrivaled in the U.S. since the Gilded Age of the late 19th century.[49] Because skills are, in turn, so closely aligned with one's economic prosperity, there is an

FIGURE 10.

Average scores on PIAAC numeracy scale for adults age 16–34 (millennials) and percentage of millennials with a parent with tertiary degree, by participating country/region: 2012



NOTE: The countries/regions are listed in descending order based on the percentage of adults age 16–34 with at least one parent with tertiary degree. See table C-5 for complete data.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

[49] Piketty, *Capital in the 21st Century*; Facundo Alvaredo, Anthony B. Atkinson, Thomas Piketty, and Emmanuel Saez. "The Top 1 Percent in International and Historical Perspective," *Journal of Economic Perspectives* 27 (Summer 2013): 3-20; Lawrence F. Katz and Robert A. Margo, *Technical Change and the Relative Demand for Skilled Labor: The United States in Historical Perspective*, NBER Working Paper 18752 (Cambridge, MA: National Bureau of Economic Research, 2013).

increasing danger that the gulf between advantaged and disadvantaged will continue to widen. Indeed, the reinforcing nature of this process can be dizzying to contemplate. Consider, for example, that:

> *Families clearly have a strong interest in investing in the future social and economic well-being of their children. Although some of these investments may not require financial resources—such as reading to one's children when they are young—many obviously do, including payments for quality child care, purchases of books and computers, living in higher-priced neighborhoods with access to good public schools, assistance with college costs, and financial support for young adults to help them get started in their independent economic lives once their education is completed.*[50]

The disparity in private (as well as the public) investments made on behalf of children between different levels of SES can be substantial, lasting, and self-perpetuating. Moreover, these benefits are in addition to the remuneration that we assume generally accompanies having a parent with higher levels of educational attainment.

Economic opportunities, accessible in large measure through educational attainment as well as the educational attainment levels of one's parents, are clearly tightly woven with skills acquisition. The PIAAC data provide a crucial reminder, however, that merely having parents with higher education (or higher socioeconomic status), or having higher levels of education oneself, does not guarantee a competitive skills advantage. Many of those who attain higher levels of educational attainment, who are among the most advantaged of our adult population, nonetheless demonstrate relatively weaker skills in comparison to their international peers. For education to be a vehicle for future success, for it to fuel the American Dream, it has to be aligned with an economy that values the skills that it imparts, and those skills must be translatable to tangible opportunities. If the outlook is cloudy for many of the more advantaged segments of the population, then it is indeed dark for those who are least advantaged by their socioeconomic status and less likely to have access to a high quality education.

[50] Timothy Smeeding, Robert Erikson, Markus Jantti, eds., *Persistence, Privilege, and Parenting: The Comparative Study of Intergenerational Mobility* (New York: Russell Sage Foundation, 2011).

DEMOGRAPHIC CHARACTERISTICS AND SKILLS

Trends in immigration and differences in birth rates among racial/ethnic groups are profoundly altering the demographic makeup of the U.S. As the economist Ronald Ferguson has predicted, "A few decades from now there will be no racial majority group in the United States. All of us, including whites, will be minorities because each of our groups will represent less than half the population." It is in everyone's interest, therefore, to narrow evident achievement gaps between racial/ethnic groups in the U.S. Only by doing so, Ferguson advises, will we "arrive at mid-century with adults and children from every background feeling they have as much access to opportunity as anybody else does and as much reason to play the game with the expectation that if they work hard they will be successful."[51]

By 2030, Hispanics are projected to account for nearly 20 percent of the U.S. population, and non-Hispanic African-Americans nearly 14 percent. The Asian-American population is expected to increase from 5 to 7 percent.[52] It is therefore critical that as a nation we have a better understanding of the skill levels of these groups at all age levels, as well as the challenges they face to acquiring better skills. In addition, having a clearer view of how well—or how poorly—different segments of the population perform on skills assessments will allow us to identify more accurately the scope of the challenges we face.

Nativity

Across many of the participating PIAAC countries, immigrants form a large and growing percentage of the total adult population. Some might assume that the foreign born, a large number of whom have lower literacy skills than the native-born population and take PIAAC in the language of their host countries, are driving the poor performance of the U.S. in international skills surveys. The PIAAC data shed light on this complex issue. The focus in this section is on how nativity affects the performance of U.S. millennials and whether critical factors such as education and socioeconomic status mitigate the impact of nativity.

In almost all countries with a sample size large enough to compute scores for both groups, native-born millennials scored higher than their foreign-born peers (table 3). The score gap between these groups, however, varied among countries.[53] The countries with a relatively large gap in the scores between native- and foreign-born millennials (ranging from 38 points in Austria to 62 points in Sweden) were among some of the top-performing countries overall in numeracy: Finland, Flanders (Belgium), Netherlands, Sweden, Austria, Denmark, and Norway. The extent of the gap between the scores of native- and foreign-born millennials was not proportionally related to the size of the foreign-born population in a particular country. For example, Canada and Australia, countries with

[51] Ronald F. Ferguson, "Professional Community and Closing the Student Achievement Gap." Paper presented at Advocating for What's Right: A One-Day NEA Symposium on Critical Issues for Educators, Washington, DC, 2004, **http://www.tolerance.org/tdsi/sites/tolerance.org.tdsi/files/assets/general/Ferguson_2004.pdf**.

[52] U.S. Census Bureau, Population Division, "Projections of the Population by Sex, Race, and Hispanic Origin for the United States: 2015 to 2060, 2012 National Population Projections: Summary Tables, Table 4, **https://www.census.gov/population/projections/data/national/2012/summarytables.html** (release date: December 2012).

[53] OECD, *OECD Skills Outlook 2013*.

TABLE 3.

Percentage distribution and average scores on PIAAC numeracy scale for adults age 16–34, by whether they were native born or foreign born and participating country/region: 2012

Country/region	Percentage distribution		Average score		
	Native born	Foreign born	Native born	Foreign born	Native born – Foreign born
OECD average	**88***	**12***	**279***	**248***	**32**
Australia	76*	24*	275*	266*	9*
Austria	83*	17*	287*	249*	38
Canada	78*	22*	277*	259*	17
Czech Republic	96*	4*	284*	286*	-3*
Denmark	84*	16*	286*	247*	39*
England and Northern Ireland (UK)	82*	18*	268*	236	31
Estonia	97*	3*	281*	282*	#*
Finland	94*	6*	298*	238	60*
Flanders (Belgium)	92*	8*	293*	249*	44*
France	91*	9*	270*	226	44*
Germany	86	14	284*	247*	37
Ireland	75*	25*	264*	257*	7*
Italy	88	12	261	233	28
Japan	99*	1*	291*	‡	‡
Netherlands	89*	11*	294*	252*	42*
Norway	84*	16*	287*	232	55*
Poland	100*	#*	270*	‡	‡
Republic of Korea	97*	3*	282*	‡	‡
Slovak Republic	99*	1*	279*	‡	‡
Spain	83*	17*	261	233	28
Sweden	83*	17*	294*	231	62*
United States	**87**	**13**	**258**	**232**	**27**

Rounds to zero.

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

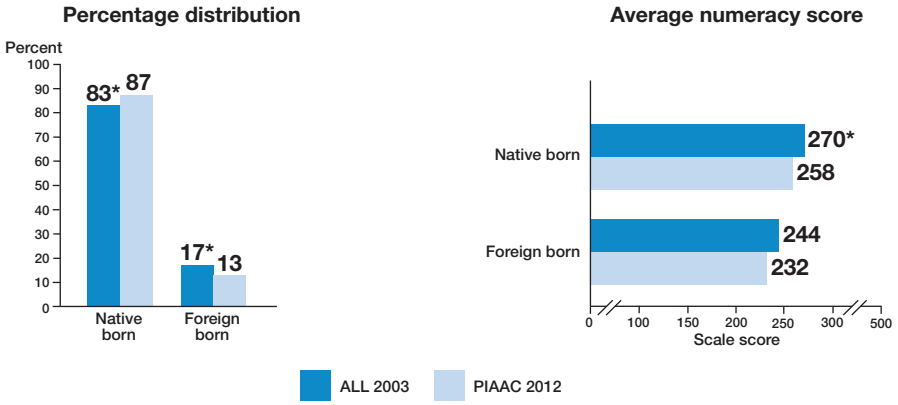
a large percentage of foreign born in the population, had relatively small gaps compared to those of other countries and, in particular, the gaps between the scores of the native and foreign born in the U.S.

The conjecture that the performance of the foreign born in the U.S. accounts for the weak comparative showing of U.S. millennials is not supported by the data. The performance of native-born U.S. millennials, when compared to the performance of native-born millennials from other OECD countries, parallels the relatively poor performance of all U.S. millennials. Native-born U.S. millennials did not perform higher in numeracy than their peers in any other country. Trend data on the performance of native and foreign-born young adults reveal, in fact, that U.S. native-born

young adults carry much of the responsibility for the decline in overall scores in numeracy that were discussed at the onset of this report. Figure 11 shows that the scores for native-born millennials declined 12 points from 2003 (as did the scores for foreign-born millennials, though the differences for foreign born from 2003 to 2012 were not statistically significant).

FIGURE 11.

Trend in percentage distribution and average scores on the ALL and PIAAC numeracy scale for U.S. adults age 16–34, by whether they were native born or foreign born: 2003 and 2012



* Significantly different ($p < .05$) from PIAAC (2012).

