Patterns of Literacy among U.S. Students

Sean F. Reardon, Rachel A. Valentino, and Kenneth A. Shores

Summary

How well do U.S. students read? In this article, Sean Reardon, Rachel Valentino, and Kenneth Shores rely on studies using data from national and international literacy assessments to answer this question. In part, the answer depends on the specific literacy skills assessed. The authors show that almost all U.S. students can "read" by third grade, if reading is defined as proficiency in basic procedural word-reading skills. But reading for comprehension—integrating background knowledge and contextual information to make sense of a text—requires a set of knowledge-based competencies in addition to word-reading skills. By the standards used in various large-scale literacy assessments, only about a third of U.S. students in middle school possess the knowledge-based competencies to "read" in this more comprehensive sense.

This low level of literacy proficiency does not appear to be a result of declining performance over time. Literacy skills of nine-year-olds in the United States have increased modestly over the past forty years, while the skills of thirteen- and seventeen-year-olds have remained relatively flat. Literacy skills vary considerably among students, however. For example, the literacy skills of roughly 10 percent of seventeen-year-olds are at the level of the typical nine-year-old.

This variation is patterned in part by race, ethnicity, and socioeconomic background. Black and Hispanic students enter high school with average literacy skills three years behind those of white and Asian students; students from low-income families enter high school with average literacy skills five years behind those of high-income students. These are gaps that no amount of remedial instruction in high school is likely to eliminate. And while the racial and ethnic disparities are smaller than they were forty to fifty years ago, socioeconomic disparities in literacy skills are growing.

Nor is the low level of literacy skills particularly a U.S. phenomenon. On international comparisons, American students perform modestly above average compared with those in other developed countries (and well above average among a larger set of countries). Moreover, there is no evidence that U.S. students lose ground relative to those in other countries during the middle school years. Thus, although literacy skills in the United States are lower than needed to meet the demands of modern society, the same is true in most other developed countries.

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Literacy, as the editors note in the introduction to this volume, plays a key role in social mobility, economic growth, and democratic participation. Literacy—the ability to access, evaluate, and integrate information from a wide range of textual sources—is a prerequisite not only for individual educational success but for upward mobility both socially and economically. In addition, because much of the growth in the economy in recent decades has been in areas requiring moderate- to high-level literacy skills, economic growth in the United States relies increasingly on the literacy skills of the labor force. Finally, in an information-rich age, thoughtful participation in democratic processes requires citizens who can read, interpret, and evaluate a multitude of often-conflicting information and opinions regarding social and political choices.

Given the importance of literacy skills, how well do U.S. students read? The answer to this question is not simple, for a number of reasons. The first concerns the kind of "reading" being assessed: sounding out the words in a picture book, reading the instructions on a homework assignment, reading a novel, or evaluating the arguments in an expository text. Each is an example of reading, but each draws on a very different set of skills and competencies. The second reason concerns the benchmark used in the assessment. A comparison of U.S. students' literacy skills with those of earlier cohorts may show improvement even if actual literacy proficiency rates remain low. A comparison with students in other countries likewise yields information on relative rather than absolute levels of literacy. A comparison of student performance relative to standards of proficiency determined by literacy experts, and taking into account the types of skills needed for success in the modern economy and for thoughtful participation in democratic processes, may yield yet a different set of answers. A third reason concerns differences among student subgroups. Literacy skills, and trends in literacy skills, may vary by age, by gender, by race and ethnicity, and by socioeconomic background. A full answer to the question of how well U.S. students read must address this variation.

In this article, we describe the reading skills of U.S. students during the elementary and middle school years, when literacy skills are developing most rapidly. We draw on research based on large national and international assessments to describe the development of different types of literacy skills and knowledge as children age, the trends in literacy skills over the past four decades, the variation in literacy skills and trends among subgroups of students, and the relative positions of U.S. students and those in other countries.

Dimensions of Literacy

Literacy encompasses a complex set of skills. At its simplest, it is a combination of word-reading skills and knowledge-based literacy competencies. Word-reading skills, such as decoding and letter-sound awareness, are more procedural in nature and are necessary for reading written text. Knowledge-based literacy competencies include vocabulary knowledge, background knowledge related to the words included in the text, and the ability to integrate these two features with contextual information to make sense of a given text. Knowledge-based competencies also draw on comprehension skills, which enable the reader to draw inferences and conclusions from complex texts, to compare and evaluate the effectiveness of texts, and to interpret and integrate ideas and information, particularly information from discrepant sources.[1]

Table 1. Description of ECLS-K Reading-Proficiency Levels

Classification	Literacy skill	Description
Word-reading literacy skills	Letter recognition	Identifying upper- and lower-case letters by name
	Beginning sounds	Associating letters and sounds at the beginning of words
	Ending sounds	Associating letters and sounds at the end of words
	Sight words	Recognizing common words by sight
	Comprehension of words in context	Reading words in the context of other text
	Literal inference	Making inferences using cues directly stated within the text (for example, understanding the comparison being made in a simile)
	Extrapolation	Identifying clues used to make inferences, and using background knowledge and cues to understand the use of homonyms
Knowledge-based competencies	Evaluation	Demonstrating an understanding of the author's style of cuing the reader in, and making connections between a problem in the narrative and related real-life experiences
	Evaluating nonfiction	Critically evaluating, comparing, contrasting, and understanding the effect of aspects of both expository and biographical texts
	Evaluating complex syntax	Evaluating complex syntax and understanding high-level nuanced vocabulary in biographical text

Source: ECLS-K psychometric reports.

