

Education, Skills, and Economic Growth in Central America

Elizabeth M. King



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About the Author

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Abstract

Evidence demonstrates that education contributes to economic development, lowers poverty and inequity, and improves lives. A solid foundation of reading, writing, and basic math learned in school can equip young people with a set of competencies and skills, behaviors, and attitudes, as well as a sense of cooperation and social responsibility, that enables them to participate in society as productive workers and responsible citizens. It can impart young people with the ability to innovate and apply knowledge that supports a dynamic economy, determines the type of work they do, and raises their productivity and earnings. More schooling can benefit society in other ways too—in terms of better health, enhanced ability to cope with economic and environmental shocks, and greater social cohesion, among others. Given these benefits, it's not surprising that individuals, families, and governments have been investing increasingly in education.

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1. Introduction

Evidence demonstrates that education contributes to economic development, lowers poverty and inequity, and improves lives. Learning unleashes the human mind and makes development achievements possible—from health advances and agricultural innovations to efficient public administrations and private sector growth. A solid foundation of reading, writing, and basic math learned in school can equip young people with a set of competencies and skills, behaviors, and attitudes, as well as a sense of cooperation and social responsibility, that enables them to participate in society as productive workers and responsible citizens. It can impart young people with the ability to innovate and apply knowledge that supports a dynamic economy, determines the type of work they do, and raises their productivity and earnings. More schooling can benefit society in other ways too—in terms of better health, enhanced ability to cope with economic and environmental shocks, and greater social cohesion, among others. Given these benefits, it's not surprising that individuals, families, and governments have been investing increasingly in education.

Education and economic growth

Theories of endogenous growth identify education as a positive force, especially for long-run growth trajectories (Romer, 1994). Economists have attempted to estimate the size of this effect on economic growth, but many have not found unequivocal evidence of the positive impact of education, typically measured as average years of schooling.¹ Some

¹ While data on the rate of enrollment are more ubiquitous, the average years of schooling is a better proxy for human capital in an empirical growth model because it is the result of

studies have found a positive causal impact; others have not.² A recent review of the literature by Delgado, Henderson, and Parmeter (2014) sheds light on this unsettled state of the literature; the authors point to the different specifications estimated by the studies as a source of the mixed results. For example, some studies rely primarily on assumptions about the nonlinear relationship between economic growth and years of schooling as an identification strategy. In addition, years of schooling is not an adequate measure of human capital, and an additional year of schooling in one country does not mean the same across countries in terms of human capital formation. The authors show that mean student test scores is a measure of education that reflects differences in the quality of schooling across countries, It yields the expected positive correlation between economic growth and education, even without assumptions about a nonlinear specification.³

Indeed, Hanushek and Woessmann (2008) find that an increase of one standard deviation in average reading and math scores (roughly equivalent to improving a country's ranking from the median to the top 15 percent in these assessments) is associated with a substantial two percentage points increase in annual GDP per capita growth, holding constant years of schooling. In another paper, Hanushek and Woessmann (2009) identify low levels of cognitive achievement as the cause of slow economic growth in Latin American countries, despite the region's relatively high schooling levels from as early as the 1960s.⁴

a series of schooling decisions and is thus less likely to be correlated with contemporaneous macroeconomic shocks that also effect growth rates. In contrast, macroeconomic shocks that affect growth rates could lead to an immediate change in enrollment rates as the recent global macroeconomic crisis has demonstrated.

² A partial list of the studies that have estimated growth regressions with education as a factor illustrate the serious search for incontrovertible evidence of this impact: Barro (1991), Benhabib and Spiegel (1994); Judson (1998); Bils and Klenow (2000); Krueger and Lindahl (2001); Pritchett (2001); Hanushek and Woessmann (2008).

³ "Our nonparametric cross-sectional exploration of the Hanushek and Kimko (2000) data shows a significant and robust effect of human capital quality on economic growth rates. Recently developed techniques, such as sophisticated projection techniques developed through the construction of existing education databases, might be applied to measure changes in mean education achievement, to help develop these data into larger and more widely available datasets" (Delgado, Henderson, and Parmeter, 2014, p. 23).

⁴ According to the Barro-Lee data, the average years of schooling in 1960 was 5.7 in Argentina, 5.2 in Chile, and 3.1 in Bolivia. In comparison, in 1960 the corresponding

Controlling for average years of schooling, if the region's test scores had been one standard deviation higher, then its average annual growth rate in GDP from 1960 to 2000 would have been higher by 2.6–2.9 percentage points.⁵

Educational challenges for Central America's economic growth

Increases in average years of schooling are no longer enough to support and sustain economic growth. Without substantial improvements in the skills acquired by students, more years of schooling will not translate into higher productivity or real advances in the future lives of young people. This paper discusses the implications of this challenge for the education systems in Central American countries. The challenge is an educational imperative that is very relevant for the region's economic growth prospects, for reasons that are discussed below.

First, although the region's sectoral distribution of employment has not changed notably in the past decade,⁶ overall the nature of jobs has changed, even within the same industries. Jobs have changed because of profound shifts in production processes. For instance, jobs in industry and services now require more familiarity by workers with computer and communication technologies and greater ability to compete in globalized markets. Firm-level data for Brazil, Costa Rica, El Salvador, Guatemala, Guyana, Honduras, and Nicaragua, collected between 2002 and 2007, show that vacancies take longer to fill in Latin America than anywhere else in the world (Aedo and Walker, 2012).⁷ One reason is that

numbers were 4.2 in Korea, 3.7 in Singapore and 2.8 in Malaysia. Only Japan stood out at 7.8 years.

⁵ Schoellman (2012) measures the effect of quality-adjusted years of schooling in accounting for cross-country output per worker differences, and finds that cross-country differences in education quality are roughly as important as cross-country differences in years of schooling in accounting for output per worker differences, raising the total contribution of education from 10-20 percent of output per worker differences.

⁶ According to the available ILO Web database, a decrease of 4 percentage points in agriculture, no change in industry, and an increase of about 4 percentage points in services between 1996 and 2006. In contrast, the numbers for East Asia over the same period are 8, 1, and 6 percentage points.

⁷ The samples in these Enterprise Surveys were designed to be representative of the main sectors in each country. Aedo and Walker (2012) use only the most recent wave of data per country. The dataset includes information on the average time taken to fill a job vacancy (skilled and unskilled), labor earnings to skilled and unskilled workers, and average job

the skills and competencies of available workers do not match the technical requirements of the unfilled jobs.⁸ On average, employers in these countries take almost four weeks to fill a job vacancy with external candidates. Aedo and Walker (2012: 111) conclude that “[t]hese cross-regional differences are likely to be related not only to the composition of firms in the country and their demand for skills, but also to the composition of skills in the population and the stringency and enforcement of hiring and other labor regulations.” Moreover, they find that the time to fill a job vacancy is about three times longer for skilled than for unskilled workers—on average, 6.5 weeks for skilled labor compared with 2.1 weeks for unskilled labor.⁹

Second, the penetration of new information and communication technology (ICT) is rapidly changing how people work and live worldwide. ICT will continue to deepen in homes and in the workplace in emerging economies, with corresponding skills needed for this greater adoption. Compared with the advanced countries, none of the countries in Latin America comes close now, but ICT is a wave that cannot be avoided. The speed of penetration in Central America has accelerated too, but there are huge differences across the countries. In 2013, Costa Rica and the Dominican Republic were at 46 percent penetration, but Nicaragua was only at 16 percent. To compare, in the East Asian Tiger economies, use of the Internet reached three fourths to four fifths of their population in 2013, well in line with the average percentage in other developed countries. Even among the emerging economies of East Asia,

turnover. It also includes many other characteristics of the firm, including the degree of integration into global markets—proxied by exports, imports, and foreign direct investment—as well as on each firm’s technology adoption practices.

⁸ Other reasons mentioned by the Aedo and Walker (2012) are low effort in job search or failures in the firms’ recruitment strategies and a sluggish adjustment between supply and demand because of occupational or geographical immobility (for example, local costs such as housing or high reservation wages among the unemployed).

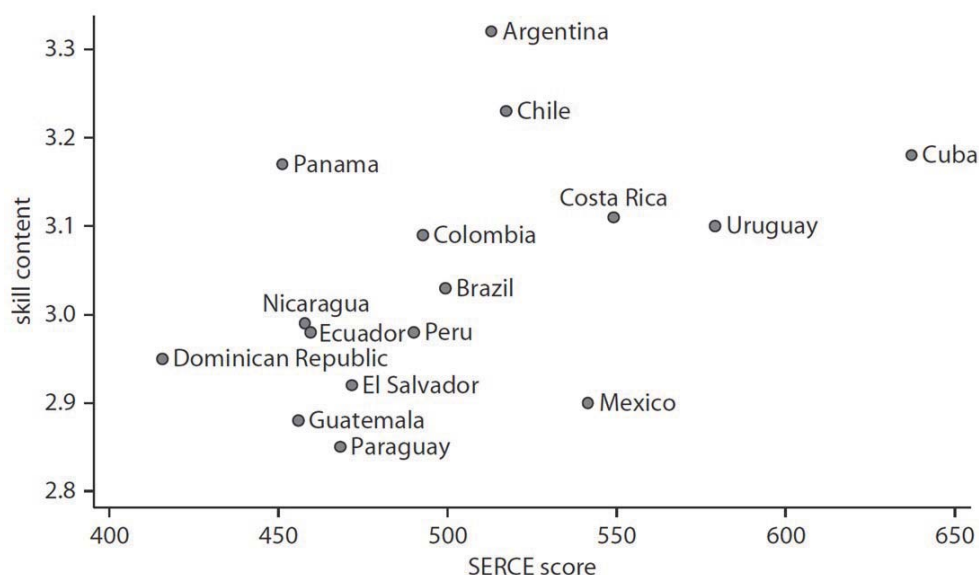
⁹ Aedo and Walker (2012) also conclude that “the technical skills demanded by more high-tech industries, such as knowledge of English and information technology, are likely important factors constraining hiring in the region. The findings show that high-level technical skills are missing. The high-tech industries—including autos and auto components, chemicals and pharmaceuticals, electronics, and metals and machinery—take even longer to fill job vacancies than low-tech industries (both for skilled and unskilled workers)” (p. 115).

penetration has risen very fast and already exceeds the average rate for developing countries.