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Adult Literacy and Lifeskills Survey (ALL), 2003–08, Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

Native-born millennials in the U.S. performed poorly compared to their counterparts even when accounting for levels of educational attainment. Across all three levels of educational attainment, native-born U.S. millennials did not score higher than any of their international peers (table 4 and table C-6). At the lowest two levels of educational attainment, native-born U.S. millennials scored lower than their peers in all countries except in two instances: They scored similarly to their peers in England/Northern Ireland (UK) and the Slovak Republic with less than a high school credential. At the highest level of educational attainment (above high school), native-born U.S. millennials scored comparably to their peers in five other countries. (Note: For this analysis, we removed 16- to 19-year-olds from the calculation so that this youngest group would not skew the data on percentages of those without a high school credential and scores for this lowest level of education.)

Similarly, across socioeconomic categories (as measured by parental education), native-born U.S. millennials maintained their poor international standing vis-à-vis the native born of other countries (table 5 and table C-7). U.S. native-born millennials did not score higher than their peers across any of the parental education levels. The percentage of native-born U.S. millennials (50%) whose parents had a socioeconomic advantage (e.g., those with at least one parent having obtained a tertiary education) was larger than that of native-born millennials in 14 other countries.[54] Yet this relatively advantaged group had a lower skill level than their peers internationally.

[54] Canada had the largest percentage (57%) of native-born millennials with at least one parent obtaining a tertiary degree.

TABLE 4.

Percentage distribution and average scores on PIAAC numeracy scale for native-born adults age 20–34, by educational attainment and participating country/region: 2012

Country/region	Less than high school		High school		Above high school	
	Percentage	Average score	Percentage	Average score	Percentage	Average score
OECD average	**11***	**241***	**48***	**276***	**40***	**302***
Australia	16*	244*	44	274*	39*	294*
Austria	9	253*	55*	283*	35*	313*
Canada	9	231*	30*	272*	60*	292*
Czech Republic	7	250*	69*	281*	25*	314*
Denmark	13*	256*	50*	289*	37*	311*
England and Northern Ireland (UK)	6*	213	56*	262*	38*	294*
Estonia	15*	247*	45	282*	40*	298*
Finland	8	276*	56*	296*	37*	321*
Flanders (Belgium)	7	254*	45	285*	48	316*
France	11*	224*	51*	262*	38*	304*
Germany	12*	249*	50*	281*	38*	309*
Ireland	13*	222*	25*	263*	62*	279
Italy	25*	231*	52*	265*	22*	288
Japan	5*	‡	44	287*	51*	306*
Netherlands	16*	263*	50*	292*	34*	320*
Norway	8	251*	49*	284*	43*	313*
Poland	6*	230*	50*	260*	43	289
Republic of Korea	2*	‡	49*	277*	49*	290
Slovak Republic	9	213	66*	278*	25*	305*
Spain	33*	236*	27*	268*	40*	282
Sweden	10	264*	52*	289*	37*	321*
United States	**8**	**206**	**45**	**251**	**46**	**286**

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding. See table C-6 for complete data.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

The nuances of how our immigrant population is performing on these skills assessments, and the relationship of this performance to language acquisition, country of origin, educational attainment, and time of migration are all topics worthy of greater scrutiny. Nonetheless, the PIAAC data clearly suggest that skills deficits are evident *across* the native and foreign-born population of U.S. millennials. Moreover, our native-born millennials are not outperforming their peers internationally.

TABLE 5.

Percentage distribution and average scores on PIAAC numeracy scale for native-born adults age 16–34, by highest level of parental education and participating country/region: 2012

Country/region	Neither parent attained upper secondary		At least one parent attained secondary and post-secondary, non-tertiary		At least one parent attained tertiary	
	Percentage	Average score	Percentage	Average score	Percentage	Average score
OECD average	**16***	**257***	**46***	**277***	**38***	**295***
Australia	28*	259*	32*	274*	40*	294*
Austria	9	264*	63*	285*	28*	302*
Canada	6*	256*	37*	271*	57*	286*
Czech Republic	2*	236	76*	280*	22*	305*
Denmark	12*	263*	40	280*	47	298*
England and Northern Ireland (UK)[1]	12*	231	53*	271*	35*	294*
Estonia	7	258*	44	275*	49	294*
Finland	10	288*	52*	293*	37*	310*
Flanders (Belgium)	14*	271*	42	289*	45*	307*
France[1]	18*	255*	49*	269*	32*	294*
Germany	4*	‡	48*	276*	48	298*
Ireland	33*	252*	37*	265*	30*	280
Italy	48*	250*	39	269*	12*	281
Japan	4*	‡	44	284*	53	299*
Netherlands	28*	280*	33*	291*	39*	308*
Norway	7	271*	40	279*	53	295*
Poland	6*	244*	73*	266*	22*	293*
Republic of Korea	21*	274*	46*	279*	33*	291*
Slovak Republic	12*	224	69*	282*	20*	301*
Spain	55*	252*	25*	266*	20*	281*
Sweden	11*	285*	35*	289*	54	301*
United States	**8**	**225**	**42**	**252**	**50**	**274**

[1] The item response rate is below 85 percent. Missing data have not been explicitly accounted for.

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding. See table C-7 for complete data.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

As the next section will show, the economic and educational standing of more disadvantaged segments of the U.S. population, including some of the foreign born, reveal complex interactions between elements of race/ethnicity and nativity in the U.S. that call for a nuanced policy response.

Race/ethnicity in the U.S.

The New York Times recently commented that America's racial divide—measured in terms of income, wealth, employment, homeownership, occupation, and pay—comprise "a central fault line that has shaped the nation's history."[55] International assessment data, for all it offers, can often mask the crucial social and economic inequities that are vital to a deeper understanding of the skill level of U.S. adults. In what ways is that fault line visible in the skills data for our millennial population? Moreover, what role do educational attainment, quality of both K-12 and post-secondary educational institutions, and nativity play in helping us understand these data?

As noted previously, the demographic makeup of the U.S. is rapidly shifting. According to 2012 U.S. Census data, Whites represent 77.7 percent, African-Americans 13.2 percent, and Asians 5.3 percent of the population. Hispanics of any race comprise 17.1 percent of the total U.S. population.[56] Over the course of a decade, public school enrollment from pre-K through 12th grade for Whites fell from 60 to 52 percent, while Hispanic enrollment increased from 17 to 24 percent.[57] Enrollment for Asian/Pacific Islander[58] students has remained stable over this period. Projections of school enrollment by racial/ethnic group predict a continuation in these trends for the upcoming decade.

Against this backdrop are the stark economic racial/ethnic inequalities that remain entrenched in the American society. As reported by Pew Research, the median wealth (assets-debts) of White households is 20 times that of Black and 18 times that of Hispanic households.[59] This disparity in wealth is also reflected in data regarding income distribution, unemployment rates, and mortality rates.[60]

Data from the National Assessment of Educational Progress (NAEP) provide evidence of longstanding racial/ethnic gaps in achievement that broadly mirror these inequalities.[61]

[55] Neil Irwin, Claire Cain Miller, and Margot Sanger-Katz, "America's Racial Divide, Charted," *The New York Times*, August 19, 2014, **http://www.nytimes.com/2014/08/20/upshot/americas-racial-divide-charted.html?_r=0**.

[56] U.S. Census Bureau, Population Division, "Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties: April 1, 2010 to July 1, 2012," Population Estimates Table PEPSR6H, **http://factfinder2.census.gov/bkmk/table/1.0/en/PEP/2012/PEPSR6H**.

[57] U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, "Racial/Ethnic Enrollment in Public Schools," in *The Condition of Education*, last modified April 2014, **https://nces.ed.gov/programs/coe/indicator_cge.asp**.

[58] The racial breakdown is denoted differently in the Census and NAEP. Asians are a unique group in the Census; Asians and Pacific Islanders are grouped together in NAEP.

[59] Rakesh Kochhar, Richard Fry, and Paul Taylor, "Wealth Gaps Rise to Record Highs between Whites, Blacks, Hispanics," *Pew Research Center*, 2014, **http://www.pewsocialtrends.org/2011/07/26/wealth-gaps-rise-to-record-highs-between-whites-blacks-hispanics**.

[60] Annie E. Casey Foundation, *Race for Results: Building a Path to Opportunity for All Children* (Baltimore, MD: Annie E. Casey Foundation, 2014); T. J. Mathews and M. F. MacDorman, "Infant Mortality Statistics from the 2010 Period Linked Birth/Infant Death Data Set" National Vital Statistics Report 62, No. 8, **http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6301a9.htm**.

[61] Christopher Jencks and Meredith Phillips, *The Black-White Test Score Gap* (Washington, DC: Brookings Institution Press, 1998); G. Kao, J. S. Thompson, "Racial and Ethnic Stratification in Educational Achievement and Attainment," *Annual Review of Sociology* 29 (2003): 417-42; Arthur Sakamoto, Kimberly A. Goyette, and Kim Chang Hwan, "Socioeconomic Attainments of Asian Americans," *Annual Review of Sociology* 35 (August, 2009): 255-76.

