

# Why Quality Matters in Education



Education can boost economic growth—but simply spending more money is seldom the answer

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the costs and benefits of school reform clearly shows investments that improve the quality of schools offer exceptional rewards to society. What is much less clear, however, is *how* to improve the quality of education.

Most studies of the economic aspects of education focus on school attainment, or the “quantity” of education. This appears logical from the perspective of both analysis and policy: the quantity of schooling is easily measured and readily tracked over time. But it distorts policies and potentially leads to bad decisions.

The policy challenges facing most countries at the beginning of the 21st century—including developing countries—are ones that have to do with *quality*, rather than quantity. Higher quality translates into greater earnings for individuals over their lifetime. Moreover, a society with a more educated labor force can also expect faster economic growth even if the returns may not be discernible for many years. Quality, defined here by measured mathematics and science skills, reflects a variety of factors—family inputs, health, schooling, and so forth. Of these, existing research suggests that the clearest way to improvement lies in strengthening schools. For those countries that stick to a path of real school quality improvement, investments in education have the potential to deliver truly large economic as well as social gains.

## Economic well-being and growth

Economic growth determines how much improvement will occur in the overall standard of living of society. Differences in growth rates that seem small can make a huge difference if maintained over a period of time. Consider a medium-

**I**T IS DIFFICULT these days to ignore the message that education matters. Governments everywhere in the world have assumed a substantial role in educating their citizens, and “providing education for all” is a central pillar of the Millennium Development Goals. A variety of motivations lead societies to provide strong support for schooling. Some are purely economic, while others are driven by ideas of using education to improve political participation, social justice and, more generally, develop society.

The enthusiasm for promoting more education is well-warranted, but the fundamental question is how much society should invest, as public investment in education comes at the expense of other public and private investments. Analysis of

income country starting at \$6,000 in GDP per capita in 2000. Without any growth, GDP per capita will stagnate. But if that country finds a way to grow at just 0.5 percent each year, incomes would increase from \$6,000 to \$7,700 by 2050—an increase of almost a third. If it were to grow at 1 percent per year, it would reach almost \$10,000 in 2050. Small differences in growth rates have huge implications for the income and wealth of society. Indeed, the current economic position of the United States and other developed countries is largely the result of these countries' strong and steady growth over the second half of the 20th century.

While a variety of models and ideas have been developed to explain differences in growth rates across countries (see for instance Barro and Sala-i-Martin's 2003 evaluation), they invariably include—but are not limited to—the importance of human capital, which is enhanced by a strong education system. Education has the possibility of making both the individual receiving it and others better off. Specifically, a more educated society may lead to higher rates of innovation and invention, make everybody more productive by helping firms introduce new and better production methods, and lead to more rapid introduction of new technologies.

Past research into growth differences across countries has emphasized school attainment differences and has found them to be highly related to economic growth. But the quantity of schooling is a very crude measure of people's knowledge and cognitive skills. Moreover, the role school attainment plays in economic growth has become controversial. A large part of the controversy—and the resulting policy mistakes—revolves around a fixation on school attainment without explicit consideration of the quality of schooling (see box).

### Good quality boosts growth

In an effort to shed light on the role that the quality of education plays in economic growth, Dennis Kimko and I studied international differences in mathematics and science knowledge, as evidenced by testing since the 1960s. We found that school quality indeed has a remarkable impact on differences in economic growth.

The analysis was very straightforward. All of the available earlier international test scores were formed into a single composite measure of quality and related to differences in growth rates across countries. The basic statistical model, which included the level of income, the quantity of schooling, and population growth rates, explained a substantial portion of the variation in national economic growth rates. But the quality of the labor force as measured by math and science scores also proved extremely important: one standard deviation difference on test performance was related to a 1 percent difference in annual per capita GDP growth rates. The impact of such a difference in growth rates is very large. One percentage point higher growth—say, 2 percent versus 1 percent per year—will over a 50-year period yield incomes that are 64 percent higher.