Third, migration has been an important vehicle for families and individuals in Central America to escape poverty and/or conflict and to find better employment. There are important relationships between migration and education. In the Dominican Republic, those households in which the head has more education tend to have more emigrants (Amuedo-Dorantes and Pozo, 2010).¹⁰ Among the migrants from Central America, those who come from countries that have a better education system tend to be employed in higher-skilled jobs in the United States (Aedo and Walker, 2012) (figure 1). Remittances from these emigrants have been contributing a substantial share of national incomes.

Figure 1. Correlation of Education Quality in Migrants' Country of Origin with Skill Content of Work Done in the United States, 2006

a. Cognitive and analytical skills



Source: Aedo and Walker (2012).

Note: Skill content is assessed on a scale of 1 to 5; quality of education is assessed by SERCE score; only individuals with tertiary education are included.

¹⁰ About 9 percent of households with heads claiming no education report having at least one family member abroad. The comparable statistic for heads claiming 24 years of education is 12 percent (Amuedo-Dorantes and Pozo 2010).

In 2013, remittances received by Honduras and El Salvador from emigrants amounted to 16.9 and 16.4 percent of their GDP, the highest shares in the Latin America region (World Bank 2014a). The remittances have also benefited schooling levels in the country of origin because they augment household incomes and mitigate their liquidity constraints. In the case of migrants from El Salvador and Nicaragua to the United States, while education appears to be negatively related to the decision to remit, it is positively related to remittance amounts (Funkhouser, 1995).

Outline of the paper

This paper focuses on two broad questions—whether Central American countries have the human capital that is able to accelerate their economic progress, and what approaches they can take to improve their human capital development. The paper situates the challenge of skills development facing the region by comparing it with recent developments in established and emerging economies in East Asia. In particular, it discusses the implications of this challenge for the education system in Central American countries. The paper considers whether their education systems are poised to unleash students’ academic performance, creativity, and innovation, and how governments can support educational institutions with an enabling environment.

The next section reviews the rich analytical literature related to human capital and economic growth. There is a large literature that estimates the impact of education on individual earnings and other development indicators, such as health. The increased availability of achievement test scores has made it possible to estimate directly the impact not only of years of education but also of learning levels. The previous section referred briefly to this literature; section 2 reviews the most important debates on the topic. Section 3 presents the patterns that emerge from the empirical evidence on education, skills, and employment in Central American countries. We make clear at the outset that there are considerable differences in educational indicators across Central American countries. Although we refer to the countries as a region in the paper, education data reveal wide gaps among them. Comparisons with neighboring countries as well as the emerging economies across the Pacific also provide useful insight. Section 4 discusses relevant lessons from other countries, especially from countries

that have more recently joined the ranks of developed countries. Section 5 presents possible strategies to accelerate human capital development in Central American countries and thus break barriers to economic growth. Finally, Section 6 closes the paper with some principles for setting priorities for policy and investments.

2. Survey of the Literature and Evidence

This section focuses on the mechanisms through which economic benefits accrue to individuals, families, and the economy. It also reviews evidence on the impact of education on nonmarket returns, such as improved health. Furthermore, it considers the returns to cognitive skills, not just years of schooling, and introduces a relatively nascent literature that links work productivity and earnings to noncognitive or personality skills.

Education and individual earnings

A large number of studies have estimated the effect of education on occupation, employment, and earnings. This literature gained momentum after the pioneering work of Mincer (1974). The studies typically estimate the relationship between a person's earnings (in logarithmic values) and that person's years of schooling and age or a measure of work experience (usually with quadratic terms). Despite differences in empirical specifications and the level of economic development of the countries included, almost all studies find that earnings increase with years of schooling and with age or work experience (but at a declining rate). Periodic reviews of these estimates in developing countries (Psacharopoulos and Patrinos, 2004; Montenegro and Patrinos, 2014) show that, on average, an additional year of schooling raises individual earnings by more than 10 percent and that this average return is similar across countries with different income levels. These estimates are based on regression analyses that control for differences in individual characteristics and family background.¹¹

¹¹ See Card (1999, 2001) and Krueger and Lindahl (2001) for excellent discussions of the theoretical and econometric issues (e.g., endogenous schooling) when inferring causality

Table 1. Estimated Earnings Premiums in Selected Countries in Latin America, Around 2008

	Brazil 2008	Chile 2006	Colombia 2008	Mexico 2008	Peru 2008	Uruguay 2008	Costa Rica 2008	El Salvador 2008	Nicaragua 2005
Years of education	0.1	0.12	0.12	0.12	0.11	0.1	0.09	0.08	0.1
Primary complete (vs. incomplete) primary	0.26	0.11	0.21	0.19	0.15	0.2	0.12	0.11	0.29
Secondary technical complete (vs. primary complete)	n.a.	0.39	n.a.	0.69	n.a.	0.4	0.43	n.a.	0.42
Secondary academic complete (vs. primary complete)	0.25	0.32	0.42	0.62	0.26	0.45	0.32	0.38	0.37
Nonuniversity tertiary complete (vs. secondary academic complete)	n.a.	0.44	0.43	0.3	0.37	0.53	0.25	0.42	0.31
University complete (vs. secondary academic complete)	0.92	1.12	1.21	0.79	0.94	1.07	0.71	0.99	0.77

Source: Aedo and Walker (2012).

Note: Earnings are by full-time private sector employees. Dependent variable is real monthly earnings. The education earnings premium for primary is the difference in the logarithm of monthly earnings between complete primary and incomplete primary education, the education earnings premium for secondary is the difference in the logarithm of monthly earnings between complete secondary academic and complete primary education, and the education earnings premium for university is the difference in the logarithm of monthly earnings between complete university and complete secondary academic education. Regressions control for potential experience, gender, and region. n.a. = not applicable.

Focusing just on Latin America, Aedo and Walker (2012) estimate the earnings premiums to education in several countries, including three in Central America (table 1). Their estimates of the average premium for an additional year of schooling range widely from 8 percent in El Salvador to 12 percent in Chile, Colombia, and Mexico. Breaking up the full education cycle into levels is quite revealing. They find the following

between education and earnings from wage regressions. They also review the empirical literature that uses supply-side programs to instrument schooling choices in order to address the issue of endogenous schooling, and conclude that instrumental-variables estimates of the return to schooling are usually larger than the ordinary least-squares estimates.

patterns: Earnings premiums for secondary education (whether academic or technical) are higher than for primary education, except in Brazil. The premiums for technical secondary education are similar to those for an academic secondary education degree. Premiums for a university degree are generally higher than those for secondary education (whether academic or technical), but these premiums are lower in Central America than the rest of Latin America, except in El Salvador. Premiums for nonuniversity tertiary education are smaller than for a traditional university education, but are similar to the premiums for secondary education. In terms of patterns over time, premiums for secondary education decreased monotonically in every country during the period 1998–2008, while premiums for university graduates increased in most countries in 1998–2003 and then fell in all countries during 2003–08.

Skills, beyond years of schooling

Because of the greater availability of international and regional standardized tests for many more countries, more growth studies are including cognitive achievement, in addition to years of schooling, as a determinant of economic growth. The switch to measures of cognitive skills in individual earnings functions has been less possible because estimating earnings functions would require testing students or new workers using a standardized assessment and following them over several years in order to observe their earnings growth. The Programme for the International Assessment of Adult Competencies (PIAAC) is a recent assessment instrument that measures the cognitive and workplace skills of adults. It offers data for estimating earnings functions with measures of cognitive skills, but few developing countries have participated thus far (OECD, 2013a).¹²

Although no Central American country has participated yet in PIAAC, it is interesting to note the findings of Hanushek et al. (2013) who analyze PIAAC data on 22 countries to estimate individual earnings

¹² The latest information on this indicates that 33 countries are now participating. Unfortunately, PIAAC includes no Latin American countries, except for Chile. The first PIAAC application was conducted in 2008. The survey interviews adults aged 16-65 in their homes; about 5,000 adults participate in each country. It assesses literacy and numeracy skills and the ability to solve problems in technology-rich environments (OECD, 2013a).

functions. They find that education quality, as measured by cognitive skills, has a strong positive impact on individual earnings, and implies that having data on Central American countries might also reveal that cognitive skills matter significantly for individual earnings.

Across the 22 countries, a one-standard deviation increase in numeracy skills is associated with an average 18 percent wage increase among prime age workers. Moreover, because of measurement errors in skills, these estimates should be thought of as lower bounds on the return to skill.