NAEP long-term trend data[62] show that since the 1970s, racial/ethnic gaps have been relatively stable—despite the modest narrowing of the White-Black and White-Hispanic gaps at almost all three age categories assessed (ages 9, 13, and 17).[63] In core subjects such as reading and mathematics, "main" NAEP data reveal that White-Hispanic and White-Black gaps have existed since main NAEP was administered in the 1990s for reading and mathematics at grades 4 and 8, and in 2005 in mathematics for grade 12.[64] Gaps in the performance of Asian/Pacific Islander compared to White students emerged, most notably in main NAEP mathematics, at grades 4, 8, and 12. That is, Asian/Pacific Islander students in these grades outperformed White grade-level peers in mathematics.[65]

The status dropout rate (the percentage of 16- to 24-year-olds not enrolled in school and not having a high school credential) also reveals significant variations by racial/ethnic groups. For each year that data have been collected between 1990 and 2012, the status dropout rate was lower for White than for Black and Hispanic young adults.[66] Over this same period, however, there were declines in the status dropout rate across all racial/ethnic groups, resulting in a narrowing of the gap in the White-Hispanic dropout rate; the White-Black gap in the dropout status rate in 2012 was not, however, statistically different from 1990.[67]

For the most part, the racial/ethnic gaps identified in educational achievement and attainments at the K-12 level are borne out in the PIAAC skills data on millennials. Gaps in average numeracy scores are evident (table 6). White and Asian millennials outperform their Black and Hispanic peers, though the scores for Asian and White millennials do not differ significantly from one another as they do in many of the K-12 national assessment results. The overall demographic trends evident in the K-12 population—with an increasingly more diverse school age population—are present when we look at age segments of the adult population, with millennials decidedly more diverse than older adults. While Whites comprise 70 percent of the population of adults over the age of 35, they are only 58 percent of millennials.

In what ways do race/ethnicity influence our understanding of the overall performance of U.S. millennials? As a means of comparison, 64 percent of millennials in the U.S. performed below the minimum standard (below level 3) in numeracy, compared to 47 percent of millennials in the OECD average. Fifty-four percent of White millennials and 52 percent of Asian millennials performed below this level, as compared to 83 percent of Hispanic and 88 percent of Black millennials.

[62] NAEP Long-Term Trend is a study based on older frameworks than Main NAEP. Long-term trend frameworks for reading and mathematics were developed in the 1960s.

[63] *The Nation's Report Card: Trends in Academic Progress 2012*, prepared by U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Washington, DC, June 2013), **http://nationsreportcard.gov/ltt_2012/summary.aspx**.

[64] The current NAEP reading assessment framework governs reading assessments from 1992 to the present at grades 4, 8, and 12. The current NAEP mathematics assessment framework governs mathematics assessments from 1990 to the present at grades 4 and 8. The grade 12 NAEP mathematics assessment framework was redesigned in 2005, which began a new trend line for this subject.

[65] *2013 Grade 12 Reading and Mathematics Results*, prepared by U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Washington, DC, 2014), **http://nationsreportcard.gov/reading_math_2013/#/achievement-gaps**. Asian-White gaps emerged in 2003 at grades 4 and 8, and 2005 at grade 12.

[66] U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, "Status Dropout Rates," in *The Condition of Education*, last modified January 2014, **http://nces.ed.gov/programs/coe/indicator_coj.asp**.

[67] Data are based on sample surveys of the civilian noninstitutionalized population, which excludes persons in prisons, in the military, and others not living in households.

TABLE 6.

Percentage distribution, average scores, and proficiency level results on PIAAC numeracy scale for U.S. adults age 16–65, by race/ethnicity and age group: 2012

Age group	OECD average	United States					
		All adults age 16-65	White	Black	Hispanic	Asian/ Pacific Islander	Other race
Age 16–65							
Percentage distribution	100	100	65	13	14	5	3
Average score	269	253	268	212	215	262	250
% below level 3	53	64	55	90	85	58	68
% at level 4/5	13	9	12	1	2	12	9
Age 16–34							
Percentage distribution	37	39	58	14	19	6	3
Average score	276	255	271	219	228	268	‡
% below level 3	47	64	54	88	83	52	‡
% at level 4/5	15	9	12	1	3	12	‡
Age 35–65							
Percentage distribution	63	61	70	12	11	4	3
Average score	265	252	267	207	202	255	246
% below level 3	56	64	55	92	87	63	73
% at level 4/5	11	9	11	1	1	11	7

‡ Reporting standards not met.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

The performance of White and Asian millennials, however, still does not reach the level of the top performers internationally and remains below the OECD average. In fact, average scores and percentages of U.S. White millennials that performed below level 3 are similar to those of millennials in France (average score of 267 and 54% scored below level 3), which ranks near the bottom internationally. While a greater percentage of White and Asian/Pacific Islander millennials (12%) performed at the highest proficiency level (level 4/5) compared to Hispanic (3%) or Black (1%) millennials, these percentages are still lower than the OECD average (15%) and the percentages of millennials at this level in top-performing countries (Finland at 26% and the Netherlands at 21%). The issues of race and ethnicity clearly impact our understanding of how skills are distributed among our young adult population and deserve further attention and research.

Race/ethnicity and educational attainment. As with adults overall, differences in the performance within racial/ethnic groups in the U.S. are associated with different levels of educational attainment. (Note: Due to sample sizes in the PIAAC data for race/ethnicity in the U.S., performance for racial/ethnic groups by levels of educational attainment could not be estimated for millennials and is reported here for adults 25–65). Across all racial/ethnic groups, those with greater levels of educational attainment scored higher than adults with less education (table 7). However, the

TABLE 7.

Percentage distribution, average scores, and proficiency level results on PIAAC numeracy scale for U.S. adults age 25–65, by race/ethnicity and educational attainment: 2012

Educational attainment	Race/ethnicity				
	White	Black	Hispanic	Asian/ Pacific Islander	Other race
Lower secondary or less					
Percentage distribution	5	10	25	4	4
Average score	212	157	168	‡	‡
% below level 3	94	100	99	‡	‡
Upper secondary					
Percentage distribution	33	36	32	19	37
Average score	251	203	217	‡	‡
% below level 3	71	95	86	‡	‡
Post secondary, non bachelor's degree					
Percentage distribution	17	18	9	8	21
Average score	269	220	‡	‡	‡
% below level 3	58	91	‡	‡	‡
Bachelor's degree					
Percentage distribution	17	9	7	26	7
Average score	295	250	‡	277	‡
% below level 3	29	71	‡	48	‡
Master's/research degree					
Percentage distribution	12	5	3	24	9
Average score	308	‡	‡	300	‡
% below level 3	19	‡	‡	27	‡

‡ Reporting standards not met.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

distribution of the population among levels of educational attainment differed by race/ethnicity. For example, 57 percent of the Hispanic adult population reported having an upper secondary education or less, compared to 38 percent of White adults, 46 percent of Black adults, and 23 percent of Asian/Pacific Islander adults. In terms of post-secondary education, a greater percentage of White (34%) and Asian/Pacific Islander (34%) adults age 25–65 reported that their highest level of educational attainment was either a post-secondary non-bachelor's degree or a four year bachelor's degree as compared to Black (27%) or Hispanic (16%) adults in this age group. Given the previously noted association between educational attainment and skill level, it is therefore not surprising that Hispanic and Black adults age 25–65 (as well as millennials) performed worse than their White and Asian peers.

Variation in performance among racial/ethnic groups persists, however, even for those with similar levels of education. For example, 95 percent of Black adults age 25–65 reporting their highest level of education as upper secondary and 86 percent of Hispanic adults at this educational level performed below the minimum standard (below level 3) in numeracy compared to 71 percent of White adults. This differential in performance, particularly the gap in percentages of White and Black adults that scored below level 3, was noted at each level of educational attainment (with reportable results). In fact, Black adults age 25–65 consistently scored about 50 points lower than their White peers across most educational attainment categories, where sample sizes were adequate to allow for a reliable estimate. Equally alarming, there is no difference between the percentages below level 3 for Black adults that report having only a high school credential (95%) and those that report having some post-secondary (nonbaccalaureate) education (91%). Our educational institutions—especially those serving more disadvantaged segments of the population—need to do a better job imparting skills. Moreover, if there is inequality in the investment and quality of educational resources for different racial/ethnic and socioeconomic groups within the U.S., then inequalities in skills, economic opportunity, income, and wealth will continue to grow over time.

These data point to a distinct pattern of inequity in the quality and type of opportunities that different racial/ethnic groups receive in the U.S. The data also suggest that while millennials overall, and even those within specific racial and ethnic groups, may be attaining higher levels of education than older peers, the skills associated with these attainment levels are below average in absolute and relative terms. In regard to post-secondary education, where skills acquired at the K-12 level are expected to be honed, a larger portion of White young adults are enrolled in elite colleges and universities, while a greater percentage of Black and Hispanic young adults generally attend community colleges.[68] In addition, researchers have found that many for-profit two- and four-year colleges do not yield impressive returns to investments in education.[69] While millennials overall are acquiring greater debt to pay for their post-secondary education, Blacks and Hispanics may be accumulating this debt with less payoff in terms of skills acquisition. The stratification of types of post-secondary education by race/ethnicity contributes to skills inequality among the American adult population which in turn exacerbates income inequality.[70]

Although sample sizes prohibit comparisons of scores among all of the racial/ethnic groups with a baccalaureate and a post-graduate degree (master's or research degree), some relevant results about skills and race/ethnicity can be noted.[71] For those in each of the racial/ethnic categories who reported attaining a baccalaureate degree, White adults scored higher than their racial/ethnic peers with similar levels of educational attainment. At the highest level of educational attainment—a post-secondary master's/research degree—scores could only be computed for White and Asian/Pacific Islander adults, and these scores were not statistically different. Notable, however, is the

[68] Mettler, *Degrees of Inequality*.