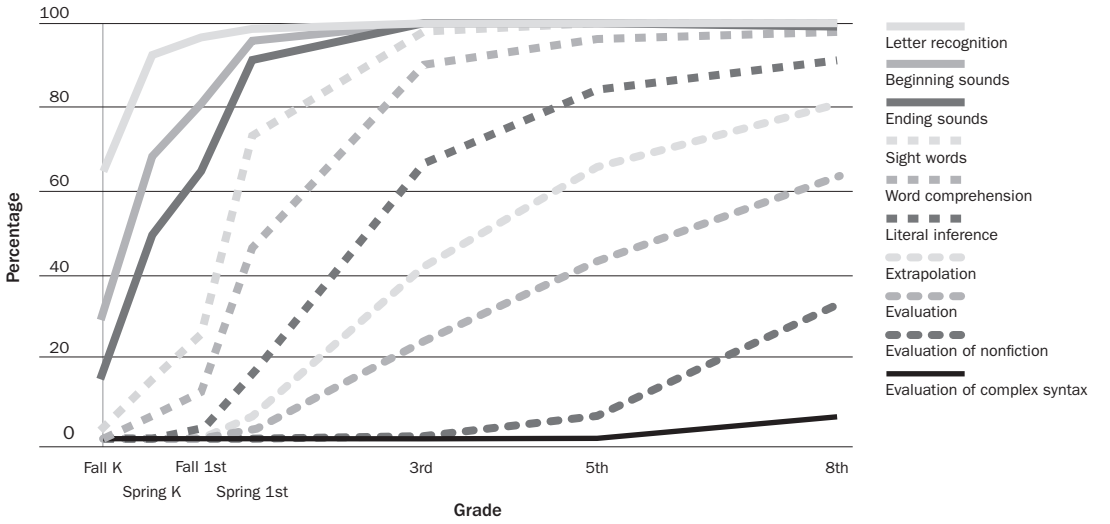
The distinction between these two sets of competencies is not sharp, and their development does not proceed in simple sequential order: children develop vocabulary and background knowledge even before they learn to decode, for example, and continue to build their background knowledge in parallel with the development of complex comprehension skills. Nonetheless, the distinction between word-reading literacy skills and knowledge-based literacy competencies is useful because it elucidates the differences in the types of skills and competencies that various literacy tests assess.

The Development of Literacy in School

The best source of nationally representative data on how children in the United States develop literacy skills in elementary and middle school is the Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K).[2] This study assessed the literacy skills of a nationally representative sample of roughly 25,000 students as they started kindergarten in the fall of 1998 and then assessed their skills six more times over the next eight years, with the final assessment in the spring of 2007, when the students were in eighth grade. The literacy assessments provide estimates of the percentage of students who were proficient at each point in time in each of ten distinct word-reading skills and knowledge-based competencies.[3] Table 1 describes the ten proficiencies assessed, classifying them as either primarily skill-based or knowledge-based, though as noted, the distinction is not always as sharp as the categorization would imply.

Figure 1, derived from published ECLS-K reports, illustrates the estimated patterns of development of these ten competencies from kindergarten through eighth grade. As the figure shows, most children learn word-reading skills in the first two years of school. A

Figure 1. Percentage of Proficient Students, by Literary Skill, Grades K-8



Source: Authors' calculations from ECLS-K psychometric report data (http://nces.ed.gov/pubs2009/2009002.pdf).

majority of children enter kindergarten with basic letter-recognition skills, but only a third can identify the beginning sounds of words, and fewer than 20 percent can identify ending sounds. By the spring of first grade, however, more than 90 percent of children are proficient in these areas, and three-quarters can recognize words by sight, a skill that fewer than 5 percent have mastered at the start of kindergarten. Indeed, by third grade virtually all students can "read" in the procedural sense—they can sound out words and recognize simple words in context.

From first through third grade, most students learn to recognize words by sight, comprehend words in context, and make inferences about text by using cues stated in the text. From third through eighth grade, many students acquire knowledge-based literacy competencies, such as inference based on extrapolation (the ability to use background knowledge and text cues to make inferences and to understand homonyms), evaluation (the ability to understand the author's style of presenting information and to make connections between the story and one's life), and evaluation of nonfiction texts (the ability to critically evaluate and understand aspects of expository and biographical texts). By eighth grade, 81 percent of students are able to extrapolate for inference, 64 percent are proficient in evaluation, and 37 percent are able to evaluate nonfiction. Fewer than 10 percent can evaluate complex syntax, the highest-order literacy skill assessed in the ECLS-K tests.

Although most students acquire considerable literacy skills by eighth grade, acquisition of these skills appears to slow after first grade. One likely reason is that knowledge-based competencies inherently take longer to develop than do word-reading skills. Another reason for the slowdown, however, may be that literacy instruction and curricula are less effective in middle school than in early elementary school. Although the ECLS-K data cannot identify how much of the slower

rate of literacy development in middle school stems from less effective instruction, we show later in this article that U.S. students develop literacy skills during middle school at the same rate, on average, as students in other developed countries.

In reviewing the evidence from the ECLS-K study, one caveat should be noted: the nature of the ECLS-K tests and system used to score them implicitly assume that the ten literacy competencies develop in an invariant sequential order. Literacy is assumed to be a unidimensional skill, a notion that most literacy experts would reject as overly simplistic.[4] This assumption may lead to some distortion of the developmental patterns shown in figure 1, although we suspect the distortions are not substantial. No nationally representative data provide longitudinal evidence of literacy development where literacy is measured as a multidimensional set of competencies. Such data would be very useful in providing a more nuanced understanding of how literacy develops and where instructional and curricular reforms might most productively be targeted.