But this overall measure of returns to skill also masks considerable cross-country heterogeneity: Returns are below 15 percent in eight countries, including all four participating Nordic countries, and above 21 percent in six countries, with the largest return being 28 percent in the United States. Estimated returns tend to be largest for numeracy and literacy skills and smaller for problem solving skills, although the relative importance of different skill dimensions varies across countries. Estimates prove highly robust to different earnings measures, additional controls, and various subgroups. Finally, exploiting the cross-country dimension of our analysis, we find that returns to skills are systematically lower in countries with higher union density, stricter employment protection, and larger public-sector shares (Hanushek et al., 2013: 15).

Changes in demand for skills

Education yields its greatest benefits in countries undergoing rapid technological and economic change because it can give workers the ability to continue acquiring skills throughout life, as well as the capacity to adapt to new technology. In the United States, the occupational landscape changed from the late 1970s to the mid-1980s, raising the demand for skilled workers (Murnane, Willett, and Levy, 1995; Goldin and Katz, 2009).¹³ During this period, cognitive skills became more

¹³ The historical analysis by Goldin and Katz (2009) of the long-run changes in the wages of workers with different levels of education in the United States illustrates the relationship between skills and returns to education over a century. It links the secular growth in the relative demand for more educated workers in the United States to growth in the relative supply of skills in explaining the wage differentials among workers. “The concept of a highly-educated worker changed across the period we analyze. A college graduate or possibly one with a post-graduate degree is considered highly educated today. In 1915,

important predictors of wages after high school, the result of a drop in the proportion of young workers employed as machine operators. Such jobs paid relatively high wages but did not require mastery of basic math skills. Further evidence from the United States indicates that the adoption of computers and computer-based technologies has shifted demand towards the increased use of workers who have superior problem-solving and technical skills relative to workers trained for routine production (Autor, Levy, and Murnane, 2003). Acemoglu and Autor (2011) propose a framework that catalogues the shift in the kind of skills demanded in different jobs in a growing economy today—from skills for manual, routine work to skills for manual, nonroutine tasks and even more analytical, nonroutine work (table 2).

Table 2. Skills Requirements of Jobs in Growing Economies

Type of work	Manual	Cognitive
<ul style="list-style-type: none"> Routine 	<ul style="list-style-type: none"> Working at pace determined by speed of equipment Controlling machines and processes Making repetitive motions 	<ul style="list-style-type: none"> Repeating same tasks Being exact or accurate Having structured work
<ul style="list-style-type: none"> Nonroutine 	<ul style="list-style-type: none"> Operating vehicles, mechanized devices Using hands to handle, control or feel objects, tools or controls Using manual dexterity Having spatial orientation 	<ul style="list-style-type: none"> Analytical Analyzing information or data Thinking creatively Interpreting information Interpersonal Establishing and maintaining personal relationships Guiding, directing, motivating subordinates Coaching, mentoring

Source: Acemoglu and Autor (2011).

however, a high school graduate would have been deemed well educated.... In the race between technological change and education,... education ran faster during the first half of the century and technology sprinted ahead of limping education in the last 30 years. The race produced economic expansion and also determined which groups received the fruits of growth.”

Acemoglu and Autor (2010) find striking patterns in wages for the United States and European Union economies over the last five decades that support the framework in table 2.

(1) low skill (particularly low skill male) workers have experienced significant real earnings declines over the last four decades; (2) there have been notably nonmonotone changes in earnings levels across the earnings distribution over the last two decades (sometimes referred to as wage ‘polarization’), even as the overall return to skill as measured by the college/high-school earnings gap has monotonically increased; (3) these changes in wage levels and the distribution of wages have been accompanied by systematic, nonmonotone shifts in the composition of employment across occupations, with rapid simultaneous growth of both high-education, high-wage occupations and low-education, low-wage occupations in the United States and the European Union; (4) this polarization of employment does not merely reflect a change in the composition of skills available in the labor market but also a change in the allocation of skill groups across occupations—and, in fact, the explanatory power of occupation in accounting for wage differences across workers has significantly increased over time; (5) recent technological developments and recent trends in offshoring and outsourcing appear to have directly replaced workers in certain occupations and tasks” (Acemoglu and Autor 2010, p 3).

These observations about the advanced economies are strikingly similar to some of the results about a “middle income trap” in East Asia and Latin America.¹⁴ For instance, Eichengreen, Park, and Shin (2013) conclude that the growth slowdown in Asia’s emerging economies could be due to a shortage of workers with at least a secondary level of education, other things being equal. The authors note that “high-quality” human capital matters more than “low-quality” human capital for avoiding growth slowdowns, and such capital is needed to move up the value chain to high value-added activities like business services. Furthermore, economic slowdowns are less likely in countries where high-tech products account for a large share of exports. The authors conclude that the lack of high-quality human capital helps to explain

¹⁴ There have been different definitions of “middle-income trap.” Aiyar et al. (2013, p. 3) defines the “middle-income trap” as “the phenomenon of hitherto rapidly growing economies stagnating at middle-income levels and failing to graduate into the ranks of high-income countries.”

why Malaysia and Thailand are caught in a middle-income trap, and that the rapid expansion of secondary and tertiary education has helped explain the Republic of Korea's successful transition from middle- to high-income status. Another case in point is Vietnam, where predominantly manual and routine jobs are being replaced with more analytical, interactive, and nonmanual work in which the type of task changes regularly. Workers performing these new jobs are earning more than their peers in traditional jobs (World Bank, 2013a).

Returns beyond the labor market

Besides higher work productivity and earnings, education confers other benefits on an individual, the family and community, and the economy as a whole. Rather than attempt to review the evidence on the many "nonmarket" benefits of education,¹⁵ this section elaborates on only two nonmarket returns to illustrate other benefits of education: better health and improved ability to cope with shocks. These are other development goals, so understanding how education helps achieve them is useful.

Better health. Education's positive effects on health and life expectancy happen through several channels. Among them is that education facilitates better decision-making in many aspects of life, including where one lives and works, how to access and process health-related information, how to choose appropriate medical care, and how generally to promote good health through nutrition and avoidance of risky behaviors.¹⁶ In turn, better health reduces morbidity and mortality,

¹⁵ See the review by Wolfe and Zuvekas (1995).

¹⁶ Does schooling cause better health or does another factor cause both more schooling and better health? This is a relevant question for the claim we make here. Behrman and Wolfe (1989) examine the issue of causality by study using sibling data from Nicaragua in both fixed and random effect models and conclude that the relationship between women's schooling and better health and nutrition is not due to unobserved or unmeasured factors but instead is causal. Groot and van den Brink (2007) and Arendt (2005) also examine this causality issues for the Netherlands and Denmark, respectively, using different estimation techniques such as instrument variables. Another set of studies that have examined attempted to identify the long-term causal effect of education on health have used compulsory schooling laws as an instrumental variable for schooling (Mazumder, 2008). However, these studies have generally been undertaken for the United States and Europe, since it is important to look across several birth cohorts in order to compare those cohorts before and after the laws and so that sufficient time has passed to be able to observe adult health outcomes.

lowers medical care expenditures and time spent being ill, and raises higher productivity and potential earnings. Groot and van den Brink (2007) calculate that in the Netherlands, which already has high GDP per capita, the implied health returns to education are 1.3–5.8 percent. Brunello et al. (2011) find that, for 12 European countries, one additional year of education reduces self-reported poor health decades later by 7.1 percent for women and 3.1 percent for men, with improved health behaviors (regarding smoking, drinking, and exercising) contributing 23–45 percent of this total effect, depending on gender.

More educated parents also have healthier children, even after controlling for household income. Education increases knowledge about the benefits of vaccination and effective strategies for coping with inadequate public health services, and thus helps reduce the spread of infectious diseases. In fact, Gakidou et al. (2010) estimate that, of the 8.2 million fewer deaths of children aged five years and below between 1970 and 2009, one half can be attributed to the global increase in the schooling of women of reproductive age. They conclude that a child whose mother can read is 50 percent more likely to live past age five.

Coping with natural and economic shocks. Households with more education cope better with shocks than less educated households, other things being equal. They tend to have more resources and knowledge, which help them assess potential risks in a wide range of areas (Toya and Skidmore, 2005). Educated households also cope better with income fluctuations or natural disasters and exploit new economic opportunities. For example, Blankespoor et al. (2010) find that women’s education appears to reduce families’ vulnerability to weather-related disasters. Comparing countries with similar income and weather conditions, those countries with better-educated female populations cope better with extreme weather events than countries with low levels of female education. Education has also helped support El Salvador’s economy, despite a drought, Hurricane Mitch, and declines in global crop prices, which created enormous income fluctuations, as discussed by Rodríguez-Meza, Southgate, and Gonzalez-Vega (2004). The authors find that, controlling for household characteristics such as physical assets and household size, the average years of schooling of employed members of rural households is associated with higher income levels. Frankenberg, Smith, and Thomas (2003) and Corbacho, Garcia-Escribano, and

Inchauste (2007) find that households with more education in Indonesia and Argentina, respectively, fared better than households with less education during these countries' macroeconomic crises.