One common concern about this type of analysis is that schooling might not be the actual cause of growth but may

instead reflect other attributes of the economy that are beneficial to growth. To test this proposition, we investigated a number of other factors that might explain the relationship between the quality of education and growth, but ended up rejecting all of them. For example, the positive relationship does not seem simply to reflect the extraordinarily high growth over the

### Does more schooling equal higher growth?

In recent years, a number of critics have questioned whether the quantity of schooling really is a driving force behind economic growth. Some argue that even though there might be a correlation between growth and school attainment, there may not be a causal relationship—growing countries may simply use a portion of their wealth to buy more schooling. Others insist the estimated effects of education on growth are sensitive to the parameters of the underlying statistical analysis, and that it is difficult to distinguish among alternative estimates. Still others argue that the underlying model assumptions lead to very different implications about the schooling–growth relationship. Finally, some point out that the estimates of the effect of schooling on growth differ significantly from what would be expected from the highly positive microeconomic relationship between individual earnings and schooling—possibly reflecting the failure to use education in socially productive ways.

While these studies raise legitimate concerns, their message should not be misinterpreted. First, commonly available measures of school attainment are likely to be very imperfect measures of the human capital that is relevant to growth. Several authors have shown that a number of the research anomalies disappear when measurement issues are dealt with. Moreover, these authors do not even directly address what is perhaps the most important measurement issue: variations in cognitive skills and measured quality that have been highlighted by recent tests show that the knowledge at a given level of schooling completion in some countries has virtually nothing in common with that in other countries. These measurement problems are reinforced by simple recognition that qualitative skills reflect more than just formal schooling, including family input, cultural norms, health, and other factors.

Second, human capital is important, but it is not the only thing that governs the functioning of an economy. There is no question that basic features such as a developed system of property rights, limits on the amount of governmental intrusion through taxes and regulations, and the openness of labor and product markets have an enormous impact. Pushing more school attainment on an economy unable to use it productively is unlikely to have positive effects.

What are the policy implications? Clearly, human capital can be built up by providing more schooling, but policies that fail to consider the quality of schooling risk expanding quantity without truly expanding human capital. Likewise, development policies that fail to take into account the overall structure of an economy are likely to expand school attainment with little measurable improvement.

1960–1990 period enjoyed by East Asian countries (which also consistently score very high on international tests but might have grown rapidly for other reasons). When the East Asian countries were excluded from the analysis, quality still showed a strong influence on growth. Nor is it just that the test measures are really a proxy for other attributes of the country, such as efficient market organizations. Among U.S. workers educated abroad, those from countries with higher math and science performance consistently performed better, thus precluding the possibility that it is simply something about the characteristics of the home country economies.

The strength of improved quality can be readily seen by calculating the economic impact that can be expected from quality improvements. Consider beginning a school improvement program in 2005 that ultimately proves successful. School reform of course takes time—it takes years before school graduates work their way into the labor force and make their impact felt. Chart 1 illustrates the impact reform could be expected to have over time if it is successful at achieving a moderately strong knowledge improvement (corresponding to a 0.5 standard deviation increase in test score achievement). The curves sketch the path of GDP improvement that would occur with a reform plan that reaches its school improvement goal within 10, 20, or 30 years. Consider just the slow improvement of schools over a 30-year period. In 2040, GDP would be almost 4 percent higher than projected without the schooling reforms. Of course, faster reforms would yield even greater gains in GDP.

How big would this “growth dividend” be? The horizontal dashed line indicates the typical level of national spending on education. If this moderately strong improvement in student skills could be obtained during a 20-year reform period, a country could expect to pay for *all of its educational expenditures* by 2040 with the growth dividend.

Research also links test scores directly to individual earnings and productivity: the better an individual performs on standardized tests, the more likely he or she is to earn a good salary. The earnings advantages associated with higher achievement on standardized tests are quite substantial in the United States and other developed countries. Three recent studies of U.S. labor markets undertaken respectively by Mulligan (University of Chicago), Murnane and colleagues (Harvard University), and Lazear (Stanford University) provide direct estimates of the effect of test performance on earnings. The studies, which are based on different, nationally representative data sets that follow students after they leave the education system and enter the labor force, provide remarkably similar estimates: one standard deviation increase (moving from the average of the distribution to the 84th percentile) in mathematics performance at the end of high school translates into 12 percent higher annual earnings—an earnings gain that can be expected across the entire working life of the individual. And there are reasons to believe that these estimates provide a lower bound on the effect of higher educational achievement.

