Written Testimony provided by Richard J. Murnane, Harvard Graduate School of Education, to the U.S. Senate Health, Education, Labor and Pensions Committee

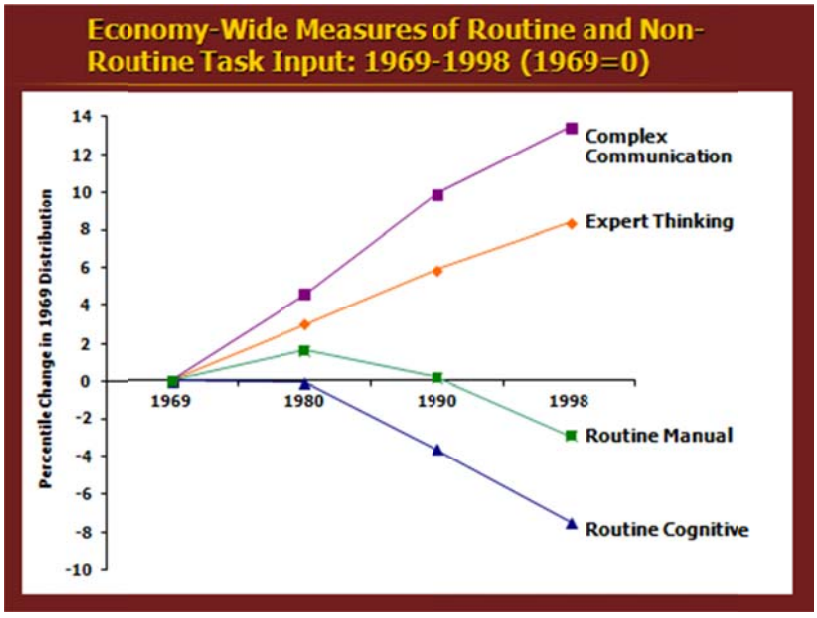
March 8, 2012

I thank the members of the U.S. Senate HELP Committee for the opportunity to submit testimony. My testimony consists of three parts, the first dealing with changes in the demand for skills in the U.S. work force, the second dealing with recent disturbing trends in the distribution of educational attainments and skills among young Americans, and the third dealing with strategies to provide more Americans with the skills to be college and career ready. I make three points in each of the three parts to the testimony.

I. Changing Skill Requirements

1. Over the last three decades, technological change and globalization have reshaped the occupational structure of the American work force. Increasingly, work that consists primarily of carrying out routine cognitive tasks, such as filing, and routine manual tasks such as assembly line work, are either carried out by computer-guided machines or sent off-shore to lower wage countries. During this same period, work involving **expert thinking** in a particular domain and **complex communication** has grown in importance, primarily because these are tasks that computers cannot do well. Figure 1 illustrates how changes in the nation's occupational structure over the last three decades of the 20th century altered the types of tasks that the U.S. work force carried out.[1]

Figure 1

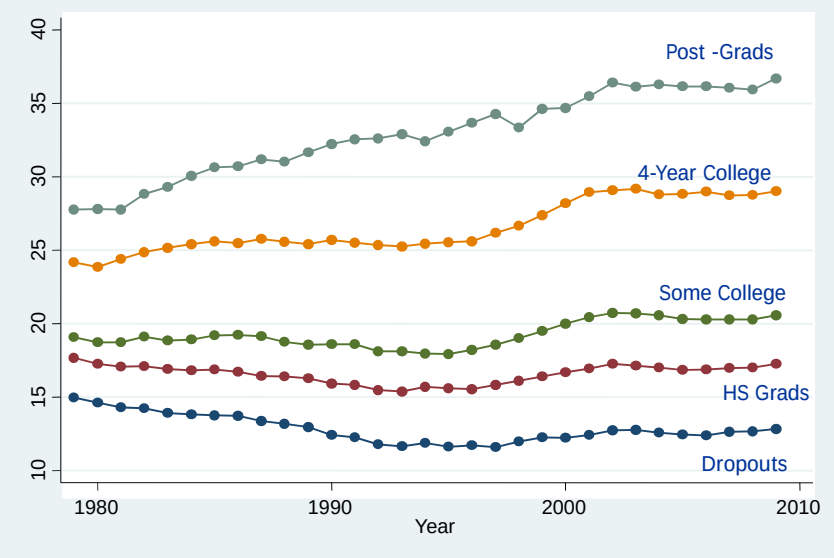


[1] The evidence on changing skill demands and Figure 1 come from Murnane and Levy (1996) and Levy and Murnane (2004).