Current Literacy Skills of U.S. Students

A second source of evidence regarding the literacy skills of U.S. students is the reading tests administered as part of the National Assessment of Educational Progress (NAEP). The NAEP has two components, the so-called Main NAEP assessments and the Long-Term Trend NAEP (NAEP-LTT) assessments. The latter assessments have used a common assessment and scale to measure the reading skills of nationally representative samples of nine-, thirteen-, and seventeen-year-olds since 1971 and so provide descriptions of trends over time in U.S. children's literacy skills. The Main NAEP literacy assessments have been administered to nationally and state-representative samples of fourth, eighth, and twelfth graders periodically since 1990, and the assessment content has been changed on occasion to reflect current standards and curricula. The main NAEP, unlike the NAEP-LTT, includes both an overall score and subscores for literacy on informational and literary texts. Both assessments primarily evaluate knowledge-based literacy competencies, although clearly students also require word-reading literacy skills to perform well on the tests. The NAEP data do not reveal whether students who score low do so because they lack word-reading skills or knowledge-based literacy competencies, or both.[5]

NAEP results are often reported as the proportion of students who score at a level labeled "proficient" or "advanced." These descriptions do not, by themselves, indicate whether U.S. students are developing literacy skills at an appropriate or acceptable pace. Determining whether a student is "proficient" or "on grade level" requires a set of normative judgments about what skills students of a given age or grade should possess. For the NAEP, such judgments are made by a panel of national reading experts with detailed knowledge of cognitive development, literacy practices, reading curricula, and the literacy demands of modern society. Nonetheless, such judgments are inherently provisional and are subject to change as societal conditions change. Thus, the discussion here also describes the levels of word-reading and knowledge-based competencies in terms of the concrete literacy tasks children are capable of performing.

According to the most recent Main NAEP reading assessments administered in 2011, 67 percent of fourth-graders performed at or above the "basic" level, meaning that they were able to use text to locate information and make simple inferences and to use textual

information to justify opinions. Thirty-four percent of fourth graders performed at or above the "proficient" level, meaning that they demonstrated higher-order reading abilities, such as integrating and interpreting multiple texts and applying text to draw conclusions and make evaluations. Only 8 percent of students scored at the "advanced" level, demonstrating more sophisticated, higher-order knowledge-based competencies, including the ability to make complex inferences and to use text to justify their evaluations.[6] Scores of fourth graders were not significantly different on the informational and literary texts subscales. That only a third of fourth graders performed at the "proficient" level appears consistent with ECLS-K data presented in figure 1, which suggests that roughly a third of fourth graders are proficient in evaluating texts and linking narratives to real-life experiences.

Seventy-six percent of eighth graders in 2011 scored at or above the "basic" level, which means they were able to identify components of a text (such as the main idea, theme, setting, and character for literary texts; and the main ideas, inferences, and supporting details for informational texts), to make some judgments, and to provide support about text content. Thirty-four percent of eighth graders scored at or above the "proficient" level, meaning that they could analyze text features (figurative language for literary texts and rhetorical devices and causal arguments for informational texts), summarize main ideas and themes, and fully justify their evaluations. Only 3 percent of eighth graders scored at the "advanced" level, which requires demonstration of the ability to read literary and informational texts critically, make connections within and across texts, and explain the effects of text features (as opposed to merely identifying them).[7] Like fourth graders, eighth graders scored similarly on the informational and literary texts subscales. Again, the share of eighth graders who are proficient according to the NAEP standard comports with the ECLS-K data, which shows that roughly 25–30 percent of eighth graders are able to critically evaluate nonfiction texts (see figure 1).

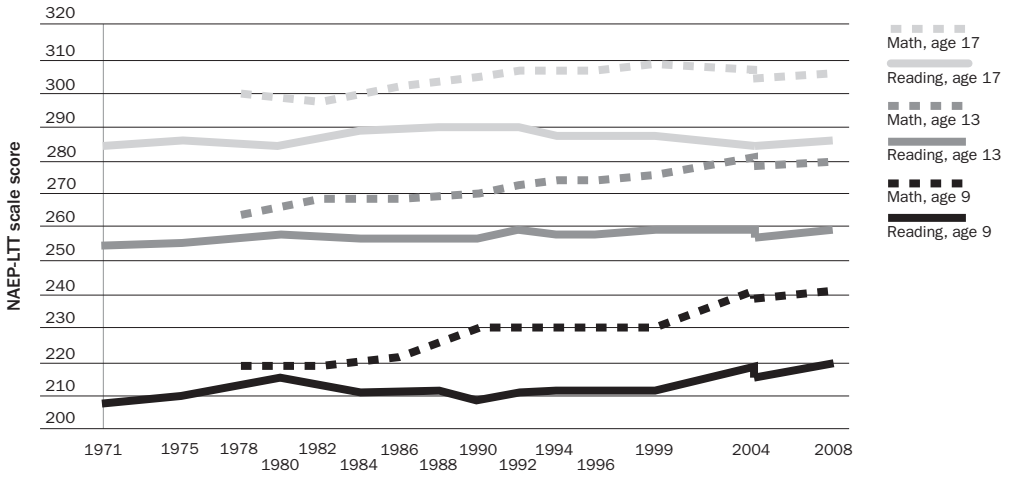
Twelfth-grade results are available only through 2009. Three-quarters of twelfth graders scored at or above the "basic" twelfth-grade level, meaning they could identify elements of meaning and form and could make and provide textual support for inferences and interpretations. Roughly three-eighths of twelfth graders scored at or above the "proficient" level, which means they could locate and integrate textual information using sophisticated analyses of meaning and form and could provide specific textual support for inferences and textual comparisons. Only 5 percent scored at the "advanced" level, meaning that they could analyze and evaluate multiple texts for a variety of purposes.[8] Although twelfth graders scored higher on the informational subscale than on the literary subscale, the NAEP assessments produce little evidence that the literacy skills of twelfth graders in the United States differ significantly between literary and informational texts.[9]