Beyond cognitive skills

Bowles et al. (2001) find that introducing a measure of cognitive performance into an earnings equation reduces the coefficient of years of education by an average of 18 percent, but conclude that much of this return to schooling reflects forces that cognitive tests do not capture. Learning outcomes have been typically measured in terms of reading and numeracy skills, but these are a very limited set of cognitive skills. Specific technical or vocational skills related to an occupation can expand opportunities in the labor market, and communication, teamwork, critical thinking, and problem-solving skills are undeniably useful for people to function well at home, in their communities, and at work. But there is now a growing body of evidence from multiple disciplines (psychology, behavioral economics, and neuroscience) that identifies aspects of a person's personality also as important predictors of academic performance and later success in life. These aspects of personality are frequently referred to as "noncognitive" skills. Just as the research on cognitive ability has identified different types of intelligences and how they affect behaviors and activities, the research on personality also has identified specific traits that are more closely related to those behaviors and activities.

Of the different aspects of personality, there is prevalent support for perseverance (or grit) as invaluable to academic and labor market success. Grit, defined as the tendency to be organized, responsible, hardworking, and focused on pursuing long-term goals with sustained zeal, has been shown to be a robust predictor of achievement in academic, vocational, and avocational domains (Duckworth et al., 2007; Duckworth et al., 2012; Von Culin, Tsukayama, and Duckworth, 2014). Evidence indicates that, as early as eighth grade, one is able to predict who will complete more education: 39.1 percent of students who spend only one hour a week on homework complete some form of post-secondary education program, compared to 65.2 percent of those who spend seven or more hours a week on homework (Deke and Haimson, 2006).

In fact, it appears that noncognitive skills may be more important than intelligence. In the United States, Heckman, Stixrud, and Urzua (2006) find that increasing a student's noncognitive ability over the same decile range as cognitive ability has a greater effect on lowering attrition from high school and increasing transition to college than increasing cognitive ability over the same decile range. This impact of personality traits also seems larger at higher education levels. But even when controlling for socioeconomic background and demographic characteristics, which are the more traditional predictors of academic success, a student's noncognitive skills, such as commitment, self-efficacy, and achievement motivation, are positively related to school continuation rates (and therefore completed level) and academic excellence.

Noncognitive skills are receiving greater attention among researchers to explain labor market success. In the workplace, self-esteem, generalized self-efficacy, locus of control, and emotional stability are among the best predictors of job performance and job satisfaction (Judge and Bono, 2001). Murnane et al. (2000), using two longitudinal data sets with earnings information for workers in the United States, find that cognitive skills affect earnings but that the effect of those skills is modest, concluding that other factors—including personality traits—may explain much of the variation in earnings. In yet another study on the United States, “employers of new college graduates report that communications skills, motivation/initiative, teamwork skills, and leadership skills are all more highly valued than academic achievement or grade point average” (Kuhn and Weinberger, 2005). In Sweden, personality skills seem to have a much stronger effect on labor earnings for low-income workers than do cognitive skills, in part because the personality skills influence the duration of unemployment for those who become unemployed, whereas cognitive skills do not (Lindqvist and Vestman, 2011). Finally, in Vietnam, employers report that they expect a mix of high-quality cognitive, behavioral, and technical skills in their workers, similar to employers in more advanced middle- and high-income economies (World Bank, 2013a). Next to job-specific technical skills, team work and problem-solving skills are considered important behavioral and cognitive skills for blue collar workers. For white collar workers, employers expect critical thinkers who can solve problems and communicate well.

In sum, education systems face the complex challenges of building cognitive skills. These challenges include increasing enrollment and years of education, and fostering the development of noncognitive skills that will help students achieve success in the labor market and in life generally (King and Rogers, 2014). How then can an education system improve the capacity of school heads and teachers to enhance students' cognitive abilities and different personality traits? How can it promote academic excellence without stifling creativity? How can it ensure an enabling environment in educational institutions to promote both? These are tough questions for national policy makers and local stakeholders alike.

3. Education in Central American Countries

The global education community has much to celebrate. The rapid educational expansion across countries over the past decades has tripled the average years of schooling of an adult in just two generations, and in developing countries the enrollment rates of school-age children and youth continue to rise. Progress in enrollment and completion rates over the years has narrowed gaps in years of schooling across countries, although significant gaps in cognitive achievement persist. We are able to track aspects of educational progress over time because time-series data on years of schooling are available for many more countries, but not so data on cognitive achievement and even less for noncognitive skills. In this section, we first discuss patterns and trends in Central America, and then review studies that have analyzed education in the region.

Educational progress in Central America

Central American countries have been part of the remarkable global increase in enrollment rates and completed years of schooling. Three indicators illustrate this (table 3).¹⁷

¹⁷ A word here about the comparability of data across countries might be helpful. The enrollment data we cite are generally from UNESCO, as made available through the World Bank's EdStats website. Researchers have used alternative sources of enrollment and completed rates because of specific measurement issues related to administrative data. For example, Urquiola and Calderon (2006) compare schooling information collected directly from households through an extensive set of household surveys assembled by the Inter-

Table 3. Basic Education Indicators, Central American Countries, 1999–2012/13

Country/ region	Persistence to last primary grade			Secondary net enrollment rate			Tertiary gross enrollment rate		
	Mean 1999– 2001	Mean 2004– 06	Mean 2009–12	Mean 1999– 2001	Mean 2004–06	Mean 2009–12	Mean 1999– 2001	Mean 2004–06	Mean 2009– 12
Costa Rica	89.17	85.96	89.43	n.a.	n.a.	73.13	n.a.	25.56	45.60
Cuba	95.83	96.84	95.89	79.17	84.65	85.13	22.53	67.18	88.13
Dominican Republic	70.59	n.a.	77.00	39.36	50.37	61.71	n.a.	n.a.	n.a.
El Salvador	63.93	68.07	84.80	44.77	52.03	58.35	20.60	21.15	24.08
Guatemala	54.22	62.83	69.46	26.99	n.a.	44.83	n.a.	n.a.	n.a.
Honduras	n.a.	80.96	74.72	n.a.	n.a.	n.a.	14.89	17.06	20.48
Nicaragua	53.87	48.29		35.66	42.46	45.44	n.a.	n.a.	n.a.
Panama	88.13	85.30	93.07	58.50	61.23	67.18	39.93	42.61	42.91
Central America	73.68	75.46	83.48	41.06	51.52	55.50	25.14	26.94	29.16
South America	82.70	85.99	86.87	55.60	62.69	73.28	30.96	38.75	53.76

Source: UNESCO data from the World Bank EdStats database.

<http://datatopics.worldbank.org/education>.

Note: Means for Central America and South America are unweighted averages across countries. n.a. = Not available.

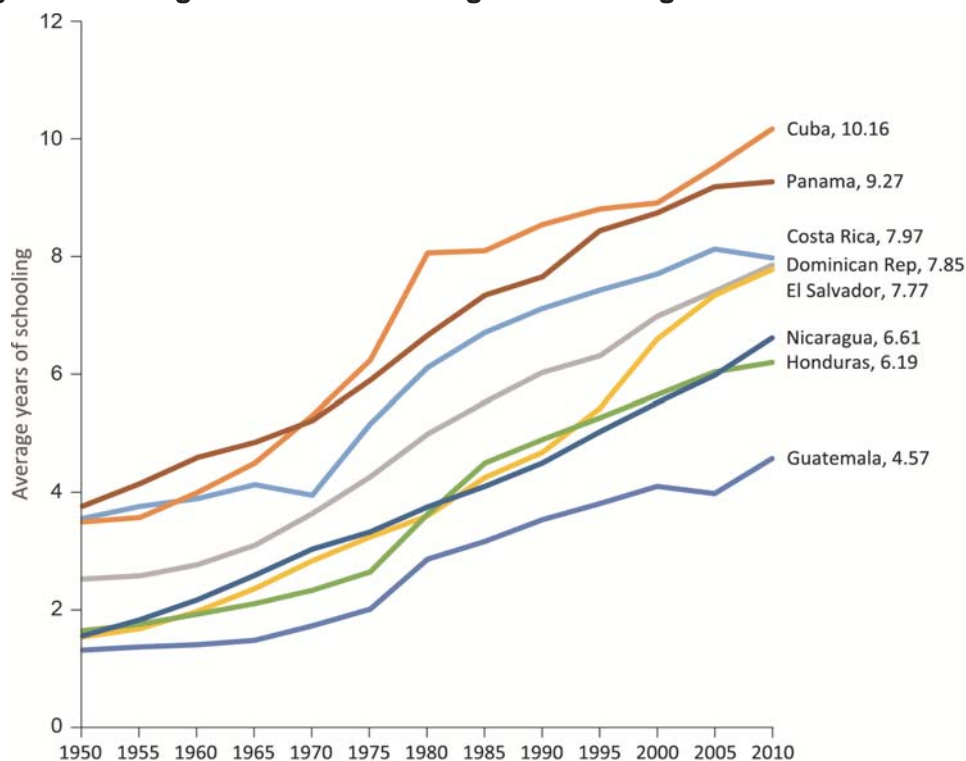
American Development Bank. As they point out, there are different reasons why education numbers may differ. “First, countries’ definitions of primary education vary (e.g. grades 1–5 vs. grades 1–8; ages 7–11 vs. ages 6–13) ... this alone can cause otherwise identical performers to be placed rather differently in aggregate comparisons. ... Second, enrollment ratios are often measured using different sources of data within each country. For instance, the numerator may come from administrative information, while the denominators may be calculated using population estimates generated from census data. This can easily result in enrollment ratios in excess of 100 percent, even if there is no misreporting. For instance, if children transfer between schools during the academic year, they might be counted twice in administrative data, but only once in the population estimate” (p. 575). Taking these issues into consideration and using information about differences in normative age of entry, grade repetition and dropout, the authors are able to come up with a measure of effectiveness of the school system—the gap between average years in school and average years of schooling. Using the household survey data, they conclude that in terms of enrollment the best performers are Argentina, Chile, the Dominican Republic, Jamaica, Panama, and Uruguay, but within this group, Jamaica and the Dominican Republic perform worst in “turning children’s contact with the school system into years of schooling.” At the other end, El Salvador, Guatemala, Haiti, Honduras, and Nicaragua do worst in enrollment, but given student attendance patterns, El Salvador does as well as Argentina, Chile, Panama, or Uruguay, and Nicaragua does as poorly as the Dominican Republic.