Key elements of expert thinking include a deep understanding of causal relationships in the domain of work, skill at pattern recognition, initiative, and metacognition (the ability to monitor one's problem-solving strategies). Key elements of complex communication include skill at observing and listening, eliciting critical information, interpreting the information, and conveying the interpretation to others both orally and in writing. Expert thinking and complex communication are not new subjects to add to the curriculum of the nation's schools. They can and should be fostered in the context of teaching the traditional core subjects. For example, high quality science instruction provides a forum for teaching both expert thinking and complex communication. Indeed, a necessary condition for increasing the number of students who leave high school prepared to thrive in Science, Technology, Engineer, and Mathematical (STEM) college majors is science instruction that consistently enhances students' expert thinking and complex communication skills.

2. Since Americans learn a great many of the skills needed to excel at expert thinking and complex communication in formal educational institutions, it is no surprise that the labor market payoffs to educational attainments have increased in recent decades. This pattern is illustrated in Figure 2, which shows trends over the period 1979-2009 in the average hourly earnings (adjusted for inflation) of male workers with different educational attainments.[2] One lesson illustrated by Figure 2 is the importance of providing all American youth with the knowledge, skills, and financial opportunities needed to enroll in and graduate from post-secondary educational programs. I return to this lesson later in this document.

Figure 2: U.S. male average real hourly wage by education, 1979-2009 (2009$)



[2] Figure 2 is based on wage data from the Current Population Survey.

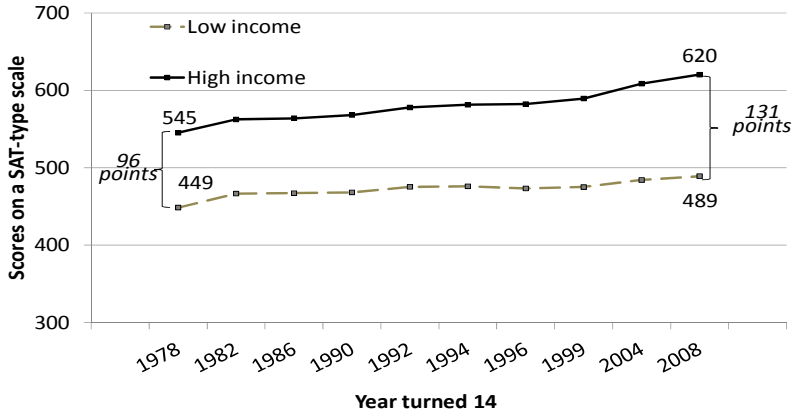
Not all American youth want to pursue four-year college degrees. Many want to enroll in two-year vocationally oriented education and training programs. Some want to enter the military. Some want to pursue traditional trades such as plumber and electrician and others want to enter new trades, many related to technology and health. These trades, some old and some new, provide many opportunities to do valuable work and to earn a good living. However, given the pace of technological change, almost all Americans will need to succeed in education or training programs over the course of their work lives in order to remain productive and to earn a middle class living. For that reason it is important that youth leave high school with the tools to continue to learn effectively. One oft-used term is that youth should leave high school, **college and career ready.**

3. Providing all American children with the high quality education they need to leave high school **college and career ready** is a new challenge. The nation's educational institutions did not tackle this challenge in the past because the economy provided a great many jobs that consisted primarily of carrying out the same task over and over. Workers needed to be able to read, do simple arithmetic, and follow directions, but that was enough for millions of jobs paying a living wage. It is these jobs that are disappearing. In summary, our educational challenge today is that the education that was good enough to support the economy of the 1970s is not good enough to support the economy of today and tomorrow. The reason I emphasize that the challenge is new is that the nation's educational institutions are struggling to learn how to meet this challenge. It is difficult and uncertain work.