[69] U.S. Department of Education, "Obama Administration Takes Action to Protect Americans from Predatory, Poor-Performing Career Colleges," [press release], **http://www.ed.gov/news/press-releases/obama-administration-takes-action-protect-americans-predatory-poor-performing-ca**; Henry Farrell, "Five Questions on Regulating For-Profit Colleges," *Washington Post*, May 29, 2014, **http://www.washingtonpost.com/blogs/monkey-cage/wp/2014/05/29/five-questions-on-regulating-for-profit-colleges/**.

[70] Greenstone et al., "Thirteen Economic Facts"; Mettler, *Degrees of Inequality*.

[71] Sample size for Hispanics in this category was insufficient to provide a reliable estimate.

gap in performance between White and Black adults with a four-year college degree. White adults scored 44 points higher than their similarly educated Black peers. Moreover, 71 percent of Black adults with this level of educational attainment scored below the minimum standard in numeracy, compared to 29 percent of White adults.

Left unacknowledged and unmitigated, the trends in racial/ethnic differences in adult skill levels in the U.S. will result in an ever-growing population of U.S. adults without the human capital required to compete flexibly and effectively in the economy and participate fully in our democracy. Across all racial/ethnic groups, the PIAAC results expose skills deficits that we ignore at our own risk. As Ronald Ferguson has warned, "If we fail to raise the achievement levels across the entire population—particularly among Latinos and African Americans—we will continue sliding backwards in the community of nations in regards to academic skill levels and perhaps also in our capacity to compete."[72]

[72] Ferguson, 2014, 7

IMPLICATIONS

PIAAC results for the United States depict a nation burdened by contradictions. While the U.S. is the wealthiest nation among the OECD countries, it is also among the most economically unequal.[73] A nation that spends more per student on primary through tertiary education than any other OECD nation systematically scores low on domestic and international assessments of skills.[74] A nation ostensibly based on the principles of meritocracy ranks among the highest in terms of the link between social background and skill level.[75] And a nation with some of the most prestigious institutions of higher learning in the world houses a college-educated population that scores among the lowest of the participating OECD nations in literacy and numeracy.

The PIAAC data on adult skills, disaggregated to compare the performance of millennials to their peers internationally across levels of performance, educational attainment categories, degrees of parental education, and key demographic factors, shed light on the challenges we face as a nation to overcome some of these inconsistencies. First, the data reveal that in relative terms, our millennials do not perform favorably in comparison to their peers internationally. This holds true even for our best performing and most educated millennials, those who are our native born, and those with the greatest socioeconomic advantage. In addition to the relative poor performance of U.S. adults (both for adults overall and millennials), there has been an absolute decline of skills. A decade ago, the skill level of American adults was judged "mediocre."[76] Now it is below even that. Millennials, who will form the backbone of this nation's future, are not poised to lift us out of this predicament; in fact, the lack of adequate skills in this population has become a challenge for us to confront.

These findings need to be considered against a backdrop of larger social, economic, technological, and political forces that are shaping our society, forces that have given rise to greater income and wealth inequality in the U.S. and other developed countries.[77] Some economists have attributed this rise in inequality to, among other factors, a dramatic widening of the "wage premium" (that is, the wage differential associated with those who have higher levels of skill/education compared to those with less), which moves issues of education and skills to the forefront. Large-scale innovations in technology and shifts in the global labor markets and trade practices have all contributed to an economy and society where skills matter a great deal more than they once did, and in ways

[73] OECD, "Gross Domestic Product in US Dollars at Current Prices and Current PPPs," Economics: Key Tables from OECD, Table 5, last modified June 11, 2014, **http://www.oecd-ilibrary.org/economics/gross-domestic-product-in-us-dollars_2074384x-table3**; OECD, "Gross domestic product (GDP): GDP per head, US $, constant prices, constant PPPs, reference year 2005," OECD StatExtracts Table 1, accessed 2014. The U.S. ranked first in GDP purchasing power parity (PPP) and third in per capita GDP PPP in 2012 among the 34 OECD nations; Wilkinson and Pickett, *The Spirit Level*.

[74] OECD, *OECD Skills Outlook 2013*; U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, "Selected Findings from PISA 2012," in *PISA 2012 Results*, accessed 2014, **http://nces.ed.gov/surveys/pisa/pisa2012/pisa2012highlights_1.asp**; OECD, *Education at a Glance* (Paris, OECD Indicators, OECD Publishing, 2013), **http://dx.doi.org/10.1787/eag-2013-en**; "Are the Nation's 12th-Graders Making Progress in Mathematics and Reading," prepared by U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (Washington, DC, June 2013), NCES 2014-087, (Washington, DC, 2014), **http://nces.ed.gov/nationsreportcard/subject/publications/main2013/pdf/2014087.pdf**).

[75] OECD, *OECD Skills Outlook 2013*.

[76] Sum et al., "The Twin Challenges."

[77] Piketty, *Capital in the 21st Century*.; Jonathan D. Ostry, Andrew Berg, and Charalambos G. Tsangarides, *Redistribution, Inequality, and Growth* (Washington, DC: International Monetary Fund, February 2014), **http://www.imf.org/external/pubs/ft/sdn/2014/sdn1402.pdf**; Andrew Berg and Jonathan D. Ostry, "Inequality and Unsustainable Growth: Two Sides of the Same Coin," *IMF Staff Discussion Note* (April 8, 2011), **http://www.imf.org/external/pubs/ft/sdn/2011/sdn1108.pdf**.

to which we are still adapting. The "return to skills" (what labor economists refer to when they speak of the gain a worker can expect given an investment in higher levels of education and training) has risen steadily since 1980. On the other side of the equation, the widening of the gap in wages for those with a high school degree and those with a four-year baccalaureate degree is also due to the *falling* real earnings for those with only a high school education.[78] No matter how you conceptualize the wage inequality problem, skills emerge as a crucial element.

How skills, education, and labor markets interact, and how these change over time, are critical to understanding the increased polarization of the economy—one with very skilled workers at one end in professional and technical jobs requiring specialized or advanced degrees, and unskilled workers at the other. What we often register as a rising demand for educated workers—and an increasing payoff for higher levels of educational attainment—may be a multifaceted, shifting picture that we still need to bring into sharper focus. The demand for more educated workers may translate to a demand for workers with "very high levels of education" and perhaps very particular kinds of education and technical expertise.[79] Even those with some post-secondary education, or even many with a four-year baccalaureate degree, may face two distinct and critical challenges. One is that their skill levels, despite post-secondary education, may be inadequate, particularly in a global labor market. The PIAAC results speak directly to this. The other is that the market may be demanding and only highly remunerating very particular technical skills that merely a select few can supply. From this vantage point, a picture of the labor market emerges where fewer individuals with specialized skills and high-wage opportunities are winners, while increasingly large numbers of adults without these skills and opportunities lose. If accurate, this characterization of winners and losers in a global web of economic, social, and political relationships has immediate and lasting impacts on families, communities, and the nation as a whole. In this scenario, advantage is concentrated among a few, while disadvantage is shared widely.

The dynamic interactions among education, skills, and labor market demands, and the influence of this on inequality in America, should not be ignored. Many politicians, economists, and policy makers agree that if left unchecked, inequality hinders growth by perpetuating stagnation in the economy overall.[80] There is mounting awareness, as well, of the societal costs associated with having large portions of the population with low skills. Christine Lagarde, Managing Director of the International Monetary Fund (IMF), added her voice to a chorus of world leaders who acknowledge that if left unchecked, high levels of inequality threaten to have a corrosive effect on democracy. "Disparity also brings division," Lagarde cautions. "The principles of solidarity and reciprocity that bind societies together are more likely to erode in excessively unequal societies. History also

[78] Daron Acemoglu and David Autor, "What Does Human Capital Do?", review of *The Race between Education and Technology*, by Claudia Goldin and Lawrence F. Katz, *Journal of Economic Literature* 50, no. 2 (2012): 426-63; Autor, *Polarization of Job Opportunities*; Autor, "Skills, Education, and the Rise," 843-851; Levy and Murnane, *Dancing with Robots*.

[79] Autor, *Polarization of Job Opportunities*; Autor, "Skills, Education, and the Rise," 843-851; Acemoglu and Autor, "What Does Human Capital Do?"

[80] Standard & Poor's Financial Services LLC, "How Increasing Income Inequality is Dampening U.S. Economic Growth, and Possible Ways to Change the Tide"; Ostry, Berg, and Tsangarides, *Redistribution, Inequality, and Growth*; Berg and Ostry, "Inequality and Unsustainable Growth"; Nelson D. Schwartz, "The Middle Class Is Steadily Eroding. Just Ask the Business World," *New York Times*, February 2, 2014, **http://www.nytimes.com/2014/02/03/business/the-middle-class-is-steadily-eroding-just-ask-the-business-world.html**.

teaches us that democracy begins to fray at the edges once political battles separate the haves against the have-nots."[81] Moreover, highly unequal societies are associated with having greater levels of poor health, addiction, obesity, homicides, violence, and incarceration, and lower levels of educational performance and social mobility.[82] The skills of our millennials—our youngest cohort, who will be the workers, the decision-makers, and the parents of the next 40 years—will also have cascading effects on every level of society. A very real danger lies in perpetuating a cycle where low skill levels, less income, and less access to quality education will beget a further entrenchment of deep inequality, with some segments of society more at risk than others. This is the very opposite of what a meritocratic society purports to offer.