The first indicator, the persistence rate in primary education, is the proportion of students who enter the primary level and ultimately reach the last year of the primary cycle. This proportion increased significantly over the past decade, especially in the Dominican Republic, El Salvador, Guatemala, and Panama. The second indicator, the net enrollment rate in secondary education, shows dramatic increases in Central America, although these numbers remain markedly lower than the average enrollment rate in South America. Excluding Costa Rica and Cuba, which report rates similar to those in South America, the average secondary net enrollment rate in Central America is 56 percent, compared with 73 percent in South America. Lastly, focusing on tertiary education, the average gross enrollment rate, again excluding Costa Rica and Cuba, is 29 percent, compared with 54 percent for South America, 46 percent in Costa Rica, and 88 percent in Cuba. Overall, with the exception of Costa Rica and Cuba, Central American countries lag behind South American countries by about a decade with respect to enrollment rates in secondary and tertiary education. However, with higher shares of students persisting through the end of the primary cycle in all the countries, higher enrollment rates at the secondary level look promising.

As a result of the expansion in enrollments, average completed years of schooling in Central America have been rising for all countries; but there has been some divergence among the countries as a few of them have accelerated their progress (figure 2). According to Barro-Lee estimates for 2010¹⁸ the average completed schooling in Cuba for adults aged 15 and older has reached 10.2 years, up from 3.6 years in 1950. In contrast, the 2010 level in Guatemala was only 4.6 years, up from 1.4 years in 1950. El Salvador is noteworthy because it has overtaken both Honduras and Nicaragua within the past two decades.

¹⁸ Data are available from the World Bank EdStats database, <http://datatopics.worldbank.org/education/>.

Figure 2. Average Years of Schooling for Adults Aged 15 Years and Older



Source: Barro-Lee data from the World Bank EdStats database:
<http://datatopics.worldbank.org/education/>.

Most countries in Latin America have been participating in regional and/or international standardized tests. The *Laboratorio Latinoamericano de Evaluación de la Calidad de la Educación* (LLECE)¹⁹ tests have been applied thrice over the past decade and a half—in 1997, 2006 and 2013. In addition, several South American countries (plus Costa Rica) have participated in the Programme for International Student Assessment (PISA) tests since 2000. These assessments measure the level of basic cognitive skills that students have acquired by grade six in the case of LLECE and by age 15 in the case of PISA.²⁰

¹⁹ LLECE is the network of quality assessment systems for education in Latin America. It is coordinated by UNESCO's Regional Bureau for Education in Latin America and the Caribbean with headquarters in Santiago, Chile.

²⁰ Most of these countries have not participated in other international tests such as the Trends in International Mathematics and Science Study (TIMSS), the Progress in International Reading Literacy Study (PIRLS), or the Programme for the International Assessment of Adult Competencies (PIAAC).

Table 4. Regional Education Quality Test Scores as a Percentage of Argentina's Scores, 2006 and 2013

Region/country	Reading		Math		Science	
	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Costa Rica	111.20	107.26	107.08	100.94	n.a.	n.a.
Dominican Republic	83.22	89.65	81.02	82.39	87.23	88.52
Guatemala	89.14	96.16	88.85	92.03	n.a.	n.a.
Honduras	n.a.	94.22	n.a.	90.49	n.a.	n.a.
Nicaragua	93.38	94.18	89.26	87.19	n.a.	n.a.
Panama	93.21	94.90	88.03	87.03	96.69	94.77
Central America	94.03	96.06	90.84	90.01	91.96	91.64
Central America, excluding Costa Rica	89.74	93.82	86.79	87.83	91.96	91.64
South America, excluding Argentina	99.53	101.57	98.61	100.03	100.86	99.68

Sources: SERCE (2006); TERCE (2013).

Note: UNESCO's Second Regional Comparative and Explanatory Study (SERCE) was conducted in 2006; UNESCO's Third Regional Comparative and Explanatory Study (TERCE) was conducted in 2013. Not many countries participated in the First Regional Comparative and Explicative Study (PERCE) in 1997. As the reference country, Argentina's values are 100; countries that exceed 100 have done better than Argentina. The regional averages are unweighted means; countries that did not participate in a test are omitted from the average for that year. n.a. = Not available.

Instead of showing student test scores, table 4 presents each country's average LLECE scores in reading, math, and science as a percentage of Argentina's average scores. Estimating relative scores obviates concerns about the strict comparability of the tests from year to year. While Argentina is not the best performer in Latin America, it has participated in the three subject tests in the three LLECE applications, as well as in the PISA tests since 2000, and thus can serve as a reference country in the region for both assessments. Since few countries in Central America participated in the 1997 LLECE, table 4 focuses on the 2006 and 2013 results of UNESCO's Regional Comparative and Explanatory Studies (SERCE and TERCE).²¹

²¹ UNESCO has conducted three Regional Comparative and Explanatory Studies. Not many countries participated in the First Regional Comparative and Explicative Study (PERCE) in 1997. The Second Regional Comparative and Explanatory Study (SERCE) was

Table 5 shows that Central American countries perform below Argentina—with the exception of Costa Rica, which performs better than Argentina in reading comprehension and math tests. For example, in the 2006 and 2013 math tests, on average the students in the Dominican Republic performed at 81 and 82 percent, respectively, of the average performance of students in Argentina. However, between 2006 and 2013, these countries improved relative to Argentina, on average, especially in reading comprehension. Since Argentina’s own scores have increased, the improvement in the relative scores in Central America is indeed good news.

Table 5. Simulated PISA Scores in Central America and East Asia as Percentage of the Republic of Korea's Scores, 2006 and 2012

Region/country	Reading		Math		Science	
	2006	2012	2006	2012	2006	2012
Costa Rica	74.80	82.28	74.58	73.47	n.a.	79.74
Dominican Republic	55.98	66.23	56.43	57.70	65.34	66.80
Guatemala	59.96	71.04	61.88	64.46	n.a.	n.a.
Honduras	n.a.	69.61	n.a.	63.37	n.a.	n.a.
Nicaragua	62.81	69.58	62.17	61.06	n.a.	n.a.
Panama	62.70	70.11	61.31	60.96	72.42	71.52
Central America	63.25	71.48	63.28	63.50	68.88	72.69
South America	68.65	74.97	69.43	69.73	76.45	74.98
East Asia advanced, excluding the Republic of Korea	91.49	100.90	97.20	101.37	101.15	102.38
East Asia emerging economies	n.a.	81.34	n.a.	78.25	n.a.	82.43

Sources: LLECE for 2006 and 2013 scores; PISA for 2006 and 2012 scores.

Note: As the reference country, Korea's values are 100; countries that exceed 100 have done better than Korea. The regional averages are unweighted means; countries that did not participate in a test are omitted from the average for that year. Simulated PISA scores are obtained only for countries that participated in the LLECE tests in corresponding years, because this simple simulation uses the scores of each country relative to Argentina's scores in LLECE and then Argentina's scores in PISA relative to Korea's scores. In Central America, only Costa Rica participated in PISA and only in 2012, so those scores are actual scores relative to Korea's. n.a. = Not available.

conducted in 2006. The Third Regional Comparative and Explanatory Study (TERCE) was conducted in 2013.

We next compare student performance in Central America with the emerging economies of East Asia. This comparison is not straightforward because Central American countries do not participate in international tests, excepting Costa Rica in the most recent PISA and El Salvador in the TIMSS. To make the comparison, we use the relative standing of Argentina in the PISA tests in order to impute relative scores for Central American countries, had they participated in PISA.²² Since our aim is to compare Central America with East Asia, table 5 provides the country comparisons relative to Korea. Costa Rica, the best-performing country in Central America, averages about 82 percent in reading, 74 percent in math, and 80 percent in science of Korea's corresponding average scores in 2012. The rest of Central America averages about 70 percent of Korea's scores in both reading comprehension and science and about 60 percent in math. The comparable numbers for the emerging countries in East Asia (Indonesia, Malaysia, Thailand, and Vietnam) are 81 percent in reading comprehension, 78 percent in math, and 82 percent in science. In other words, compared with the emerging economies of East Asia, Central American countries, except for Costa Rica, fall far behind with respect to student test scores.

In a word, the current obvious educational challenge in Central America is learning. We turn next to the factors that help explain the lagging completion rates and lower quality of education in Central America. We review numerous published studies on Central America that cover the past two decades and draw heavily from their data analyses. Later in the paper (section 4), we discuss findings for other parts of the world, with a focus on advanced countries and East Asia.