II. Disturbing Trends in the Distribution of Educational Attainments and Skills

1. Given the growing importance of cognitive skills and educational attainments to success in the labor market, it is important to keep track of the extent to which American children from different backgrounds are succeeding in school. Recent evidence shows disturbing trends. Sean Reardon (2011) has documented that the gaps between the average reading skills and mathematical skills of children from relatively affluent families and those from relatively low-income families have increased by one-third over the last three decades. The growth in the gap in mathematical skills is illustrated in Figure 3.

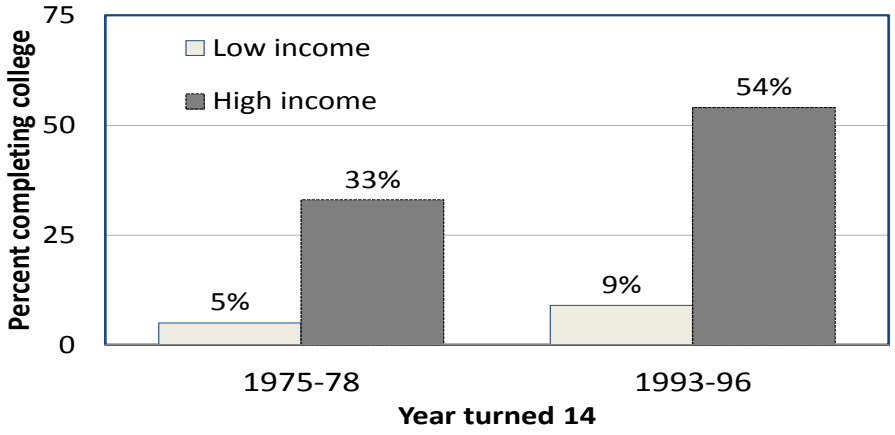
Figure 3: Math achievement for low and high income children



Source: The figure, which is taken from a forthcoming book by Greg Duncan and Richard Murnane, is based on data presented in Reardon (2011). "Low" and "high" incomes are defined as the 10th and 90th percentiles of the parent income distribution.

Given the importance of reading and mathematical skills for success in post-secondary education and training programs, one might expect that the growth in the income-related gaps in these skills would translate into a growth in income-related gaps in college graduation rates. Indeed, this is the case, as Martha Bailey and Susan Dynarski (2011) have documented. Figure 4 illustrates this pattern. Between the late 1970s and the mid-1990s, the college graduation rate of American youth from families in the top quarter of the income distribution increased by 21 percentage points, from 33% to 54%. During this period, the college graduation rate of American youth from families in the bottom quarter of the income distribution increased by only four percentage points, from 5% to 9%.

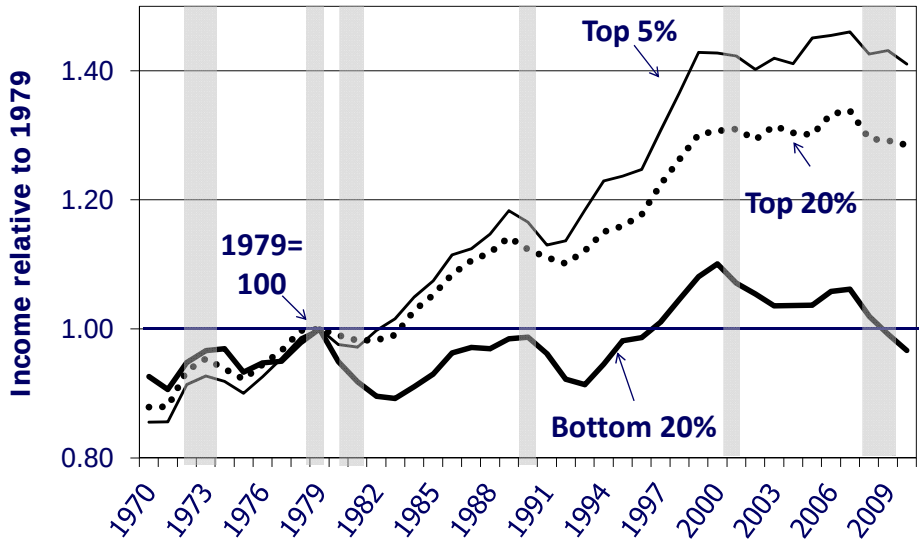
Figure 4: College graduation rates for low and high income children