Students' reading competencies vary substantially across states, however. For example, the proportion of fourth-grade students scoring below "basic" ranged from 49 percent in Louisiana to 20 percent in Massachusetts; only 18 percent scored "proficient" or "advanced" in Louisiana, compared with 47 percent in Massachusetts. Similar variation is evident in eighth and twelfth grades.[10]

Trends in Knowledge-Based Competencies

The most reliable estimates of trends in the literacy skills of U.S. students come from the

Figure 2. Trends in Average NAEP Reading and Math Scores, by Age, 1971–2008



Source: Authors' calculations from NAEP-LTT data (http://nces.ed.gov/nationsreportcard/ltt).
Note: The assessment format was changed after 2004, indicated by the break in the lines.

NAEP-LTT. Figure 2 illustrates the trends in average literacy and math competencies from 1971 to 2008, the most recent NAEP-LTT assessment year. During this period, the scores of nine-year-olds improved moderately (twelve points, or roughly three-tenths of a standard deviation in NAEP scores), while the average scores of thirteen- and seventeen-year-olds have remained relatively flat (increasing by only five points and one point, respectively).[11] Most of the increase in literacy scores of nine-year-olds appears to have occurred since 1999, and the slight upward trend in scores of thirteen-year-olds from 2004 to 2008 suggests that this increase in the knowledge-based competencies of nine-year-olds may persist through middle school, although more data are needed to determine if this nascent trend continues. Overall, however, figure 2 shows that, despite some evidence of improvements in the most recent decade, the knowledge-based competencies of U.S. students have changed little in the past forty years.

At any given age, students vary considerably in their literacy abilities. For example, at age nine, students scoring at the 10th percentile can carry out simple discrete reading tasks (such as following brief written directions), while students scoring at the 90th percentile are already able to make generalizations and interrelate ideas. At age thirteen, students at the 10th percentile can locate and identify facts and make inferences based on short passages, while those at the 90th percentile can comprehend complicated literary and informational texts. By age seventeen, the most skilled readers can synthesize and learn from specialized reading information, while the least skilled readers are not yet able to make generalizations and interrelate ideas. Roughly 10 percent of seventeen-year-olds have knowledge-based competencies lower than those of the median nine-year-old student.[12]

The NAEP-LTT data also show that the recent gains in reading skills among nine-year-olds are primarily the result of a reduction in

the number of very-low-skilled readers. The literacy scores of a student at the 75th or 90th percentile of the distribution are only slightly higher than they were in 1999, but the scores of a reader at the 10th or 25th percentile are significantly higher. This increase may reflect a deliberate targeting of instruction to more disadvantaged students (as intended by the federal No Child Left Behind legislation), or it may be that advances in the instruction of skills-based competencies have led to modest improvements in the knowledge-based competencies tested by the NAEP. Several recent studies evaluating the effect of the No Child Left Behind reform on NAEP scores, however, find no significant impact either on the average reading scores or on scores at the bottom of the distribution, suggesting that the improvement in the literacy skills of the lowest-skilled readers is not attributable to the legislation.[13]

A useful comparison is the trend in math scores among U.S. students. As figure 2 illustrates, math scores for nine- and thirteen-year-olds have improved substantially in the past three decades. The average math score of nine-year-olds rose by twenty-four points between 1978 and 2008, roughly two-thirds of a standard deviation. The scores of thirteen-year-olds have improved less, by about half of a standard deviation; scores for seventeen-year-olds have changed relatively little over the same period, increasing by roughly one-fifth of a standard deviation. The relatively sizable gains in average math scores among nine- and thirteen-year-olds stand in stark contrast to the smaller or null changes in reading scores over the same time period.

There are three possible reasons for the discrepancy between math and reading gains. First, mathematics instruction may simply have improved over time, while literacy instruction did not. If that is the case, greater effort may be needed to improve literacy instruction in the United States. A second possibility is that the NAEP math and reading assessments emphasize different types of skills. Although math is made up of both procedural (addition, multiplication, algebraic manipulation) and conceptual skills (linking mathematical expressions and operators to real-world quantities and processes), the NAEP-LTT math assessments appear to focus predominantly on procedural skills.[14] In contrast, the reading assessments focus more on knowledge-based competencies than on procedural skills. If students' procedural skills in both math and reading grew significantly over the past thirty years, while their knowledge-based literacy skills and conceptual math skills changed relatively little, these different emphases might produce large gains in the NAEP math assessments but small gains in the NAEP reading assessments. Thus, differences in trends between math and reading NAEP scores may be an artifact of the different types of competencies assessed in the two NAEP tests.

A large proportion of students still completes middle school without mastering the necessary knowledge-based competencies they will need in high school and throughout adulthood.

A third possibility, however, is that procedural skills may simply be more constitutive of math than of literacy and that procedural skills are

more "teachable"—more susceptible to improvements in instruction—than are conceptual and knowledge-based competencies. Under this hypothesis, the NAEP-LTT trends in math and reading skills are neither evidence that more could be done to improve reading scores nor an artifact of differential prioritization of procedural skills in the math and reading assessments. Rather they may simply indicate that procedural skills matter more in math, and because procedural skills may be more susceptible to instruction, math scores may have been more responsive than reading scores to schooling reforms (or at least to reforms targeting skills instruction) over the past few decades. Several recent studies showing that the No Child Left Behind legislation improved NAEP math scores but not reading scores would support this argument.[15] A full discussion of this issue is beyond the scope of this article, but clearly one should be cautious about interpreting the very different trends in reading and math scores.