Determinants of schooling

The basic model of demand for schooling postulates that an individual or the family of a child makes education decisions by comparing the discounted costs of schooling against the discounted value of anticipated returns in the future. According to this conceptual model, an individual

²² Using this approach, we could have imputed also the test scores of East Asian countries if their students had been able to take the LLECE tests. The relative standing of the countries would be the same for both imputations.

remains in school until the discounted (perceived) returns are equal to the costs of schooling. Costs include any out-of-pocket expenses and the opportunity cost of school attendance; private returns include labor market earnings and a range of nonmarket benefits associated with more education. Wealthier families are better able to afford the costs, so controlling for taste or preference for schooling and future returns, their children are likely to complete more years in school as well as attend better schools. In settings where nearly half of school-age children do not enter school, the most important schooling decision may be whether a child enrolls in school and attends classes regularly. In contexts where a large majority of children already attend school, enrollment may not be an adequate measure of educational progress; instead, dropout behavior, transition to higher levels of schooling, graduation rates, and indicators of learning would be better measures (Orazem and King 2007). Future returns will also differ across households and individuals, with children from wealthier, urban, nonindigenous families and more educated parents likely to be expecting brighter futures. The following review of past studies highlights the findings with respect to the elements of this conceptual framework.

Household income. The literature on the schooling of children in developing countries has emphasized the role of family income constraints and parents' education in explaining differences in school attainment (Glewwe, 2002). The relationship between household income and schooling investment has long been established and manifests in several ways. We have already mentioned the importance of remittances from emigrants as a source of household income. Several studies, for instance, have shown this to be the case in El Salvador. Acosta (2011) finds that girls and boys (less than 14 years old) in remittance-recipient households are more likely to be enrolled in school than those in nonrecipient households, controlling for household wealth. Edwards and Ureta (2003) find that remittances have a large negative impact on the probability of dropping out of school. In urban areas remittances have at least 10 times the effect of other sources of family income, while in rural areas remittances have 2.6 times the effect of other income.²³

²³ An older study by Funkhouser (1995) finds that emigrants from El Salvador are twice as likely to remit to households compared to emigrants from Nicaragua. And the Salvadoran

Ratha (2009) also finds that the children in remittance-recipient households are more likely to attend private schools. Indeed, as remittances have been an important source of household income, one of the short-run effects of the global crisis which decreased flows of remittances from abroad, has been to reduce school attendance. Young adolescents have increased their job-seeking and employment activities instead (Duryea and Morales, 2011).

The effect of household income on schooling is demonstrated also by how much government cash transfer programs have influenced school enrollment and attendance, although the impacts of these programs have been found to be larger when conditions are imposed on the households. Nicaragua's Social Safety Net (Red de Protección Social, RPS) program, for example, pays households cash in exchange for school attendance and regular visits to health clinics by children. This program has had significant impact on schooling activities in the program households (Gitter and Barham 2008; Thomas, 2012).²⁴ In Costa Rica's Superémonos program, households receive coupons worth about US\$30 per month, redeemable for food in supermarkets, if their children regularly attend school (Duryea and Morrison, 2004). Among children aged 12 to 15, the program has increased school attendance, adding 5.0 percentage points in 2001 and 8.7 percentage points in 2002; but the program does not appear to have affected pass rates or child labor. There have been evaluations of similar cash transfer programs in other parts of Latin America, including Mexico's conditional cash transfer program PROGRESA (now Oportunidades), which is both well-known and well-evaluated.²⁵

emigrants are likely to remit approximately double their Nicaraguan counterparts. In El Salvador, education is negatively correlated with the probability of remitting, but of those who remit, the educated are more likely to remit more. In Managua, education is negatively related to decision to remit, but positively related to the level of remittances to households. Bollard et al. (2011) find that, in general, the more educated remit more.

²⁴ A key feature of the program is that the payments go to the female head of household, with the expectation that women tend to allocate more of their household resources to children than men. However, there is no evidence that directing the payments to the female head alters the program impact on school enrollment.

²⁵ Using the randomized design of the Mexico program, Schultz (2004) estimates that, at the primary level, its average effect has been to increase girls' enrollment rates by 0.92 percentage points and boys' by 0.80 percentage points, from the initial 94 percent. At the

In many studies, parents' education is typically used as a proxy measure for household income; this factor could be capturing also parents' preference for formal schooling, their own ability, and their access to information generally. Rosati and Rossi (2003) find a significant effect of parents' education on school enrollment in Nicaragua, with higher marginal effects for mother's education than for father's education.²⁶ McEwan and Marshall (2004) find that in explaining differences in student academic achievement between Cuba and Mexico, socioeconomic status, as measured by parents' education, is a strong and consistent determinant of academic achievement, accounting for 3–12 percent of the achievement gap between the two countries.

Considering the high migration rates in Central American countries, however, parents may be absent. Thus, parents' education may have a weaker impact unless it works through determining the level of remittances or how remittances are spent. According to Arends-Kuenning and Duryea (2006), one fifth of adolescents in Brazil, Ecuador, Nicaragua, and Panama live in single-mother families and four percent live in single-father families. Those who live in single-mother families have significantly lower school attendance and attainment than adolescents who live with both parents.

secondary school level, the effects have been larger—9.2 percentage points for girls and 6.2 percentage points for boys, from their initial levels of 67 and 73 percent, respectively. Behrman et al. (2001) find lower grade repetition, higher grade-to-grade progression, and children aged 9–12 when the program began achieve an additional completed grade of schooling. A benefit-cost analysis shows that the benefits (measured in terms of future simulated earnings) substantially exceed the costs of the transfers (Behrman, Parker, and Todd, 2011). In addition to confirming the attendance effects, Skoufias and Parker (2001) also find a significant decrease in the percentage of secondary students working. In the case of Ecuador's program called *Bono de Desarrollo Humano* (BDH) which began in 2003 and targets the poorest 40 percent of families with children, the program increased school attendance from 75 to 85 percent and decreased child labor by 17 percent among the poorest group, while among the less impoverished group, school attendance remain unchanged at 85 percent (Oosterbeek et al., 2008). In Colombia, the *Familias en Accion* program increased high school graduation rates by 4–8 percentage points for youth participating for 1–7 years in the program, but did not improve standardized achievement tests taken at the end of high school, at least for students who were already in school (Baez and Camacho, 2011).

²⁶ Earlier work by Behrman and Wolfe (1989) for Nicaragua yielded also a significant effect of parents' education.

Future returns to education. Not many studies directly test the feedback effect of future returns to education on schooling decisions. For this reason, the experimental study by Jensen (2010) provides very useful information. The pre-intervention data indicated that, on average, eighth-grade boys in the Dominican Republic significantly underestimate the returns to secondary education; 42 percent expected that there would be no difference in their future earnings if they completed only primary school, while 12 percent expected higher returns. The boys in the treatment group were then provided information on the actual increases in earnings for workers with more years of education. The information increased the perceived returns of the treatment group by 28 percent and these boys completed, on average, 0.20–0.35 more years of school over the next four years than those who did not receive the information. Underestimating returns to education perhaps explains why, in 2012, the persistence rate for boys in the Dominican Republic at the primary level was 76 percent, but their net enrollment rate at the secondary level was 20 percentage points lower. Since the dissemination of information about returns is relatively inexpensive, as Jensen’s study suggests, this seems a cost-effective way of getting adolescent boys to stay in school longer.

Indeed, foregone labor earnings have been shown to deter school attendance when the cost-benefit calculus of the opportunity cost of time spent in school exceeds perceived future returns to that time. In Nicaragua, a large percentage of students combine schooling with work, despite the fact that combining these activities decreases the probability that they will complete primary school by over 20 percentage points, and that working over three hours a day eventually shortens their completed schooling by 27 percent (Zabaleta, 2011). In rural Honduras, students drop out of school for several months during the harvest season, only to return the following year (Bedi and Marshall, 2002). This suggests that school attendance for young people in low-income, rural households is the result of a difficult calculus involving the expected benefits from attending school on a given day versus the associated costs of doing so—a struggle between earning income today and maybe earning more tomorrow.

School supply and inputs. The most common government intervention in education is the direct provision of public education.

Previous studies have examined the effect of school supply—as measured by the availability of a school in the community, the distance to the school, or whether the school is a public or private one—on school enrollment and attendance, especially at the primary level (Filmer, 2004). In the case of Honduras, the travel time to school is negatively associated with school attendance in the lower grades, but this effect is not statistically significant, probably reflecting the fact that most children do not live far from a school (Bedi and Marshall 2002). In many studies, one or more measures of school quality, usually defined as instructional materials, also have been shown to explain variation in attendance or enrollment, controlling for other household, school, and community factors. But these inputs are less effective when not accompanied by complementary programs, such as teacher training or curriculum reform (McEwan and Marshall, 2004; McEwan, 2014).

Several countries in Central America experienced long years of civil conflict, which left wide-scale destruction of school buildings.²⁷ In the wake of those conflicts, the governments launched programs to rebuild schools and establish new ones rapidly. To do so, they combined infrastructure programs with school-management reforms that transferred to local stakeholders some authority over how the schools are staffed, administered, and monitored. These governance reforms devolved decision-making regarding teacher hiring and other administrative matters to community groups that might include parents and students and/or school councils. The key idea behind these reforms is that greater participation by local actors who have a vested interest in improving the quality of schools can support and complement government efforts. Increasing the information available to local stakeholders provides them a tool to hold each other accountable, and devolving some decision-making authority to them shifts the relative power of the different stakeholders to influence schools (Bruns, Filmer, and Patrinos, 2011).