Source: This figure, which is taken from a forthcoming book by Greg Duncan and Richard Murnane, is based on Bailey and Dynarski (2011). Low and high incomes are defined as the bottom and top quartiles of the parent income distribution.

2. In recent decades, the gap between the incomes of families at the bottom of the distribution and those at the top has increased markedly. Figure 5 illustrates this pattern. Notice that the average real income (that is, adjusted for inflation) of families at the 20th percentile of the income distribution in 2009 was slightly lower than the average income for comparable families in 1979. In contrast, the average income of families at the 80th percentile of the income distribution was 30 percent higher in 2009 than the average income for comparable families in 1979. The growth in real income for families at the 95th percentile of the distribution was even greater – more than 40 percent.

Figure 5: Family income relative to 1979



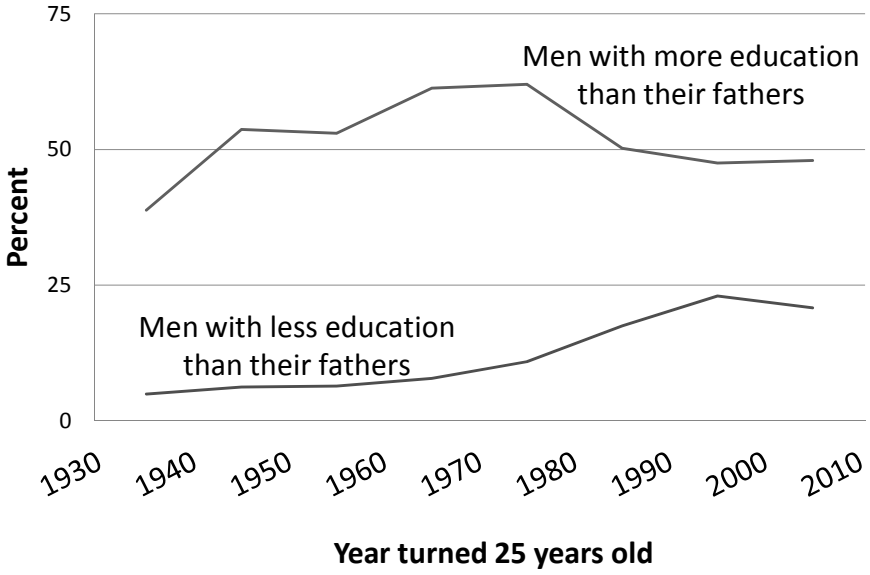
Source: This figure, which is taken from a forthcoming book by Greg Duncan and Richard Murnane, is based on data from the U.S. Bureau of the Census. Shaded areas indicate recession years.

The increase in family-income inequality has contributed to the increase in income-related gaps in educational outcomes through two sets of mechanisms: growing differences in parental resources devoted to children and growing differences in the quality of the schools children attended. These patterns are documented in the chapters of the 2011 volume entitled *Whither Opportunity? Growing Inequality, Schools, and Children's Life Chances*, edited by Greg Duncan and Richard Murnane.