To what extent can skills attainment be used as both a measure of inequality and a mechanism for mitigating its effects?[83] Economic security (not to mention individual prosperity) rests in large measure on the acquisition of specific skills as well as the ability to build on a solid foundation of skill proficiency throughout one's lifetime. However, the PIAAC results also indicate that simply providing more education may not hold all the answers. If, despite investments and reforms in K-12 education over the past decades, America is continuing to lose ground in terms of the developed skills of its adult population and workforce, then we need to better appreciate the ways in which educational systems can perpetuate inequalities of opportunity at all educational levels, as well as help redress this problem. We also should carefully examine what kinds of post-secondary education and training are leading to increased skills, and which are not—especially in a climate such as in the U.S., where this education is largely privately funded and so many young adults are putting themselves at risk financially to obtain it. If fewer individuals have access to quality post-secondary education that provides in-demand skills and higher wages, we will more likely compound inequity than alleviate it.

As a country, we need to address the question of whether we can afford (in both a moral and fiscal sense) to write off nearly half of our younger-adult population as not having the skills needed to effectively engage as full and active participants in their own future and that of our nation. We need to ask whether nations such as ours—on the one hand affluent and on the other plagued by high levels of inequality—are perhaps what Wilkinson and Pickett have labeled "social failures."[84] We have clearly not adapted nimbly to the challenges we face. Doing so now will require us to focus on policy changes; even more fundamentally, it will involve a renewed social commitment to alter our course. Skills or knowledge can either feed inequality in a society or be an equalizing force. We must decide.

[81] Christine Lagarde, "Economic Inclusion and Financial Integrity" (address, Conference on Inclusive Capitalism, London, May 27, 2014), **https://www.imf.org/external/np/speeches/2014/052714.htm**; Binyamin Applebaum, "Janet Yellen Warns of Inequality Threat," *New York Times*, October 17, 2014, **http://www.nytimes.com/2014/10/18/business/yellen-warns-of-inequality-threat.html?emc=eta1&_r=0**; Standard & Poor's Financial Services LLC, "How Increasing Income Inequality is Dampening U.S. Economic Growth, and Possible Ways to Change the Tide."

[82] Wilkinson and Pickett, *The Spirit Level*.

[83] Standard & Poor's Financial Services LLC, "How Increasing Income Inequality is Dampening U.S. Economic Growth, and Possible Ways to Change the Tide"; Autor, "Skills, Education, and the Rise," 843-851; Piketty, *Capital in the 21st Century*.

[84] Wilkinson and Pickett, *The Spirit Level*.

APPENDIX A

Background Information about PIAAC

PIAAC is a cyclical, large-scale, computer-based, direct household assessment of adult skills and life experience. Twenty-four countries and regions surveyed adults between the ages of 16 and 65 in the first round of the PIAAC assessment.[85] The National Center for Education Statistics (NCES) administered the U.S. assessment to a representative sample of 5,000 adults from August 2011 to April 2012.

PIAAC defines three core competency domains—what the OECD labels "key core information processing skills"—of literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) that support the social and economic participation of adults in advanced economies.[86]

These competencies are defined as follows:

Literacy: *the ability to understand, evaluate, use, and engage with written text to participate in society, to achieve one's goals, and to develop one's knowledge and potential.*

Numeracy: *the ability to access, use, interpret, and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life.*

Problem solving in technology-rich environments (PS-TRE): *using digital technology, communication tools, and networks to acquire and evaluate information, communicate with others, and perform practical tasks.*

PIAAC participating countries/regions included in this report are as follows:

Australia	*Flanders (Belgium)*	*Norway*
Austria	*France*	*Poland*
Canada	*Germany*	*Republic of Korea*
Czech Republic	*Ireland*	*Slovak Republic*
Denmark	*Italy*	*Spain*
England and Northern Ireland	*Japan*	*Sweden*
Estonia	*Netherlands*	*United States*
Finland		

Previous literacy assessments such as the International Adult Literacy Survey (IALS), the Adult Literacy and Life Skills (ALL) survey and the NALS (National Adult Literacy Survey) defined and measured adult skills in the domains of literacy and numeracy. PIAAC represents the first attempt to assess PS-TRE on a large scale and as a single dimension. This competency focuses on the ability to solve problems for personal, work, and civic purposes by setting up appropriate goals and plans, and accessing and making use of information through computers and computer networks.

[85] This report includes 22 countries/regions. The report does not include PIAAC data for the Russian Federation or Cyprus. Not all 22 countries participated in the PS-TRE assessment.

[86] OECD, *Skills Outlook 2013*, 54.

A detailed description of each of the literacy levels for the three domains, along with general descriptions of the types of tasks that adults can perform at these levels, is presented in appendix B.

In addition to focusing on the direct measurement of adult competencies in the three main cognitive domains, PIAAC also examined adults' intrapersonal, interpersonal, and professional skills through background questionnaires. These questionnaires asked respondents questions about the types and levels of skill use (including social skills) inside and outside of the work environment, as well as the computer skills required for employment. Exploring skill use in the predefined domains directly assessed by PIAAC allows for the identification of indicators of skill mismatch in various demographic populations. The background questionnaires also included questions about respondents' personal traits (e.g., motivation, level of perseverance, and physical skills), education and training (e.g., formal and informal learning opportunities), and demographic characteristics (e.g., age, race, gender, etc.).

Reporting results

PIAAC results are reported in two ways: as scale scores on a 0–500 scale in three domains (literacy, numeracy, and PS-TRE), and as percentages of adults reaching established proficiency levels. PIAAC reports five proficiency levels for literacy and numeracy (below level 1, level 1, level 2, level 3, and level 4/5) and four levels for problem solving in technology-rich environments (below level 1, level 1, level 2, and level 3). Across all countries, only 2 percent of adults performed at level 5 on many of the variables in the literacy and numeracy scales. This report follows OECD reporting conventions by combining the top two proficiency levels for the literacy and numeracy scales. Differences between countries or specific groups of adults are noted only if the differences in scores or percentages are determined to be statistically significant ($p < .05$). No statistical adjustments to account for multiple comparisons were used. PIAAC scales and proficiency levels are developed independently for each scale (literacy, numeracy and PS-TRE); therefore, results cannot be compared across subjects.

The complete competency framework for the PIAAC is available at: **http://www.oecd.org/edu/highereducationandadultlearning/literacynumeracyandproblemsolvingintechnology-richenvironments-frameworkfortheoecdsurveyofadultskills.htm**.

The conceptual framework for the PIAAC background questionnaire is available at: **http://www.oecd.org/site/piaac/PIAAC(2011_11)MS_BQ_ConceptualFramework_1%20Dec%202011.pdf**.

Sample items from the PIAAC assessment are available at: **http://www.oecd.org/site/piaac/surveyofadultskills.htm**.

PIAAC international Data Explorer and public use files are available at **http://nces.ed.gov/surveys/piaac/** (includes U.S. data) and at **http://www.oecd.org/site/piaac/publicdataandanalysis.htm** (international data only).

APPENDIX B - PIAAC PROFICIENCY LEVEL DESCRIPTIONS AND EXAMPLE ITEMS

Description of PIAAC proficiency levels on the literacy scale: 2012

Proficiency levels and cut scores for literacy	*Literacy task descriptions*
Level 5 (376 – 500)	At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.
Level 4 (326 – 375)	Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesize information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform the task successfully. Many tasks require identifying and understanding one or more specific, non-central idea(s) in the text in order to interpret or evaluate subtle evidence-claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information.
Level 3 (276 – 325)	Texts at this level are often dense or lengthy, and include continuous, non-continuous, mixed, or multiple pages of text. Understanding text and rhetorical structures become more central to successfully completing tasks, especially navigating complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inference. Many tasks require the respondent to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate content to answer accurately. Competing information is often present, but it is not more prominent than the correct information.

Level 2 (226 – 275)	At this level, the medium of texts may be digital or printed, and texts may comprise continuous, non-continuous, or mixed types. Tasks at this level require respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present. Some tasks require the respondent to • cycle through or integrate two or more pieces of information based on criteria; • compare and contrast or reason about information requested in the question; or • navigate within digital texts to access and identify information from various parts of a document.
Level 1 (176 – 225)	Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Some tasks, such as those involving non-continuous texts, may require the respondent to enter personal information onto a document. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognizing basic vocabulary, determining the meaning of sentences, and reading paragraphs of text is expected.
Below level 1 (0 – 175)	The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. The respondent may be required to locate information in short continuous texts. However, in this case, the information can be located as if the text were non-continuous in format. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. Tasks below level 1 do not make use of any features specific to digital texts.

Examples of literacy items

Items that exemplify the pertinent features of the proficiency levels in the domain of literacy are described below. In order to be consistent with the OECD international report, levels 4 and 5 are combined in the figures in this report (level 4/5).