El Salvador, Guatemala, Honduras, and Nicaragua have all implemented profound school management reforms, particularly in

²⁷ Chamarbagwala and Morán (2011) examine the impact of the three periods of the civil conflict on schooling and found that the two most disadvantaged groups, namely rural Mayan males and females, were the most adversely affected with respect to their education.

rural areas.²⁸ We discuss these reforms in greater detail later in this section because the evaluations of those reforms have focused more on their impact on student performance than on enrollment. With respect to school enrollment and attendance, those evaluations have concluded that monitoring by the local community and greater accountability by school actors appear to have reduced student absenteeism (Jimenez and Sawada, 1999, in El Salvador; Bedi and Marshall, 2002, in Honduras), lowered dropout rates (Di Gropello and Marshall, 2011, in Honduras) and increased continuation rates (King and Ozler, 2000, in Nicaragua; Jimenez and Sawada, 2003, in El Salvador). In El Salvador, Jimenez and Sawada (2003) estimate that the Educación con Participación de la Comunidad (popularly known as EDUCO) program, at the margin, has increased the probability that a student will continue in school by 19 percent.

Disadvantaged groups. An important point to add here pertains to education gaps between urban and rural populations and between indigenous and nonindigenous population in Central American countries. These gaps are due to unequal incomes and wealth, but income transfers alone will not necessarily close those gaps, at least in the short term. For example, although most rural students in Guatemala have access to primary school, there are large differences in the levels of learning across the country. Much of those differences are due to attending schools that have inadequate resources, capacity, and authority to monitor and enforce fundamental educational issues, especially in marginal communities (Meade, 2012).

²⁸ Other countries in Latin America also instituted school-based management reforms, among them, Argentina and Mexico. For example, in 2001, Mexico launched its Quality Schools Program which gave schools greater autonomy as well as annual grants to finance school improvement plans. The program required that parents' associations must be involved in the design, implementation and monitoring of the school plan (Skoufias and Shapiro 2006). In an evaluation of the program, Skoufias and Shapiro (2006) find that the PEC decreases dropout by 0.24 percentage points, failure by 0.24 percentage points, and repetition by 0.31 percentage points—an economically small but statistically significant impact. In an evaluation of another program (AGE), Gertler, Patrinos, and Rubio-Codina (2012) find that financing and motivating parents' associations had a significant effect in decreasing failure by 7.4 percent and grade repetition by 5.5 percent but not dropout rates. AGE was effective in poor communities, but not in extremely poor communities.

The share of indigenous peoples in national populations ranges from one percent in Honduras (data from 1988) to 42 percent in Guatemala (data from 1994), according to Hall and Patrinos (2006).²⁹ Indigenous peoples in the region are more likely to reside in rural areas, be poor, and have less schooling than nonindigenous peoples. Combined with rural-urban differences, the education gap between indigenous and nonindigenous populations is substantial. In Guatemala, in 2000, 74 percent of indigenous households were estimated to be either poor or extremely poor, nearly double that of nonindigenous households. While two-thirds of nonindigenous children aged 10–12 years were enrolled in primary school, only about half of the indigenous children aged 10–12 years were enrolled. The enrollment rate of indigenous children has been catching up to that of nonindigenous children, but indigenous students are more likely to repeat grades and dropout at the primary level without achieving literacy. For instance, the dropout rate for the first grade was 44 percent in 2000, compared with 31 percent for nonindigenous students. These differences show up years later as a gap of about three years in the average years of schooling of adults (Shapiro, 2006; Patrinos and Velez, 2009).

Furthermore, indigenous students score less on standardized tests than nonindigenous students. According to McEwan and Trowbridge (2007), the achievement gap ranges between 0.8 and 1 standard deviation in Spanish, and approximately half that in mathematics. A decomposition of this gap indicates that only a relatively small portion of the achievement gap is explained by socioeconomic differences, implying that changes in income, for example, would not close this gap. What would?

One solution could be bilingual education. Among the indigenous communities in Latin America, the proportion of those groups that speak its native languages ranges from 35 percent to 96 percent. In Guatemala, language skills are very important; it is a country with many languages (at least 25), but where Spanish is the language of business so knowing Spanish is desirable to improve access to jobs and higher wages.

²⁹ There are three basic ways of defining indigenous peoples—through self-identification, language use and geographical location (Hall and Patrinos, 2006). In Guatemala, in 2000, 39 percent of the population identified themselves as indigenous (Shapiro, 2006).

Bilingual education is available for only the first four years of schooling, and beyond that, students enroll in regular, Spanish-only schools. The government instituted the use of the Mayan language in primary education and a national bilingual education program (PRONEBI) was created. In addition to bilingual instruction, the program provides teachers the training and the teaching materials they need. Compared to a control group of Mayan children taught only in Spanish, the program has increased student comprehension and reduced failure, repetition, and dropout rates. Program evaluations report that parents support bilingual education as long as it leads to fluency in the Spanish language (Patrinos and Velez, 2009).

Factors contributing to academic achievement

Supply factors. We have discussed the factors that appear to explain progress in enrollments and years of schooling. The global literature on the determinants of student achievement, typically measured by how students perform on tests, focuses on the impact of family background and school characteristics such as teacher background, class size, per-pupil expenditures, and learning materials. There is some debate in the education and economic literature about how well these factors really determine student performance. But it appears that for developing countries where infrastructure and learning materials are in short supply or of low quality, these school inputs have a robust positive effect not only on enrollment but also on student performance.³⁰ Murillo and Román (2011) conclude that in Latin America the availability of basic infrastructure and services (water, electricity, sewage), didactic facilities (sports facilities, labs, libraries), as well as the number of books in the library and computers in schools, have had a positive effect on the SERCE test scores of primary students, but that the size of the effect varies significantly across 15 countries. In Honduras, improving provision in schools by one standard deviation increases student performance and, ultimately, earnings by 3–5.6 percent (Bedi and Edwards, 2000). Furthermore, a one standard deviation decrease in

³⁰ Possible reasons include the facts that measures of school inputs may be reflecting community characteristics that are unrelated to the schools themselves and that many of the commonly-used measures of school quality, such as pupil-teacher ratio or textbooks per pupil, are quite crude.

classroom crowding (measured by the student-teacher ratio) increases future earnings by 2.7–4.5 percent, implying an elasticity of earnings with respect to classroom crowding of 0.17–0.23.

In their comparative study of Cuba and Mexico, McEwan and Marshall (2004) conclude, however, that no more than 30 percent of the difference in test scores between the two countries (1.3 standard deviations higher for Cuban than Mexican students) is explained by differences in family, peer, and school variables, and that of these factors, it is peer and family effects that explain the largest portion of the gap, not school variables. Their findings echo the conclusions of recent reviews of numerous studies (Glewwe, 2002; Glewwe and Kremer, 2006; Bruns, Filmer and Patrinos, 2011; McEwan, 2012).³¹ The bottom line is that when it comes to improving student performance, simply raising spending per-pupil is neither sufficient nor necessary.

Teachers. The topic of teachers deserve special attention because teachers and teaching determine how much children learn in the classroom. Bruns and Luque's (2014) excellent book on teachers in Latin America reviews a large literature on this and identifies the key characteristics and performance of teachers in the region.

- Teachers in the region are mostly female, with relatively low socioeconomic status. About 75 percent of them are women and typically come from poorer households than the overall pool of university students. The teaching force is also older, with the average teacher being more than 40 years old in Peru, Panama, and Uruguay, and 35 years old in Honduras and Nicaragua, the countries with the youngest teachers, on average.
- They have high levels of formal education, but have weak cognitive skills. In 10 Latin American countries for which comparable household survey data are available, the formal

³¹ Altonji and Dunn (1996) estimate the relationship between measures of school quality and wages in the United States, with indicators of school quality instrumenting for schooling choice. They find that higher school quality, as measured by spending per pupil, average teacher salaries, or a composite index, raises the return to education. In particular, increases in teacher's salary and expenditures per pupil equal to the interquartile range for these variables leads to wage increases of 10.6 percent and 5.6 percent, respectively, for a student who leaves school after high school.

educational level of teachers is higher than for all other professional and technical workers. However, other data indicate that they tend to be academically weaker than the overall pool of higher education students. This state of affairs affects teachers' ability to impart subject matter content.

- They earn relatively low salaries, but work fewer hours per week. Teachers earn between 10 and 50 percent less in 2010 than do other “equivalent” professional workers. But since teachers work significantly fewer hours—30–40 hours per week on average, compared with 40–50 hours per week for other professional, technical, and office workers—salaries adjusted for working hours are actually higher. Teachers have longer vacations too, as well as relatively generous health and pension benefits. In Mexico, Honduras, and El Salvador, the hours-adjusted salaries of teachers are 20–30 percent more than comparable professional and technical workers; in Costa Rica, Uruguay, and Chile, they earn about the same as other professional workers; and in Peru, Panama, Brazil, and Nicaragua, they earn 10–25 percent less.
- They have a flat salary trajectory. Teachers' entry salaries are on par with other professional and technical workers in many countries, but rise very slowly, while other workers earn more as their experience increases. There is also little wage differentiation across education background compared with other sectors; hence, irrespective of individual skills, talent, experience, and performance, landing a job in teaching guarantees a salary within a relatively narrow band, with little risk of a very low or declining wage, and little chance of a high one.
- They enjoy job stability. Labor force data show that teaching offers stable employment. Women who graduated from teacher education over the past 40 years are significantly more likely to have been employed and stay employed than women with other degrees.

- They are in excess supply, but not for specialty subjects. Tertiary-level teacher education programs have proliferated over the past 15 years. As a result, 40–50 percent of graduates from teacher training schools will not find work as teachers in Peru, Chile, Costa Rica, Panama, and Uruguay. However, the countries report difficulty finding sufficient teachers for specialty subjects such as secondary school math and science or for bilingual schools in rural areas.