3. The increasing gap between the cognitive skills and educational attainments of children from families in the bottom quarter of the income distribution and those in the top quarter threatens a belief that Americans hold dear. This belief is that, while children may grow up in poverty, if they work hard, their children will not grow up poor. The mechanism through which this American dream has been realized for many generations of Americans has been access to a good education. During most of the 20th century, the majority of American children completed more education than their parents, and this provided them with access to better jobs and higher income. However, as Michael Hout and Alexander

Janus (2011) have documented, this pattern no longer prevails. As illustrated in Figure 6, among men who turned 25 years of age after the mid-1980s, fewer than half completed more years of education than their fathers. Indeed, as the figure shows, more than 20% of men who turned 25 after 1990 completed fewer years of education than their fathers did. This is a sharp deviation from the pattern in previous generations.

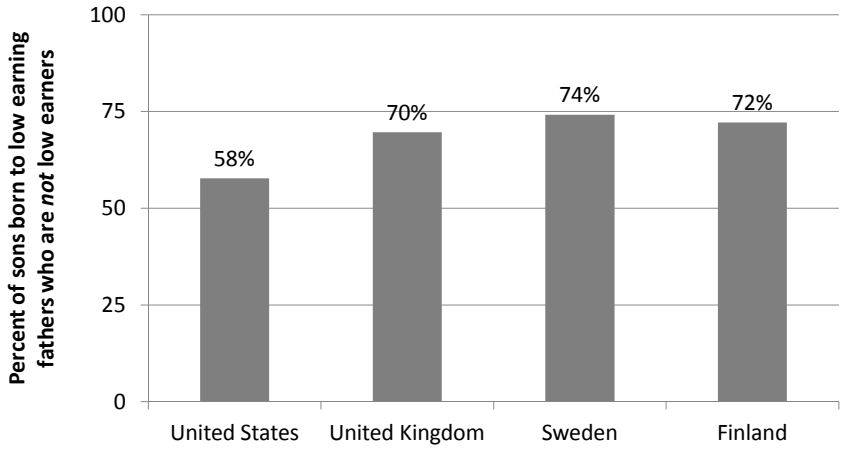
Figure 6: Men's intergenerational mobility



Source: Hout and Janus (2011)

The slowdown in the rate of increase of educational attainments of young Americans, especially those coming from low-income families, places in jeopardy upward socio-economic mobility in the United States. Indeed, a disturbing pattern that relatively few Americans are aware of is that the rate of intergenerational upward mobility in the United States is lower today than it is in the United Kingdom, Sweden, and Finland. This pattern is illustrated in Figure 7.

Figure 7: Upward mobility in the earnings of sons in the United States and other countries



Source: Jantii et al. (2008). Estimates are of sons born to fathers with earnings in the lowest 20% of earners who themselves are in the highest 80% of earners.

III. Improving American K-12 education

As stated above, the country faces the enormous challenge of providing all American children with the skills needed to graduate from high school **college and career ready**. This means preparing them with the foundational skills they will need to excel at **expert thinking** and **complex communication** in their chosen field of work. How to meet this new challenge is a topic of considerable debate, especially whether schools serving high concentrations of children from low-income families can do the job alone. I make three points that I believe are critical to successful efforts to improve American K-12 education.

1. Schools that are effective in educating disadvantaged children well do much more than provide good instruction during a normal 9 a.m. to 3 p.m. school day. They also monitor closely the progress of every child and provide extra instruction and learning opportunities late in the afternoon to remediate learning problems. Many of these schools also provide instruction and learning opportunities on Saturdays and during the summer months.[3] Many also provide pre-school programs for three- and four-year olds to prepare children to enter kindergarten ready to learn.[4] High schools that effectively serve disadvantaged students provide the learning opportunities in work places and in other non-school settings and the cultural experiences and tutoring that affluent parents provide to their teenagers.[5] In other words, schools that serve large numbers of disadvantaged

[3] See Dobbie and Fryer, 2011.
[4] Weiland and Yoshikawa (2012).
[5] See Bloom and Unterman (2012).

children and youth well play a much larger role in their lives than a five- to six-hour schedule of classes for 180 school days.