Level 4: Library search (Item ID: C323P002)
Difficulty score: 348

The stimulus displays results from a bibliographic search from a simulated library website. The test-taker is asked to identify a book suggesting that the claims made both for and against genetically modified foods are unreliable. He or she needs to read the title and the description of each book in each of the entries reporting the results of the bibliographic search in order to identify the correct book. Many pieces of distracting information are present. The information that the relevant book suggests that the claims for and against genetically modified foods are unreliable must be inferred from the statement that the author "describes how both sides in this hotly contested debate have manufactured propaganda, tried to dupe the public and...[text ends]."

Level 3: Library search (Item ID: C323P003)
Difficulty score: 289

This task uses the same stimulus as the previous example. The test-taker is asked to identify the name of the author of a book called *Ecomyth*. To complete the task, the test-taker has to scroll through a list of bibliographic entries and find the name of the author specified under the book title. In addition to scrolling, the test-taker must be able to access the second page where *Ecomyth* is located by either clicking the page number (2) or the word "next". There is considerable irrelevant information in each entry to this particular task, which adds to the complexity of the task.

Level 2: Lakeside fun run (Item ID: C322P002)
Difficulty score: 240

The stimulus is a simulated website containing information about the annual fun run/walk organized by the Lakeside community club. The test-taker is first directed to a page with several links, including "Contact Us" and "FAQs". He or she is then asked to identify the link providing the phone number of organizers of the event. In order to answer this item correctly, the test-taker needs to click on the link "Contact Us". This requires navigating through a digital text and some understanding of web conventions. While this task might be fairly simple for test-takers familiar with web-based texts, some respondents less familiar with web-based texts would need to make some inferences to identify the correct link.

Level 1: Generic medicine (Item ID: C309A321)
Difficulty score: 219

The stimulus is a short newspaper article entitled "Generic medicines: Not for the Swiss". It has two paragraphs and a table in the middle displaying the market share of generic medicines in 14 European countries and the United States. The test-taker is asked to determine the number of countries in which the generic drug market accounts for 10% or more of total drug sales. The test-taker has to count the number of countries with a market share greater than 10%. The percentages are sorted in descending order to facilitate the search. The phrase "drug sales", however, does not appear in the text; therefore, the test-taker needs to understand that "market share" is a synonym of "drug sales" in order to answer the question.

Below level 1: Election results (Item ID: C302BC02)
Difficulty score: 162

The stimulus consists of a short report of the results of a union election containing several brief paragraphs and a simple table identifying the three candidates in the election and the number of votes they received. The test-taker is asked to identify which candidate received the fewest votes. He or she needs to compare the number of votes that the three candidates received and identify the name of the candidate who received the fewest votes. The word "votes" appears in both the question and in the table and nowhere else in the text.

Description of PIAAC proficiency levels on the numeracy scale: 2012

Proficiency levels and cut scores for numeracy	*Numeracy task descriptions*
Level 5 (376 – 500)	Tasks at this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate and critically reflect upon solutions or choices.
Level 4 (326 – 375)	Tasks at this level require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about quantities and data; statistics and chance; spatial relationships; and change, proportions and formulas. Tasks at this level may also require understanding arguments or communicating well-reasoned explanations for answers or choices.
Level 3 (276 – 325)	Tasks at this level require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of number sense and spatial sense; recognizing and working with mathematical relationships, patterns, and proportions expressed in verbal or numerical form; and interpretation and basic analysis of data and statistics in texts, tables and graphs.
Level 2 (226 – 275)	Tasks at this level require the respondent to identify and act on mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving calculation with whole numbers and common decimals, percents and fractions; simple measurement and spatial representation; estimation; and interpretation of relatively simple data and statistics in texts, tables and graphs.

Level 1 (176 – 225)	Tasks at this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. Tasks usually require one-step or simple processes involving counting, sorting, performing basic arithmetic operations, understanding simple percents such as 50%, and locating and identifying elements of simple or common graphical or spatial representations.
Below level 1 (0 – 175)	Tasks at this level require the respondents to carry out simple processes such as counting, sorting, performing basic arithmetic operations with whole numbers or money, or recognizing common spatial representations in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors.

Examples of numeracy items

Items that exemplify the pertinent features of the proficiency levels in the domain of numeracy are described below. In order to be consistent with the OECD international report, levels 4 and 5 are combined in the figures in this report (level 4/5). No items mapped at level 5 in numeracy.

Level 4: Education level (Item ID: C632P001)
Difficulty score: 354

The stimulus for this item consists of two stacked-column bar graphs presenting the distribution of the Mexican population by years of schooling for men and women separately. The y-axis of each of the graphs is labeled "percentage" with 6 grid lines labeled "0%", "20%", "40%", "60%", "80%", and "100%". The x-axis is labeled "year" and data are presented for 1960, 1970, 1990, 2000, and 2005. A legend identifies three categories of schooling: "more than 6 years of schooling", "up to 6 years of schooling", and "no schooling". The test-taker is asked to approximate what percentage of men in Mexico had more than 6 years of schooling in 1970, choosing from a pull-down menu that has 10 response categories: "0-10%", "10-20%", and so on.

Level 3: Package (Item ID: C657P001)
Difficulty score: 315

The stimulus for this item consists of an illustration of a box constructed from folded cardboard. The dimensions of the cardboard base are identified. The test-taker is asked to identify which plan best represents the assembled box out of four plans presented in the stimulus.

Level 2: Logbook (Item ID: C613A520)
Difficulty score: 250

The stimulus for this item consists of a page from a motor vehicle logbook with columns for the date of the trip (start and finish), the purpose of the trip, the odometer reading (start and finish), the distance travelled, the date of entry and the driver's name and signature. For the first date of travel (June 5), the column for the distance travelled is completed. The instructions inform the test-taker that "a salesman drives his own car and must keep a record of the miles he travels in a Motor Vehicle Log. When he travels, his employer pays him $0.35 per mile plus $40.00 per day for various costs such as meals." The test-taker is asked to calculate how much he will be paid for the trip on June 5.

Level 1: Candles (Item ID: C615A602)
Difficulty score: 221

The stimulus for this item consists of a photo of a box containing tea light candles. The packaging identifies the product (tea light candles), the number of candles in the box (105 candles) and its weight. While the packaging partially covers the top layer of candles, it can be seen that the candles are packed in five rows of seven candles each. The instructions inform the test-taker that there are 105 candles in a box and asks him or her to calculate how many layers of tea candles are packed in the box.

Below level 1: Price tag (Item ID: C602A501)
Difficulty score: 168

The stimulus for this item consists of four supermarket price tags. These identify the product, the price per pound, the net weight, the date packed and the total price. The test-taker is asked to indicate the item that was packed first by simply comparing the dates on the price tags.

Description of PIAAC proficiency levels on the problem solving in technology-rich environments scale: 2012

Proficiency levels and cut scores for problem solving in technology-rich environments	*Problem solving in technology-rich environments task descriptions*
Level 3 (341 – 500)	At this level, tasks typically require the use of both generic and more specific technology applications. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) is required to make progress towards the solution. The task may involve multiple steps and operators. The goal of the problem may have to be defined by the respondent, and the criteria to be met may or may not be explicit. There are typically high monitoring demands. Unexpected outcomes and impasses are likely to occur. The task may require evaluating the relevance and reliability of information in order to discard distractors. Integration and inferential reasoning may be needed to a large extent.
Level 2 (291 – 340)	At this level, tasks typically require the use of both generic and more specific technology applications. For instance, the respondent may have to make use of a novel online form. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) can facilitate the resolution of the problem. The task may involve multiple steps and operators. The goal of the problem may have to be defined by the respondent, though the criteria to be met are explicit. There are higher monitoring demands. Some unexpected outcomes or impasses may appear. The task may require evaluating the relevance of a set of items to discard distractors. Some integration and inferential reasoning may be needed.

Level 1 (241 – 290)	At this level, tasks typically require the use of widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. The problem may be solved regardless of the respondent's awareness and use of specific tools and functions (e.g., a sort function). The tasks involve few steps and a minimal number of operators. At the cognitive level, the respondent can readily infer the goal from the task statement; problem resolution requires the respondent to apply explicit criteria; and there are few monitoring demands (e.g., the respondent does not have to check whether he or she has used the appropriate procedure or made progress towards the solution). Identifying content and operators can be done through simple match. Only simple forms of reasoning, such as assigning items to categories, are required; there is no need to contrast or integrate information.
Below level 1 (0 – 240)	Tasks are based on well-defined problems involving the use of only one function within a generic interface to meet one explicit criterion without any categorical or inferential reasoning, or transforming of information. Few steps are required and no sub-goal has to be generated.

Examples of problem solving in technology-rich environments items

Items that exemplify the pertinent features of the proficiency levels in the domain of problem solving in technology-rich environments are described below.

Level 3: Meeting rooms (Item ID: U02)
Difficulty score: 346

This task involves managing requests to reserve a meeting room on a particular date using a reservation system. Upon discovering that one of the reservation requests cannot be accommodated, the test-taker has to send an e-mail message declining the request. Successfully completing the task involves taking into account multiple constraints (e.g., the number of rooms available and existing reservations). Impasses exist, as the initial constraints generate a conflict (one of the demands for a room reservation cannot be satisfied). The impasse has to be resolved by initiating a new sub-goal, i.e., issuing a standard message to decline one of the requests. Two applications are present in the environment: an e-mail interface with a number of e-mails stored in an inbox containing the room reservation requests, and a web-based reservation tool that allows the user to assign rooms to meetings at certain times. The item requires the test-taker to "Use information from a novel web application and several e-mail messages, establish and apply criteria to solve a scheduling problem where an impasse must be resolved, and communicate the outcome." The task involves multiple applications, a large number of steps, a built-in impasse, and the discovery and use of ad hoc commands in a novel environment. The test-taker has to establish a plan and monitor its implementation in order to minimize the number of conflicts. In addition, the test-taker has to transfer information from one application (e-mail) to another (the room-reservation tool).