In general, then, NAEP data demonstrate considerable variation in the literacy skills of students, with some students able to perform quite complex literacy tasks and others of the same age and grade level demonstrating more rudimentary ones. And while the average literacy skills of nine-year-olds (and, to a lesser extent, thirteen-year-olds) have improved modestly over the past decade, a large proportion of students still completes middle school without mastering the necessary knowledge-based competencies needed in high school and throughout adulthood.

Demographic Differences in Literacy Skills

The evidence suggests that many students have not achieved sufficient literacy proficiency by eighth grade to prepare them for success in high school, college, and the labor force. We now ask how literacy skills vary among subgroups of students defined by race and ethnicity, gender, or socioeconomic background as measured by parental education or family income. A considerable body of research has documented substantial gaps in reading skills between students from low- and high-income families, black and white students, Hispanic and white students, immigrants and nonimmigrants, English-language speakers and non-English-speakers, and male and female students.[16] We summarize these findings, using NAEP and ECLS-K data to illustrate the general patterns.

Trends in Literacy Skill Gaps

The black-white gap in reading skills was very large in 1970 but narrowed considerably during the 1970s and 1980s. In the early 1970s, average NAEP-LTT reading scores of black students were 1.0–1.2 standard deviations lower than those of white students; by the late 1980s, the black-white gap was roughly half that size, as figure 3 shows. The gap widened modestly in the early 1990s before beginning to narrow again in the late 1990s; that narrowing continued slowly through 2008.[17] This pattern is evident in Scholastic Achievement Test score trends as well as in other large studies with nationally representative samples of students.[18] The most recent NAEP-LTT data (from 2008) indicate that the black-white gap is now roughly 0.6 of a standard deviation, about half of what it was forty years ago, although almost all of the progress in closing the gap was made in the 1970s and 1980s. [19]

The Hispanic-white reading gap followed a similar pattern. About the same magnitude as the black-white gap in 1975, it narrowed substantially in the late 1970s and 1980s before widening slightly in the 1990s and beginning to narrow again in the 2000s.

By 2008 it too had closed to roughly 0.6 of a standard deviation.[20] The size of the Hispanic-white gap varies among subgroups of Hispanics; reading scores are typically lower for Hispanics of Mexican or Central American origin (and higher for those of Cuban, Puerto Rican, or South American origin), for first- or second-generation Hispanic immigrant students, and for Hispanic students who speak primarily Spanish at home.[21]

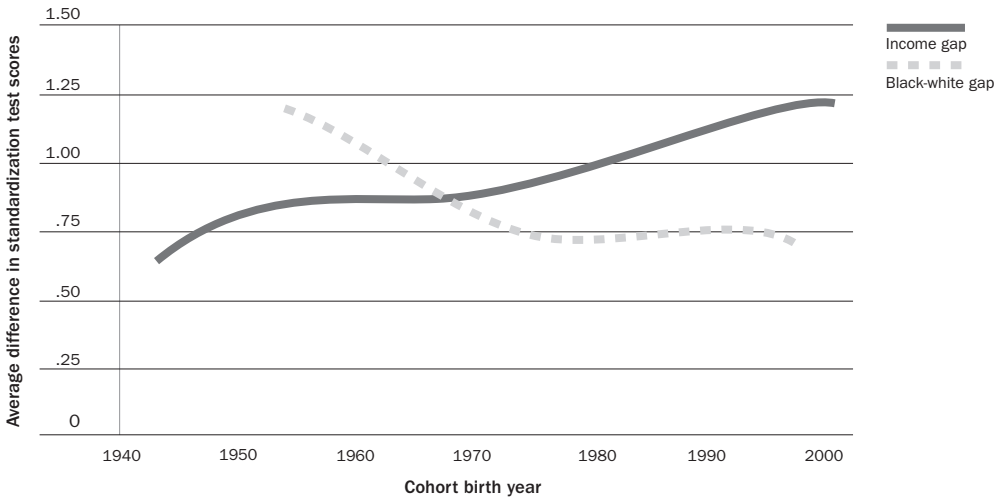
Differences in average reading skills between Asian–Pacific Islander students and white students are generally relatively small and have been small for the past thirty years, although the small gaps mask some considerable heterogeneity and changing demographics in the Asian-Pacific Islander population.[22] Finally, females consistently outperform males in reading by approximately 0.2 of a standard deviation,[23] the reverse of what is seen in math.

ECLS-K data indicate that socioeconomic disparities in reading achievement are much larger than racial and ethnic gaps. Eighth-grade students from the lowest-income families have, on average, literacy skills comparable to those of third-grade students from the highest-income families; in other words, low-income eighth graders are roughly five years behind high-income eighth-grade students in the acquisition of knowledge-based literacy competencies.[24] These socioeconomic achievement gaps appear to have widened substantially in recent decades.[25] For students born in the 1970s, the reading gap between students from families with incomes at the 90th percentile and those from families with incomes at the 10th percentile was roughly nine-tenths of a standard deviation; for students born in 2000 this "90/10 income achievement gap" was roughly 1.25 standard deviations, 40 percent larger than the preceding generation (see figure 3).[26] For children born in the 1950s, the reading gap between students from high- and low-income families was smaller than the black-white gap; the income gap is now much larger than the black-white gap.[27]