2. Accountability and capacity building are essential complements, not substitutes.[6] Incentives and the accountability system in which they are embedded are important. However, incentives by themselves will result in improved performance only if teachers, administrators, and students know how to do the things that the incentives reward. This is not the situation in the nation's schools today. Providing all students, including those from low-income families, with the skills to graduate from high school college and career ready is an unprecedented challenge for the nation's schools. Incentives and accountability alone will not be sufficient for the nation's educators to meet this challenge.

   Investing in capacity building, including high quality academic standards, curricula aligned with the standards, and professional development aimed at improving the quality and consistency of instruction, is important. However, historically the nation has devoted considerable resources to the development of curriculum and to professional development that have not improved the quality and consistency of the instruction children receive. Well-designed accountability systems hold promise to increase the effectiveness of investments in capacity-building. Of course, designing accountability systems that provide the right incentives is extremely difficult. Designing and implementing strategies to increase the instructional capacity of the nation's schools is equally difficult. No government or private-sector organization designs effective accountability systems and capacity-building investments the first time. Consequently, states will need to redesign their educational accountability and capacity-building systems in the years ahead, and federal legislation should encourage them to do so. In planning these redesigns, it is important to learn from the early efforts and to recognize that accountability and capacity building are essential complements. Pursuing one without the other will not produce better education for the nation's children.

3. Increasingly, states and local school districts are using student test scores to evaluate teachers. Typically, they do so using statistical models called "value-added" models. Essentially, value-added models provide estimates of the average amount of academic progress, as measured by test scores, that students in particular classes made during a school year. This is important information, especially when the evidence shows that in two or more successive years, students who spent the school year in the classroom of a particular teacher made relatively little academic progress. However, it is important to keep in mind that there are several explanations for this pattern. One is that the teacher lacks the skills to teach well. A second is that the teacher was absent from school for a substantial period due to illness.[7] A third is that there were students with severe

[6] See Murnane (2008).
[7] See Miller, Murnane, and Willett (2008).

emotional problems in the class who would have disrupted the instruction of any teacher.[8] A fourth is that there was a great deal of mobility among students in the class, with many new students entering the class during the school year.[9] There is strong causal evidence that each of these situations reduces student learning.

That a group of students made little academic progress during a school year is a troubling problem. However, responding to this problem effectively requires an understanding of its cause. If the cause is poor teaching, then the response should focus on improving the teacher's effectiveness and, if that does not work, dismissing the teacher. However, this response will not improve children's education if the cause is one of the other possibilities. For that reason, it does not make sense to make decisions about which teachers to dismiss and which to reward with a salary bonus solely on the basis of the results of value-added models. Instead, it makes sense to use the results of these models to identify teachers whose students are making relatively great academic progress and those whose students are making relatively little progress. The next step is to use other methods, including classroom observation by well-trained coaches or supervisors, to figure out the cause of the atypical performance. Taking this step is critical to constructive use of the results of value-added studies.

Summing Up

I conclude by reiterating the three central themes of my testimony. The first is that changes in the nation's economy have dramatically altered the demand for skills in the nation's workforce. These changes have resulted in unprecedented challenges for the nation's educational institutions. The second theme is that the gaps between the academic skills and educational attainments of Americans growing up in high-income families and those growing up in low-income families have increased substantially in recent decades. This growing inequality in educational outcomes threatens the nation's prosperity and also places in jeopardy the upward socio-economic mobility of which Americans are so proud. The third theme is that meeting the challenge of preparing all students to be college and career ready cannot be met by pushing teachers to work harder. To meet this challenge, American schools, especially those serving high concentrations of disadvantaged children, need to work differently and to play a larger role in children's lives than most play today. The policy challenge is to develop the knowledge, the capacity, and the accountability systems that will foster and support better schools for all American children.

[8] See Carrell and Hoekstra (2010).
[9] See Raudenbush, Jean, and Art (2011).

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