A range of estimates for other countries support these findings. Although less frequently available, estimates out-

side the United States consistently show strong positive effects of measured quality on individual earnings. Moreover, where direct comparisons are possible, gains appear to be even larger for developing countries than for developed countries.

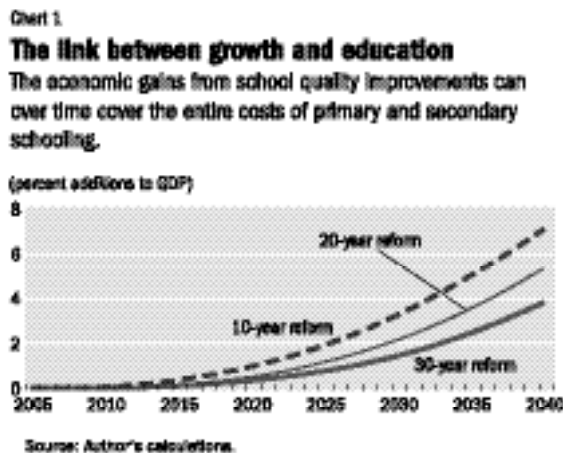
Additional returns to school quality also come through continuation in school. There is substantial U.S. evidence that students who do better in school, measured by scores on standardized achievement tests, tend to go farther in terms of educational attainment. Murnane and his colleagues separated the direct returns of measured skill from the indirect returns of more schooling and found that perhaps as much as one-third to one-half of the full return to higher achievement comes from further schooling. This effect of quality on school attainment, which is over and above the earnings impacts previously noted, is also evident in a number of other countries.

Thus, the findings that quality in education is directly linked to individual earning power and productivity are quite pervasive. Even in developing countries with relatively small manufacturing and skill-intensive service sectors, skills have been shown to have a strong impact on outcomes. While much of the quantitative research on the importance of skills has come mainly from developed countries, the qualitative picture accordingly appears to hold for many developing countries as well.

#### Difficulties in achieving better quality

Although many factors help determine cognitive skills, most government efforts for improvement focus on schools—the place where they have the most policy leverage. Unfortunately, reforming school policies and improving performance are not just a matter of will, or of providing extra resources to schools. If the effectiveness of different resources—or combinations thereof—were known, it would be straightforward to define an optimal reform strategy. The problem is that we do not currently have enough credible knowledge about how best to use new resources.

The most straightforward way to illustrate the difficulties comes from a line of research considering the relationship



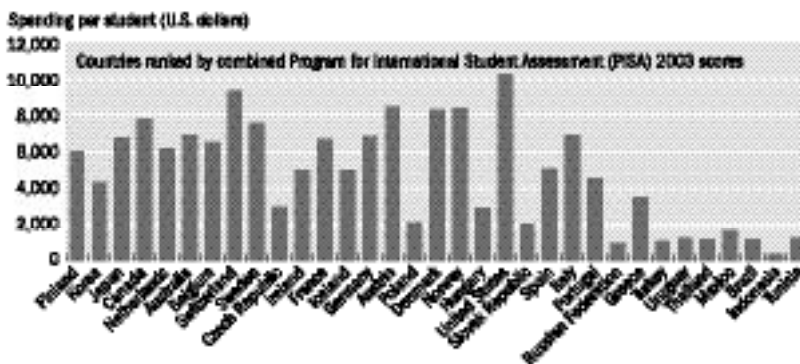
between resource usage and student performance. In the United States, for example, both aggregate data about performance of schools over time and more detailed school and classroom data point to a simple conclusion: there is a lack of any consistent or systematic effect of resources on student achievement. While controversial, partly because it conflicts with existing policy relating to education, the evidence is very extensive.

International evidence, although less extensive, supports the U.S. case. As Chart 2 shows, for the industrial countries, there is no obvious pattern of expenditure by test performance. This lack of relationship is confirmed by more detailed studies of the determinants of achievement.