Several possible reasons lie behind the widening of the income achievement gap. Rising family income inequality is certainly part of the explanation.[28] The ratio of the 90th percentile income to the 10th percentile income has doubled over the past four decades, giving high-income families much more income to invest in their children's education and cognitive development than they had a generation ago. Data on trends in spending on children appear to support this explanation: overall, families spend much more on child care, preschool, and education today than they did in the early 1970s, and high-income families spend disproportionately more than low-income families. The difference in these expenditures is largest around enrichment activities such as music lessons, travel, and summer camps.[29] In the early 1970s families in the top income quintile invested 4.2 times more a year in child enrichment expenditures than did parents in the lowest income quintile; by 2005 parents in the highest income quintile spent 6.8 times more a year on child enrichment activities than did their counterparts in the lowest income quintile.[30]

But rising income inequality and increased investments in children may not be the full explanation. Not only has the income gap between high- and low-income families widened, but the strength of association between a dollar of family income and children's academic achievement has grown stronger as well.[31] Money—or attributes correlated with money—appears to matter more for children's academic achievement

Figure 3. Trends in Income and Black-White Gaps in Reading, 1943–2001 Cohorts



Source: The income gap is the standardized difference in average reading scores between students with family incomes at the 90th percentile of the income distribution and students with family incomes at the 10th percentile.

than it once did. Indeed, family income has become more correlated over time with parental education levels, parents' own cognitive skills, family structure, and neighborhood socioeconomic characteristics.[32] Any or all of these factors may contribute to the widening literacy gaps between high- and low-income children.

The Development of Literacy Gaps

According to the NAEP, the racial reading gaps are roughly similar in size for nine-, thirteen-, and seventeen-year-olds, as is also true for the ethnicity and gender gaps. Because student reading skills are not assessed before age nine (in the NAEP-LTT) or fourth grade (in the Main NAEP), however, these assessments provide no evidence of how large disparities in literacy skills are for students in early elementary school. Moreover, because the NAEP does not assess the same sample of children repeatedly over time, apparent developmental changes in the magnitude of achievement gaps may be confounded with differences in the cohorts sampled at different ages. Longitudinal studies, such as the ECLS-K study, provide more detailed evidence regarding the development of reading gaps as children progress through elementary school than is possible with NAEP data.[33]

Evidence from the ECLS-K indicates that the black-white gap in reading skills is roughly half of a standard deviation at the beginning of kindergarten but then widens to about three-fourths of a standard deviation by the end of third grade and to nearly a whole standard deviation by the end of eighth grade (table 2).[34] Most other studies find modest growth in the black-white reading gap during elementary school, although they differ somewhat on the timing and magnitude of this growth.[35]

Most studies using data from cohorts of students born before the 1990s have found that socioeconomic differences between black and white families cannot fully explain the black-white gap in reading scores.[36] In the

Table 2. Achievement Gaps as Children Age, in Standard Deviation Units

Gap	Statistic	Fall kindergarten	Spring kindergarten	Fall first grade	Spring first grade	Third grade	Fifth grade	Eighth grade
White-Hispanic	gap	n.a.	n.a.	n.a.	n.a.	0.62	0.57	0.58
	(se)					(0.04)	(0.05)	(0.04)
White-black	gap	0.41	0.47	0.45	0.53	0.70	0.70	0.86
	(se)	(0.04)	(0.04)	(0.06)	(0.04)	(0.04)	(0.05)	(0.05)
White-Asian	gap	n.a.	n.a.	n.a.	n.a.	0.10	0.07	–0.13
	(se)					(0.05)	(0.06)	(0.07)
Income (90/10)	gap	1.09	0.98	1.07	0.98	1.15	1.14	1.18
	(se)	(0.03)	(0.02)	(0.05)	(0.03)	(0.04)	(0.05)	(0.05)
Male-female	gap	–0.20	–0.23	–0.23	–0.21	–0.19	–0.14	–0.19
	(se)	(0.02)	(0.02)	(0.04	(0.02)	(0.02)	(0.04)	(0.03)

Source: Authors' calculations. Gap signs reflect the direction of subtraction of mean differences. For example, the male-female gap appears negative because females outperform males on average, so subtracting female means from male means produces a negative number. (se) is the standard error. n.a. means not available.

ECLS-K sample (children born in 1992–93), however, black-white differences in family socioeconomic characteristics, including long-term family income, explain most or all of the racial gap from kindergarten entry through elementary school.[37]

There is less scholarship documenting the development of Hispanic-white and Asian-white reading gaps. Table 2 shows these patterns using data from the ECLS-K study. Because students were given the ECLS-K reading assessment only if they were sufficiently fluent in spoken English, many Hispanic and Asian students were not evaluated in kindergarten and first grade. By third grade, all students were given the reading assessment, so the Hispanic-white and Asian-white gaps reported here are only for students in third, fifth, and eighth grades.