Level 2: Club membership (Item ID: U19b)
Difficulty score: 296

This task involves responding to a request for information by locating information in a spreadsheet and e-mailing the requested information to the person who asked for it. The test-taker is presented with a word-processor page containing a request to identify members of a bike club who meet two conditions, and a spreadsheet containing 200 entries in which the relevant information can be found. The required information has to be extracted by using a sort function. The item requires the test-taker to "Organize large amounts of information in a multiple-column spreadsheet using multiple explicit criteria and locate and mark relevant entries." The task requires switching between two different applications and involves multiple steps and operators. It also requires some amount of monitoring. Making use of the available tools greatly facilitates identifying the relevant entries.

Level 1: Party invitations (Item ID: U01A)
Difficulty score: 286

This task involves sorting e-mails into pre-existing folders. An e-mail interface is presented with five e-mails in an Inbox. These e-mails are responses to a party invitation. The test-taker is asked to place the response e-mails into a pre-existing folder to keep track of who can and cannot attend a party. The item requires the test-taker to "Categorize a small number of messages in an e-mail application in existing folders according to a single criterion." The task is performed in a single and familiar environment and the goal is explicitly stated in operational terms. Solving the problem requires a relatively small number of steps and the use of a restricted range of operators and does not demand a significant amount of monitoring across a large number of actions.

APPENDIX C - DATA TABLES

TABLE C-1.

Data for figure 1: Average scores on the PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales for adults age 16–65, by participating country/region: 2012

Country/region	Average score		
	Literacy	Numeracy	PS-TRE
OECD average	273*	269*	283*
Australia	280*	268*	289*
Austria	269	275*	284*
Canada	273*	265*	282*
Czech Republic	274*	276*	283*
Denmark	271	278*	283*
England and Northern Ireland (UK)	272	262*	280
Estonia	276*	273*	278
Finland	288*	282*	289*
Flanders (Belgium)	275*	280*	281*
France	262*	254	—
Germany	270	272*	283*
Ireland	267*	256	277
Italy	250*	247*	—
Japan	296*	288*	294*
Netherlands	284*	280*	286*
Norway	278*	278*	286*
Poland	267*	260*	275
Republic of Korea	273*	263*	283*
Slovak Republic	274 *	276*	281*
Spain	252*	246*	—
Sweden	279*	279*	288*
United States	270	253	277

— Not available.

* Significantly different ($p < .05$) from United States.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

TABLE C-2.

Data for figure 4: Average scores on the PIAAC literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) scales for adults age 16–34 (millennials) and adults age 16–24, by participating country/region: 2012

Country/region	Literacy		Numeracy		PS-TRE	
	Millennials	Age 16–24	Millennials	Age 16–24	Millennials	Age 16–24
OECD average	282*	280*	276*	271*	295*	295*
Australia	286*	284*	273*	270*	295*	295
Austria	279*	278*	281*	279*	295*	294
Canada	281*	276	273*	268*	293*	294
Czech Republic	284*	281*	284*	278*	297*	297
Denmark	279*	276	280*	273*	298*	294
England and Northern Ireland (UK)	273	266	262*	257*	290*	288
Estonia	286*	287*	281*	279*	291*	293
Finland	303*	297*	294*	285*	307*	303
Flanders (Belgium)	288*	285*	289*	283*	298*	299
France	277	275	267*	263*	—	—
Germany	280*	279*	279*	275*	295*	295
Ireland	274	271	262*	258*	285	286
Italy	260*	261*	258	251	—	—
Japan	305*	299*	291*	283*	306*	300
Netherlands	296*	295*	289*	285*	300*	300
Norway	282*	275	278*	271*	299*	296
Poland	279*	281*	270*	269*	283	287
Republic of Korea	291*	293*	281*	281*	298*	304
Slovak Republic	277	276	278*	278*	286	287
Spain	263*	264*	257	255*	—	—
Sweden	286*	283*	283*	278*	303*	302
United States	274	272	255	249	284	285

— Not available.

* Significantly different ($p < .05$) from United States.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

TABLE C-3.

Data for figure 6: Percentage of population, by educational attainment, age group, and participating country/region: 2000, 2005, and 2010

Country/region	Population with tertiary education in 2010 or latest available year				Population age 25–64				
	Age 25–34	Age 35–44	Age 45–54	Age 55–64	Below upper secondary	Upper secondary and post-secondary non-tertiary	Tertiary education		
					2010	2010	2000	2005	2010
OECD average	37.8	33.2	27.5	22.9	26.0	44.1	21.7	27.0	30.7
Australia	44.4	39.5	34.8	29.6	26.8	35.6	27.5	31.7	37.6
Austria	20.8	20.8	18.6	16.5	17.5	63.2	13.9	17.8	19.3
Canada	56.5	56.8	46.8	42.2	11.6	37.8	40.1	45.9	50.6
Czech Republic	22.6	16.3	15.9	11.5	8.1	75.2	11.0	13.1	16.8
Denmark	37.6	36.8	31.2	27.9	24.3	42.4	26.2	33.5	33.3
Estonia	37.8	33.2	38.5	30.7	10.9	53.8	—	33.3	35.3
Finland	39.2	45.8	38.9	30.1	17.0	44.8	32.0	34.6	38.1
Flanders (Belgium)	43.8	39.4	30.9	25.6	29.5	35.5	27.1	31.0	35.0
France	42.9	33.8	21.7	18.3	29.2	41.8	22.0	25.4	29.0
Germany	26.1	28.1	26.6	25.4	14.2	59.2	23.5	24.6	26.6
Ireland	48.2	42.3	29.8	21.5	26.5	36.2	18.5	29.1	37.3
Italy	20.7	15.8	12.0	10.7	44.8	40.4	9.4	12.2	14.8
Japan	56.7	49.6	45.8	29.0	—	55.2	33.6	39.9	44.8
Netherlands	40.8	33.5	30.2	26.0	27.0	40.6	23.4	30.1	32.4
Norway	47.3	41.0	33.4	27.3	19.4	43.3	28.4	32.7	37.3
Poland	37.4	23.4	15.1	12.9	11.3	65.8	11.4	16.9	22.9
Republic of Korea	65.0	46.9	26.7	12.8	19.6	40.7	23.9	31.6	39.7
Slovak Republic	24.0	15.9	14.6	12.7	9.0	73.6	10.4	14.0	17.3
Spain	39.2	35.3	25.6	17.8	47.1	22.2	22.6	28.2	30.7
Sweden	42.2	37.2	30.0	27.5	13.5	52.4	24.8	29.0	34.2
United Kingdom	46.0	40.6	35.2	30.0	24.9	36.9	25.7	29.7	38.2
United States	42.3	43.4	40.0	41.0	11.0	47.3	36.5	39.0	41.7

— Not available.

SOURCE: OECD (2013), "Educational attainment", in OECD, OECD Factbook 2013: Economic, Environmental and Social Statistics, OECD Publishing. DOI: 10.1787/factbook-2013-77-en.

TABLE C-4.

Data for figure 8: Percentage distribution, average scores and proficiency level results on PIAAC numeracy scale for adults age 25–34, by educational attainment and participating country/region: 2012

Country/region	Lower secondary				Upper secondary				Post secondary, no bachelor's degree			
	Percentage distribution	Average score	% below level 3	% at level 4/5	Percentage distribution	Average score	% below level 3	% at level 4/5	Percentage distribution	Average score	% below level 3	% at level 4/5
OECD average	13*	233*	77*	3*	39	271*	52*	10*	17*	285*	39*	16*
Australia	15*	234*	76*	4	34	268*	55*	10	17*	276	48*	12
Austria	12*	233*	78*	4	51*	275*	48*	10*	21	301*	24*	25*
Canada	8*	218*	86*	2	20*	261*	62*	8	37*	276	47*	12*
Czech Republic	7*	253*	66*	5	62*	278*	47*	10*	5*	289*	33*	11
Denmark	14*	241*	73*	7*	34	281*	41*	16*	22	297*	28*	25*
England and Northern Ireland (UK)	16*	219*	86*	1	35	264*	57*	10	13*	269	53	12
Estonia	15*	245*	73*	3	35	278*	47*	11*	23	287*	37*	14
Finland	8*	262*	55*	9*	44*	291*	34*	22*	9*	298*	25*	23*
Flanders (Belgium)	8	241*	77*	3	40	279*	44*	12*	28*	306*	19*	29*
France	15*	210	89	1	44*	259*	65*	4	15*	292*	31*	19*
Germany	10	220*	87	1	44*	270*	53*	8	21	299*	27*	25*
Ireland	13*	223*	87*	1	20*	256*	66	4	36*	263	60	7
Italy	28*	233*	81*	2	47*	266*	56*	8	1*	‡	‡	‡
Japan	8	262*	58*	2	34	286*	35*	14*	23	291*	33*	16
Netherlands	17*	249*	66*	6*	41*	286*	39*	16*	2*	‡	‡	‡
Norway	17*	242*	65*	5*	29*	279*	43*	14*	12*	286*	35*	24*
Poland	5*	225*	81*	#	44*	254*	67*	5	5*	264	63	8
Republic of Korea	2*	‡	‡	‡	36	267*	57*	7	26*	278*	48*	7
Slovak Republic	12	216*	88	1	59*	278*	45*	11*	1*	‡	‡	‡
Spain	34*	229*	85*	1	24*	259*	66*	4	12*	267	57	6
Sweden	14*	238*	70*	6*	38	280*	42*	17*	18	300*	23*	30*
United States	10	196	95	#	37	239	76	5	21	269	60	9

See notes at end of table.