Countries with the very lowest scores tend to spend noticeably less than the average, but these are developing countries that probably differ on much more than just spending. Studies of educational achievement, particularly in developing countries, have tended to rely on small, specialized data sets that provide limited information about family and schooling characteristics and that seldom track school performance over time. These problems have raised questions about the reliability of any findings and about whether the associations are truly causal in nature. Nonetheless, these studies tend to provide somewhat stronger support for resource policies, suggesting that the importance of resources may vary with the level of resources—a developing country may gain comparatively more by investing in education than a developed country because it is starting from a lower point. This proposition is reinforced by some of the more credible research findings, which indicate that the absence of the most basic school resources—such as adequate facilities or textbooks—noticeably impacts performance. Nonetheless, the evidence does not indicate that simply spending more, even in poor countries, can be expected to have a generally significant effect on student outcomes without closer attention to the uses of resources.

Most countries have at some point attempted to improve their schools. While some have succeeded, many have not. One explanation for failure is simply that insufficient attention has been paid to teacher quality. Estimated differences in annual achievement growth between an average and a good teacher are large. Within one academic year, a good teacher can move a typical student up at least four percentiles in the overall distribution (equal to a change of 0.12 standard deviations of student achievement). In fact, a string of good teachers can erase the deficits associated with poor preparation for school. The problem is that hiring good teachers is not easily achieved. Teaching ability is not closely related to training or experience. Moreover, most teacher salary systems do not reward high-quality teachers.


**Chart 2**  
**Quality and cost**  
Differences in student performance are not driven by national levels of school spending.




Source: Education at a Glance: OECD Indicators 2003; and OECD, Learning for Tomorrow's World—First Results from PISA 2003.

Clearly, policymakers should focus on improving the overall quality of the teaching force. If one were simply to redistribute existing teachers, the overall policy goals would not be achieved. But the research evidence suggests that many of the policies that have been pursued worldwide have not been very productive. Specifically, policies of individual countries that have led to changes in measured aspects of teacher qual-

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ity—such as degrees or other teacher qualifications—do not seem to have improved the quality of teachers, at least when that quality is measured by looking at student performance.

Instead, most existing evidence indicates that quality improvements are more likely to come from selecting and retaining better teachers rather than from retraining existing teachers. While some in-service training and development programs have had success, they have generally disappointed. Moreover, existing evidence on in-service programs does not provide us with sufficient insight for selecting a program that is likely to yield significant gains in teaching performance.

There are, of course, limits on how large the changes in the teacher force can be at any point in time. It is simply not feasible to turn over the stock of teachers completely while maintaining a coherent teaching program. Many countries do not currently have active teacher retention policies. Instead, most of the decision making is left to individual teachers—once a teacher is hired, decisions about when to leave are made by that teacher rather than the school institutions. Finding a better selection mechanism that redirects who enters into teaching and other policies affecting quality takes time. Thus, even optimistic reform programs call for long planning horizons—perhaps as long as 20–30 years—and an enduring commitment to reform.

Policy changes may affect the speed of replacement—both slowing and speeding up the rate of turnover. For example, changes in teacher contracts, salaries, and benefits may induce more or fewer teachers to leave teaching. Explicit changes to allow more institutional decision making also have an obvious impact on turnover. Moreover, the ability to improve the teaching force will depend on the people who can be attracted to teaching. If the teaching force is to be improved, either the hiring must select better teachers or

retention policies must be skewed toward the best teachers. If better hiring is an important element of the plan, it may well take time before new kinds of people are attracted to teaching. Teaching is generally a career choice that requires a prior commitment—one that in turn depends on the career expectations of would-be teachers. And expectations take time to be affected by general policies.

These considerations make the case for building a plan of improvement over time. One-time adjustments or changes in programs are unlikely to be effective. The most feasible approach, given currently available information, is to experiment with alternative incentive schemes. These might involve new contracts and approaches to teacher compensation, introduction of parental choice across schools, merit awards for schools, and the like. The unifying theme is that each new policy should be designed to improve student achievement directly. For example, merit awards to teachers could be directly linked to objective information about student performance.

Finally, we need to get a better handle on what works and what doesn't. Too often, there is no regular evaluation of policies and programs. And when evaluations are conducted, they frequently focus on inputs to the system rather than on student achievement and outcomes. This underscores the need to assess student outcomes that are related to both new and existing programs. The key element is measuring student performance directly. Without objective data about student achievement, programs and policies often proceed in unproductive directions. Indeed, past research amply demonstrates that many good guesses about policies did not in the end prove successful—making regular monitoring essential. ■

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