The Hispanic-white reading gap is similar in size to the black-white gap in third grade and is relatively stable from third through eighth grade.[38] Among students proficient in oral English at the start of kindergarten—roughly two-thirds of all Hispanic kindergarteners in 1998—the Hispanic-white reading gap is large at the start of kindergarten but narrows sharply during kindergarten and first grade (not shown in table 2). In addition, this reading gap narrows most sharply in kindergarten and first grade for Hispanic students whose parents are immigrants and who speak primarily Spanish at home. This narrowing of the reading gap in early elementary school may result from the increased exposure to English text and oral language these Hispanic students encounter in school relative to their homes.[39] Not surprisingly, children who enter kindergarten with limited English proficiency consistently perform worse in reading achievement than their monolingual English-speaking peers through the end of elementary school. The difference in performance between English language learners and their native-speaking peers largely disappears, however, when socioeconomic status is taken into account.[40]

As table 2 illustrates, girls consistently perform roughly two-tenths of a standard deviation higher than boys on reading assessments throughout elementary and middle school. Some research suggests that the female advantage in reading skills grows slightly during kindergarten and first grade and tends to widen over time at the bottom of the skill distribution.[41]

The development of the income-achievement gap as children age is another trend worth noting. The income-achievement gap is 1.2 standard deviations when children enter kindergarten, narrows slightly to 1.1 standard deviations by the end of first grade, but then widens modestly to 1.35 standard deviations by eighth grade.[42] The magnitude of the disparity in reading skills (primarily preliteracy skills) between kindergartners from high- and low-income families is substantial, suggesting that early childhood interventions might be most effective in narrowing these literacy gaps.

International Comparisons of Literacy Skills

A comparison of the performance of students in the United States and other developed countries is useful for at least two reasons. First, given the importance of literacy skills for economic growth, international comparisons may be helpful for understanding the competitiveness of the U.S. labor force in coming decades. Second, international comparisons provide a benchmark for assessing how successful the U.S. educational system is at teaching literacy skills. A finding that students from other countries outperform U.S. students on literacy tests would suggest that the United States could do better. Moreover, an examination of features of the educational systems in countries that outperform the United States may suggest strategies that could be used to improve literacy in the United States.

Given the importance of literacy skills for economic growth, international comparisons may be helpful for understanding the competitiveness of the U.S. labor force in coming decades.

Evidence for such comparisons comes largely from two international studies—the Programme for International Student Assessment (PISA) and the Progress in International Reading Literacy Study (PIRLS). The most recent PISA study, conducted in 2009, provides data on the literacy abilities of fifteen-year-olds in all thirty-four member countries of the Organisation for Economic Cooperation and Development (OECD) and in thirty-one additional non-OECD countries and partners (such as Shanghai and Hong Kong). Similarly, the most recent PIRLS assessment, conducted in 2006, provides evidence of literacy abilities of fourth graders in forty countries (twenty-two of them OECD countries), including the United States. The cohort of students assessed by PIRLS (fourth graders in 2006, born in and around 1996) is roughly the same cohort as assessed by PISA (fifteen-year-olds in 2009, born in and around 1994). Thus, a comparison of international rankings in PIRLS and PISA may be informative not only about where the United States ranks with other countries in literacy but also about whether U.S. students

gain more or less in reading between fourth grade and age fifteen than do students in other countries.

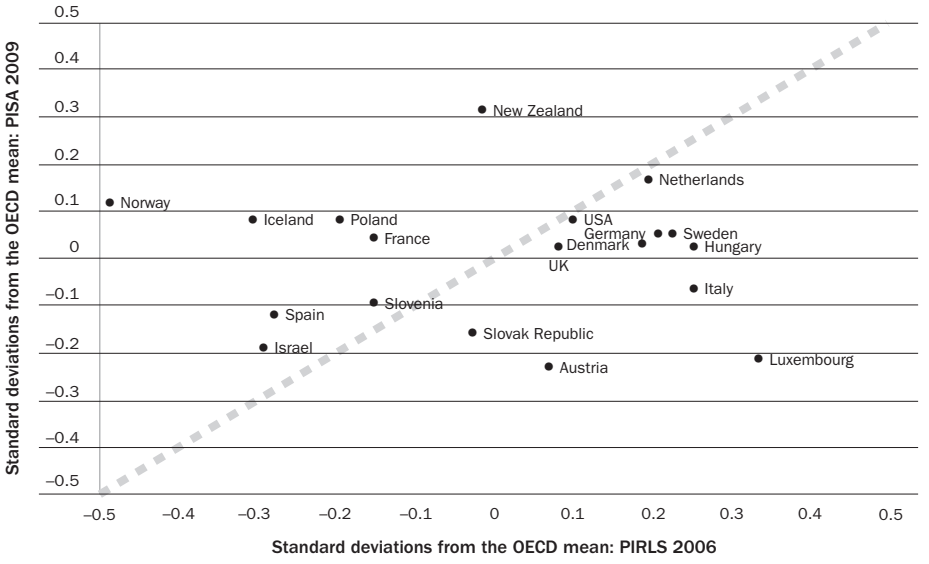
U.S. students generally perform above the international average on both the PIRLS and PISA assessments. In the 2006 PIRLS assessment, six countries had a statistically significant rank above the U.S. average, twenty-one countries ranked below, and eight were not significantly different.[43] The United States performed significantly above the PIRLS scale average, as did thirty-two other countries. The average PIRLS literacy score in 2006 did not change significantly from 2001, when the first PIRLS assessment was given.[44]

In the 2009 PISA study, fourteen countries ranked above the U.S. average, fifty-one ranked below, and eight were not significantly different.[45] The U.S. score was not significantly different from the average score for the thirty-four OECD countries.[46] From 2000, when PISA was first administered, to 2009, U.S. students showed statistically significant but not substantial improvement in reading scores.[47]

Similarly to the NAEP, PIRLS reports scale scores for student performance in both literary and informational text types. These data can be used to rank the United States and other participating countries.[48] Once again, there is little evidence of an imbalance. In 2006 the United States scored above average in both reading for literary purpose and reading for informational purpose, ranking twelfth in both categories.[49] PISA also reports scores for different text types but refers to them as continuous and noncontinuous texts. Continuous text is prose found in books and newspapers; noncontinuous text is presented as lists, forms, graphs, or diagrams. These constructs are loosely analogous to literary and informational texts, although informational text can be presented continuously.[50] In 2009 the United States ranked thirteenth in continuous text (not significantly above the OECD average), and fourteenth in noncontinuous texts (significantly above the OECD average), again providing little evidence that the U.S. students perform differently in different literacy domains.[51]