TABLE C-4.—Continued

Data for figure 8: Percentage distribution, average scores and proficiency level results on PIAAC numeracy scale for adults age 25–34, by educational attainment and participating country/region: 2012—Continued

Country/region	Bachelor's degree				Master's/research degree			
	Percentage distribution	Average score	% below level 3	% at level 4/5	Percentage distribution	Average score	% below level 3	% at level 4/5
OECD average	17*	301*	25	27	15*	312	18	39
Australia	28*	298	29	30	7*	303	27	30
Austria	3*	‡	‡	‡	13	319	12	44
Canada	28*	298	29	28	7*	304	27	35
Czech Republic	6*	313*	14*	36	21*	325*	8*	49
Denmark	14*	298	26	31	16*	314	15	43
England and Northern Ireland (UK)	‡	‡	‡	‡	‡	‡	‡	‡
Estonia	9*	302	22	25	18*	313	15	37
Finland	24*	318*	14*	43*	15*	335*	5*	63*
Flanders (Belgium)	3*	‡	‡	‡	21*	330*	6*	53*
France	12*	300	23	23	15*	315	14	40
Germany	5*	309*	19	29	19*	317	11	41
Ireland	18	294	32	20	12	293*	32	21
Italy	21	287	37	16	3*	‡	‡	‡
Japan	30*	318*	9*	40*	5*	‡	‡	‡
Netherlands	26*	313*	15*	35*	14	330*	10	58*
Norway	24	303*	22*	30	18*	310	17	43
Poland	10*	283*	40	14	36*	294*	32*	23
Republic of Korea	33*	300	22*	21	3*	‡	‡	‡
Slovak Republic	5*	293	35	19	23*	310	16	33
Spain	13*	279*	46*	9*	16*	291*	32	16*
Sweden	16*	315*	16*	40*	15*	311	20	47
United States	21	293	31	22	11	308	19	32

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

TABLE C-5.

Data for figure 10: Average scores on PIAAC numeracy scale for adults age 16–34 (millennials) and percentage of millennials with a parent with tertiary degree, by participating country/region: 2012

Country/region	Percentage of millennials with at least one parent with tertiary degree	Average numercay score for millennials
Canada	58*	273*
Sweden	54*	283*
Japan	53*	291*
Norway	52	278*
Estonia	50	281*
Denmark	48	280*
United States	48	255
Germany	47	279*
Australia	44*	273*
Flanders (Belgium)	43*	289*
Netherlands	39*	289*
Finland	38*	294*
OECD average	38*	276*
England and Northern Ireland (UK)	37*[1]	262*
Ireland	33*	262*
Republic of Korea	33*	281*
France	32*[1]	267*
Austria	28*	281*
Czech Republic	22*	284*
Poland	22*	270*
Slovak Republic	20*	278*
Spain	20*	257
Italy	12*	258

[1] The item response rate is below 85 percent. Missing data have not been explicitly accounted for.

* Significantly different ($p < .05$) from United States.

NOTE: The countries/regions are listed in descending order based on the percentage of adults age 16–34 with at least one parent with a tertiary degree.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

TABLE C-6.

Data for table 4: Percentage distribution and average scores on PIAAC numeracy scale for adults age 20–34, by whether they were native born or foreign born, educational attainment, and participating country/region: 2012

Country/ region	Native born						Foreign born					
	Less than high school		High school		Above high school		Less than high school		High school		Above high school	
	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score
OECD average	11*	241*	48*	276*	40*	302*	19	209	34	243*	34	271
Australia	16*	244*	44	274*	39*	294*	3*	‡	18*	259*	63*	278
Austria	9	253*	55*	283*	35*	313*	11*	‡	20*	‡	9*	‡
Canada	9	231*	30*	272*	60*	292*	2*	‡	15*	262*	38	281
Czech Republic	7	250*	69*	281*	25*	314*	7*	‡	59*	‡	31	‡
Denmark	13*	256*	50*	289*	37*	311*	20	210	36	254*	34	271
England and Northern Ireland (UK)	6*	213	56*	262*	38*	294*	6*	‡	23*	230	56*	259*
Estonia	15*	247*	45	282*	40*	298*	9*	‡	37	‡	50	‡
Finland	8	276*	56*	296*	37*	321*	26	‡	52*	‡	16*	‡
Flanders (Belgium)	7	254*	45	285*	48	316*	13	‡	40	‡	19*	‡
France	11*	224*	51*	262*	38*	304*	39*	‡	27*	‡	24*	‡
Germany	12*	249*	50*	281*	38*	309*	26	‡	39	252*	27*	288
Ireland	13*	222*	25*	263*	62*	279	9*	‡	24*	250*	64*	264*
Italy	25*	231*	52*	265*	22*	288	42*	‡	45	243*	9*	‡
Japan	5*	‡	44	287*	51*	306*	‡	‡	‡	‡	‡	‡
Netherlands	16*	263*	50*	292*	34*	320*	34*	‡	36	‡	25*	‡
Norway	8	251*	49*	284*	43*	313*	17	‡	35	237*	41	251*
Poland	6*	230*	50*	260*	43	289	‡	‡	‡	‡	‡	‡
Republic of Korea	2*	‡	49*	277*	49*	290	‡	‡	‡	‡	‡	‡
Slovak Republic	9	213	66*	278*	25*	305*	‡	‡	‡	‡	‡	‡
Spain	33*	236*	27*	268*	40*	282	40*	207	36	241*	22*	‡
Sweden	10	264*	52*	289*	37*	321*	16	‡	40	234	38	266
United States	8	206	45	251	46	286	21	‡	38	217	40	277

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

TABLE C-7.

Data for table 5: Percentage distribution and average scores on PIAAC numeracy scale for adults age 16–34, by whether they were native born or foreign born, highest level of parental education, and participating country/region: 2012

Country/region	Native born						Foreign born					
	Neither parent attained upper secondary		At least one parent attained secondary and post-secondary, non-tertiary		At least one parent attained tertiary		Neither parent attained upper secondary		At least one parent attained secondary and post-secondary, non-tertiary		At least one parent attained tertiary	
	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score	Percentage	Average score
OECD average	**16***	**257***	**46***	**277***	**38***	**295***	**29**	**218***	**33**	**242**	**40**	**269**
Australia	28*	259*	32*	274*	40*	294*	18*	228*	26	257*	56*	285*
Austria	9	264*	63*	285*	28*	302*	31	223*	43*	251*	27*	279
Canada	6*	256*	37*	271*	57*	286*	13*	231*	25	247*	62*	271
Czech Republic	2*	236	76*	280*	22*	305*	12*	‡	58*	‡	30	‡
Denmark	12*	263*	40	280*	47	298*	22*	215*	30	235	49*	271
England and Northern Ireland (UK)[1]	12*	231	53*	271*	35*	294*	21*	200	33	239	46	271
Estonia	7	258*	44	275*	49	294*	‡	‡	32	‡	68*	‡
Finland	10	288*	52*	293*	37*	310*	19*	‡	39	‡	42	‡
Flanders (Belgium)	14*	271*	42	289*	45*	307*	41	‡	33	‡	26*	‡
France[1]	18*	255*	49*	269*	32*	294*	51*	217*	26	‡	23*	‡
Germany	4*	‡	48*	276*	48	298*	20*	‡	39	243	41	272
Ireland	33*	252*	37*	265*	30*	280	21*	242*	36	255*	42	270
Italy	48*	250*	39	269*	12*	281	56*	223*	36	‡	7*	‡
Japan	4*	‡	44	284*	53	299*	‡	‡	‡	‡	‡	‡
Netherlands	28*	280*	33*	291*	39*	308*	45*	‡	20*	‡	35	‡
Norway	7	271*	40	279*	53	295*	24	‡	32	232	44	253
Poland	6*	244*	73*	266*	22*	293*	‡	‡	‡	‡	‡	‡
Republic of Korea	21*	274*	46*	279*	33*	291*	‡	‡	‡	‡	‡	‡
Slovak Republic	12*	224	69*	282*	20*	301*	‡	‡	‡	‡	‡	‡
Spain	55*	252*	25*	266*	20*	281*	48*	212*	30	250*	22*	267
Sweden	11*	285*	35*	289*	54	301*	19*	‡	27	227	54*	255
United States	**8**	**225**	**42**	**252**	**50**	**274**	**31**	**189**	**30**	**228**	**39**	**269**

[1] The item response rate is below 85 percent. Missing data have not been explicitly accounted for.

‡ Reporting standards not met.

* Significantly different ($p < .05$) from United States.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012.

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