

THE CONCERNS ABOUT SCHOOL QUALITY EXPRESSED IN *A Nation at Risk* reflected declining trends in performance among U.S. students and their mediocre standing relative to students in other nations. America's failure to address these concerns has led to substantial losses for individuals and for society as a whole. The workers who failed to acquire essential skills can attest to the fact that their earnings have not kept up with those of the typical worker. And the aggregate effects are even more dramatic.

By some estimates, today's entire K-12 education budget could be funded by the "reform dividend" that might have been expected from improving math and science achievement in response to the calls of the 1983 report. To wit, improvements in the schools would have boosted U.S. economic growth, and the annual windfall by 2002 would have exceeded total K-12 spending for that year.

Quality Matters

Much of the research on the economic impact of education has properly concentrated on the role of school attainment—that is, the quantity of schooling. This focus is natural. The revolution in the United States during the 20th century was the universal provision of a basic education. Moreover, years of schooling are easily measured, and data on years attained, both over time and across individuals, are readily available.

Yet today's policy concerns revolve around issues of quality much more than of quantity. Completion rates for high school and college have been roughly constant for a quarter of a century in the United States, while the rest of the industrialized world has largely caught up on measures of school attainment. *Risk* was more concerned with the fact that U.S. students had fallen behind their peers in nations like Japan, the Netherlands, and France on international exams in math and science (see Figure 4, page 44, in Paul E. Peterson, "Ticket to Nowhere"). These concerns sparked the standards and accountability movement, which seeks to define what students should learn and tests to see whether they have mastered the material.

Increased economic growth, fueled by improvements in student performance, might have funded the nation's entire K-12 education budget by now



STILL AT RISK

LOST opportunity

by ERIC A. HANUSHEK



In good part because of the impact of the *Risk* report, it is now generally recognized that students' cognitive skills are a crucial dimension of education quality. But it has not, until recently, been clear just how important differences in cognitive skill are for the long-term well-being of a nation's economy. Fortunately, data are now available that allow one to estimate the connection between cognitive skill and the economy. The conclusions of this emerging body of research are clear: education quality, as measured by test scores, is positively related to the earnings of individuals, national productivity, and economic growth.

Individual Earnings

Just as most parents believe, economists have clearly shown that a student's achievement in school directly affects his or her earnings later in life, after allowing for differences in the quantity of schooling, experience in the labor force, and a variety of other factors that also influence earnings. Students who do well in school also tend to go on for further schooling, which provides an additional boost to their earnings. As is well known, the economic benefits of a college education have risen dramatically during the past quarter century, and substantial evidence shows that students with good grades or high scores on achievement tests tend to pursue more education.

These facts are part of the reason that so much attention has been paid to the schools as an agency of equal opportunity, ultimately helping to reduce inequities in the distribution of income. Long before the *Risk* report, the War on Poverty saw schools as key to reducing racial and other disparities in economic opportunity. Through schooling it was hoped that family poverty would not be transferred to the next generation: high-quality school investments would make up for deficits originating in the home.

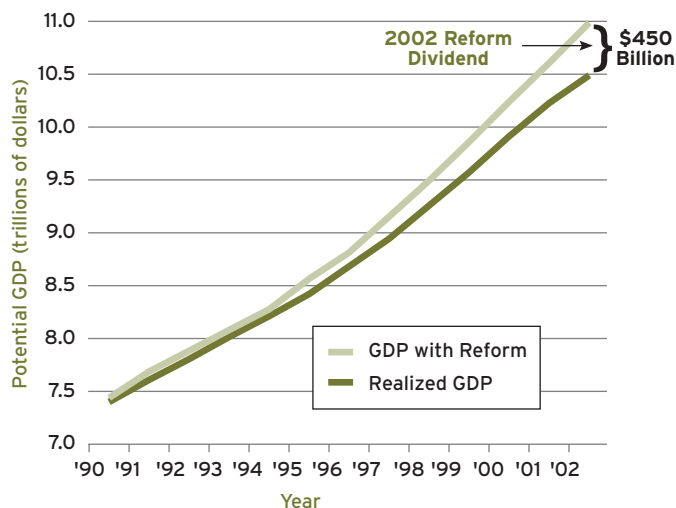
Today, many believe that the continuing difference between the earnings of black and white workers is due in good part to differences in their educational achievement, as measured by tests of cognitive ability. These continuing differences are especially worrisome, given the fact that the importance of education for the acquisition of well-paying jobs continues to grow, increasing the disparities in income between those with college degrees and those with less than a high-school diploma. Only if skill levels can be enhanced within high schools will many of the more disadvantaged in society have access to the college education that is crucial in a society where high-level skills are fundamental to success.

Economic Growth

No less important is the overall relationship between the quality of the labor force, as measured by tests of cognitive skill, and economic growth. Economic growth rates determine how much improvement will occur in society's overall standard of

The Reform Dividend (Figure 1)

The nation may have missed out on \$450 billion worth of economic output in 2002 as a result of the failure to raise student achievement in the wake of A Nation at Risk.