Making comparisons across PIRLS and PISA is difficult, because the tests are different and because a different sample of countries participated in each assessment. To compare the development of reading skills from ages ten to fifteen of U.S. students with those in other countries, we look only at the twenty OECD countries that participated fully in both PIRLS in 2006 and PISA in 2009. In this group the United States ranked eighth in PIRLS and fourth in PISA. Changes in rankings are not an ideal way of comparing the results of the two studies, however, because they can exaggerate small and insignificant differences. Figure 4 provides a comparison of the relative level of reading skills of U.S. students in PIRLS and PISA. The horizontal axis shows each country's average reading score on the PIRLS 2006 assessment, while the vertical axis shows each country's average reading score on the PISA 2009 assessment. Each score is expressed in standard deviations from the mean score across the twenty countries. Thus, in countries above the 45-degree line (such as Norway and New Zealand) students improved in average literacy skills more between ages ten and fifteen than all twenty of these countries did on average. Conversely, in countries below the 45-degree line (such as Luxembourg, Austria, and Italy), fourth-graders scored relatively better in 2006 than did fifteen-year-olds in 2009, indicating lower-than-average rates of literacy growth in middle school in these countries. The United

Figure 4. Standardized Differences in Reading Scores from the OECD Average, by Country, for PIRLS 2006 and PISA 2009



Source: Authors' calculations from National Center for Educational Statistics PISA data explorer. (http://nces.ed.gov/surveys/international/ide).
Notes: Standardized differences were calculated based on the standard deviation in scores among students in the included countries. Three OECD members were not included: Belgium and Canada, because tests were not administered throughout the countries in 2006, and Turkey, because its deviation from the OECD mean (–0.92 in 2006; –0.26 in 2009) made it an outlier.

States lies near the 45-degree line, indicating that U.S. students have average rates of literacy development in middle school relative to this group of countries.

At a minimum, this comparison indicates that U.S. students score slightly above the OECD country average in fourth grade and maintain this position through middle school. This finding suggests that the rate of development of knowledge-based literacy competencies during middle school evident in the United States (see figure 1) is typical of developed countries.

Conclusion

What does this review of the evidence on the literacy skills of U.S. children tell us? First, the answer to the question of "how well do U.S. students read?" depends on the specific literacy skills assessed. Almost all U.S. students can "read" by third grade, if reading is defined as being proficient in basic procedural word-reading skills. But reading for comprehension—integrating background knowledge and contextual information to make sense of a text—requires an additional set of knowledge-based competencies in addition to word-reading skills. By the standards used in various large-scale literacy assessments, only about a third of U.S. students in middle school possess the knowledge-based competencies to "read" in this sense.

On international comparisons, American students perform modestly above average compared with those in other OECD countries, and well above average among the larger set of countries for which the PIRLS and PISA studies provide comparative data.

Moreover, there is no evidence that U.S. students lose ground relative to those in other countries during the middle-school years. Between ages ten and fifteen, when most students are learning crucial comprehension and evaluation literacy skills, students in the United States appear to learn at a rate that places them at the average among OECD countries. This evidence of average to above-average performance of U.S. students on literacy assessments is in stark contrast to the poor relative performance of U.S. students on internationally administered math and science assessments.[52]

Although the international literacy assessments may detect no "literacy crisis" in the United States, evidence from the NAEP and the ECLS-K paints a less sanguine picture. The above-average performance of U.S. students on international comparisons does not necessarily mean that their literacy skills are adequate or satisfactory for the demands of the modern economy and modern democracy. As noted, about two-thirds of all students do not attain proficiency in knowledge-based literacy and comprehension skills by the end of middle school. To the extent that high school success, as well as later educational and economic success, depends on the acquisition of these higher-order skills in middle school, many U.S. students enter high school in need of substantial improvement in literacy.

Several pieces of evidence suggest that literacy levels in the United States could be improved. First, mathematics scores have risen much faster over the past few decades, particularly among fourth and eighth graders, than have reading scores. Of course, the same factors that have led to marked growth in the math skills of U.S. students might not lead to similar gains in literacy skills; intrinsic differences between math and literacy learning may make the former more malleable than the latter. But the math trend does stand as a counterfactual to claims that U.S. schools have been unable to produce meaningful gains in student achievement. Second, white-black and white-Hispanic literacy skill gaps narrowed considerably during the 1970s and 1980s, whereas literacy skill differences by family income have grown in the past few decades. These sizable changes indicate that literacy levels are highly malleable.

Finally, the evidence demonstrates substantial disparities in literacy skills by race, ethnicity, gender, and socioeconomic status. Black and Hispanic students enter high school with average literacy skills three years behind those of white and Asian students; students from low-income families enter high school with average literacy skills five years behind those of high-income students. These are gaps that no amount of remedial instruction in high school is likely to eliminate. And while the racial and ethnic disparities are smaller than they were forty to fifty years ago, socioeconomic disparities are growing.[53] Because the modern economy increasingly rewards educational success, widening socioeconomic gaps in literacy and math skills may reduce opportunities for social mobility. Not only are these disparities a concern for reasons of equity and social justice, but they also may severely limit the U.S. capacity to function effectively as a participatory democracy and to compete in the global economy.

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