SOURCE: Author's calculations using Congressional Budget Office data on potential Gross Domestic Product (GDP)

living. Moreover, the education of each individual has the possibility of making others better off (in addition to the increased earnings the individual receives). For instance, a more educated society may have higher rates of invention; may make everyone more productive by virtue of the fact that firms are better able to introduce new, more sophisticated production methods; and may lead to the more rapid introduction of new technologies. These "externalities" that make everyone better off provide still another reason for taking measures that will enhance the quality—not just the quantity—of schooling.

Recent work in which Dennis Kimko and I have been engaged has looked closely at the size of the impact of labor force quality, as measured by tests of cognitive ability, on the economic growth of countries. Our study has drawn on information about the mathematics and science performance of students in many countries during the past four decades. In making our estimates, we take into account differences between countries in their level of income, the average number of years students are in school, and population growth rates. We find that a difference of one standard deviation in test performance is related to a 1 percent difference in annual growth rates of per-capita gross domestic product (GDP). This suggests that school quality has a great impact on economic productivity and growth. To some, 1 percent may not appear to be a large number. But a 1 percent increase each year in the growth rate of a country soon compounds to a very large number. Consider the United States at the beginning of the 21st century, for example. In the year 2000, GDP per capita was \$34,950. An annual

growth rate of 1 percent raises average income to no less than \$57,480 in 2050—more than a 50 percent increase over the period. Quite simply, small differences in growth rates have huge implications for the income and wealth of society.

If education has such a dramatic impact on a country's economic productivity and growth, what are the implications of a less-than-adequate education system for economic growth today and in the future? Can the U.S. economy continue to lead the world when the performance of its students on international tests in math and science has been mediocre at best? Some believe it can, that strengths in other areas compensate for America's educational deficiencies. The United States, for example, has more open and competitive markets and less intrusive government regulation than do the economies of many other industrialized societies. In addition, its system of higher education is the envy of the world. But these assets only mean that the United States may well have enjoyed even greater economic productivity had it enhanced the quality of its K–12 schools. Had the reform movement sparked by the *Risk* report led to real improvements in academic achievement, it would have had a dramatic impact on the already strong economy.

Squandered Potential

Consider a hypothetical scenario in which schools instituted truly effective reform in math and science instruction at the time of the *Risk* report. Had the reforms translated into achievement gains of 0.12 standard deviations a year for the remainder of the decade, with performance constant thereafter, scores of graduates would be one standard deviation higher going into the 1990s and the future. This would have required a Herculean effort, but was within the bounds of expectations. Recall that a 1989 meeting of the nation's governors set a goal of making U.S. students' performance in mathematics and science first in the world by 2000. An improvement of the more modest magnitude considered above would have put U.S. student performance in line with that of students in several European countries, but it still would not be at the top of the world rankings.

Such a path of improvement would not have had an immediately discernible effect on the economy, because new graduates are always a small portion of the labor force. However, the impact would mount over time. Figure 1 plots the potential GDP from 1990 to 2002 and adds an estimate of what the school reform sketched above would have implied for the economy. If past relationships between quality and growth held, GDP in the United States would have been more than 4 percent higher than was realized in 2002. The area between the two trend lines shows the "reform dividend," which totals to \$2.5 trillion in the two decades after the release of *Risk*. With close to a \$10.5 trillion economy, the unrealized gain for 2002 alone would have amounted to \$450 billion, or more than the nation's total annual expenditure on K–12 public education.

Measuring Quality

A segment of the education policy community has argued against the current testing regime—either because it does not measure attributes they think are important or because the test outcomes are irrelevant. Nevertheless, the evidence reviewed above demonstrates that differences in performance on existing tests have significant implications for both individual and aggregate success. This is not to say that existing tests are the best possible. It just shows that the existing tests measure something real, something real enough that it has important ramifications for individuals and the economy.

That the acquisition of cognitive skill as measured by tests is important does not mean other aspects of education are unimportant. In fact, some research suggests that other dimensions of individual skill also influence economic performance. For instance, to the extent that aggregate growth is fueled by invention, creativity is likely to be important, and this may differ from measured cognitive skills. Currently it is in vogue to argue that schools must do more than simply teach reading, math, and science. Of course this is true. But such arguments do not deny that cognitive skills are important, and they do not say what should be done if one wants to enhance these other, currently unmeasured areas.

The question for the United States is how to create policies that boost achievement and thus economic growth. It would be easy, if we could improve quality simply by spending more or by reducing class size. But, unfortunately, evidence from both the United States and other countries shows that more school resources and smaller classes do not have much of an effect on how much a student learns in school, as measured by tests of achievement. The international math and science scores so important for growth rates are not related to variations in spending on education or other standard measures of school resources, such as pupil-teacher ratios. Similarly, within countries that participated in the 1995 Third International Mathematics and Science Study, there is no systematic relationship between resources and student performance. Consequently, the policies following *Risk* failed in large part because they concentrated on simply adding more resources to the pot.

In other words, we need to look for ways other than mere increases in expenditure or reductions in class size if we are going to enhance the quality of our education system. A large body of evidence suggests that differences in quality between schools affect how students learn, but it will take creative policies to tap this potential. What students learn in school impacts their earnings later in life, their productivity in the work force, and, ultimately, the country's rate of growth. Over time, the cumulative impact of a high-quality education system can be dramatic.

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