Many researchers have found evidence of a positive relationship between teachers' education, experience, and own cognitive skills and their students' academic performance, but very few of these studies have focused on Central America (McEwan, 2012; Hanushek, Piopiunik, and Wiederhold, 2014). For example, Marshall and Sorto (2012) find that a one standard deviation higher performance by mathematics teachers in rural Guatemala on a fourth-grade math test is correlated with 0.05–0.08 standard deviation higher performance by their students in math.³² These learning gains are relatively small, but average yearly effects accumulate over the educational cycle, potentially adding up to a significant effect. In Honduras, Marshall (2003) finds that teachers' own test scores in math and Spanish have a positive and significant effect on student test scores in these subjects.

Many countries have experimented with variants of performance-based incentives for teachers, with mixed results (Bruns and Luque, 2015). Mizala and Romaguera (2004) review the experience of four countries in Latin America, including El Salvador. El Salvador started a school incentive program in 2000, the *Plan de Estimulos a la Labor Educativa Institucional* (PLAN), a school award system designed to encourage public school teachers to work together to solve the problems affecting their schools and improve the quality of educational services

³² Other studies have found similar results in other countries of Latin America. In Peru, a one standard deviation higher performance by teachers on a sixth-grade math test correlates with 0.09 standard deviation higher math scores for their students, while effects in reading were not significant (Metzler and Woessmann, 2012). A one standard deviation higher test performance by Mexican teachers on the Carrera Magisterial competency test is associated with 0.08 standard deviation higher learning outcomes for students in the case of primary teachers and 0.25 standard deviation higher learning in the case of secondary school teachers (Santibáñez, 2006).

that they offer. The award consists of an annual bonus of US\$228.6 (an increase of 4 percent in average annual salary) for each teacher working at schools that meet objectives previously established by the government. The program emphasizes compliance with legal rules and regulations, such as attendance, punctuality, and registration, but does not examine outputs. In its third year, the program added some measures of results, including dropout and repetition rates. The program experience indicates that the rewards favored urban, multi-teacher schools, located in regions with less poverty. This could be because the award criteria emphasize educational inputs and compliance with rules, rather than outputs. The authors suggest including those criteria that are likely to have a significant impact on student achievement.

Institutional factors. As mentioned above, to recover from the consequences of long civil conflicts, the governments in these countries instituted reforms that combine financial support for schools with a management approach that took into account the limited capacity of central public agencies to administer schools, especially in rural areas, and took advantage of local incentives to improve schools. Not all researchers who have written on these school-based management reforms agree on a positive assessment of their impact. For example, Cuéllar-Marchelli (2003) views the education reform in El Salvador primarily as a “privatization strategy, contracting not-for-profit parents’ associations to administer schools financed by the state, to improve education in rural areas.” The implication of this assessment is that the school-based management reforms have been a means for the government to avoid its responsibility for providing primary education.

Decentralization reforms are, by no means, unique to Central America, but the reforms as applied in Central America have features that reflect the region’s specific governance and economic contexts (Barrera-Osorio, et al., 2009; Bruns, Filmer, and Patrinos, 2011). Below, we describe the country-specific reforms and cite the results from evaluations of the programs on student performance.

- El Salvador first launched its *Educación con Participación de la Comunidad* (popularly known as EDUCO) in the 1980s. The program relied on communities to organize their own schools; it was administered and, in part, financially supported by a

family-based association. In 1991, the Ministry of Education used the same community-based approach to expand school supply in rural areas, with public financing. Elected Community Education Associations (*Asociación Comunal para la Educación* or ACEs), drawn from the parents of students, were contracted legally by the government to deliver a given curriculum to a given number of students and were charged with monitoring teachers' performance, hiring and firing teachers, managing the school's budget, and equipping and maintaining the schools. The ACEs hired teachers on one-year renewable contracts. ACE members visited classrooms more than once a week, on average, nearly 3–4 times more frequently than their traditional counterparts. These weekly visits appear to have lowered student absenteeism, improved student performance on language tests, and raised continuation rates by 19 percentage points (Jimenez and Sawada, 2003). These positive results may have arisen from accompanying changes; for example, compared to non-EDUCO schools, EDUCO schools have fewer school closings, lower teacher absenteeism, more meetings between teachers and parents, and longer teacher work hours (Edwards and Ureta, 2003; Sawada and Ragatz, 2005).

- Guatemala launched its *Programa Nacional de Autogestión para el Desarrollo Educativo* (PRONADE) to rebuild schools using a locally autonomous, community-based approach to school construction and management. The Ministry of Education transferred money for building a new school to an organized rural community that met a set of conditions; these included having an appropriate site for the new school, demonstrating the ability and interest to manage a school, being situated more than three kilometers away from the nearest school, and having a large enough number of students who could benefit from the new school. The program expanded the supply of primary schools and accommodated higher enrollment rates. In addition, there were moderate gains in student achievement in the PRONADE community schools vis-à-vis the public schools because the number of work days in those schools increased.

However, evaluations indicate that these gains were largely offset where teacher content knowledge and pedagogical methods did not also improve (Marshall, 2009).

- Honduras launched its *Programa Hondureño de Educación Comunitaria* (PROHECO) community school program in rural areas. These schools must not be located near another school, and must have a school council that is a legal entity charged with overseeing the budget, selecting and paying teachers, monitoring teachers and student attendance, and building and maintaining school facilities. The community-based council receives funds from the Ministry of Finance. The program schools have better infrastructure and more learning materials than other schools. Comparing PROHECO schools with similar schools in rural areas, PROHECO teachers are less frequently absent because of union participation but more frequently absent because of teacher professional development. They are paid less and have fewer years of experience than comparison teachers, but they teach more hours in an average week, assign more homework, and have smaller classes. The results from standardized tests and extensive information on school, teacher, classroom, and community indicate that PROHECO schools are better able to maximize teacher effort and involve parents in the school, both of which translate into higher levels of student achievement (Di Gropello and Marshall, 2011).
- In contrast to the programs in the three countries above which focused on rural areas from their inception, Nicaragua's *Autonomía Escolar* (School Autonomy) program was aimed initially at urban secondary schools that wanted to have more decision-making power over school matters. To participate in the program, a school must have a school council composed of the school director, teachers, parents, and students, all of whom were either elected or appointed by local officials.³³ These

³³ These governance reforms possess other features. For example, while the Autonomous School Program in Nicaragua transferred decision-making authority to parents, it also had the more controversial feature of raising parents' contributions to school resources. Gershberg and Meade (2005) examined this feature of the reform and found these

councils were given the authority to hire and fire teachers, and the responsibility for maintaining the school facilities and ensuring academic quality. An early evaluation of the program assessed the extent to which decision-making authority was devolved and whether this authority was shared among the members of the school council (Rivarola and Fuller, 1999; King and Ozler, 2000). The authors find significant diversity among the autonomous schools on both counts. In contrast to school directors, many parents and teachers in the autonomous schools reported little change in their ability to participate in or influence decision-making.³⁴ The authors also find that what mattered more for student performance than whether a school took part in the program was what types of decisions were devolved to the school. Specifically, schools that took more decisions about teacher management (such as hiring and firing of teachers, evaluation, supervision, and training) tended to be more successful in increasing student achievement (King and Ozler, 2000).

- The Dominican Republic's *Solidaridad* program gives households US\$75 every three months if they meet certain conditions which include the school enrollment and daily attendance of all children in the household. Beneficiary households receive the

additional contributions to be “significant, highly varied, and correlated with income,” thus, fostering greater inequality among schools. In 2002, the parliament approved the new *Ley de Participación Educativa* (Law of Educational Participation) which gives the reform legal backing after ten years of implementation. The law keeps most aspects of the reform intact, including the school councils, but keeps out of the law the fund-raising aspects, emphasizing that basic education must be free.

³⁴ McNamara (2010) examined the circumstances under which parents participate in decentralized education programs. Using data derived from five newly autonomous schools, the study compares parents' levels of income, education, and community crime rates with their propensity to participate in school councils. Results indicate that parents who live in communities where violence is endemic are much less likely to participate in the school councils. This finding demonstrates why decentralized education programs need “commensurate support mechanisms that encourage marginal households and communities to participate in the new program.” Gershberg (1999) argued for the same: “[P]articipation can play a constructive role in education administration, but it is not an end in itself, nor can it simply be legislated. The time and effort of parents must be treated as any scarce resource and put to its most productive use.”

transfers via a debit card that can be used to purchase basic food products at authorized stores. Created in 2005, the program now covers 90 percent of the extreme poor and 80 percent of the poor. In terms of student enrollment, the Dominican Republic ranks among the best performers in Latin America, but it performs much worse than any country in the region in terms of turning children's enrollment into years of schooling and learning (Urquiola and Calderón, 2006). Thus, the effect of this program on the persistence of children to complete the school cycle and their academic performance would be its most valuable contributions. To date, we have not found the results of a rigorous impact evaluation of the program.

4. Lessons from Outside Central America

Interest in improving the quality of education has grown and intensified in advanced and developing countries alike. One example of this renewed interest is the growing number of evaluations to assess the effectiveness of a wide array of education policies and programs. The previous section on Central America provided just a glimpse of this growing body of research. In the broader literature, the assessed interventions cover a wide variety of initiatives, ranging from giving local stakeholders the authority to manage the public school in their community, to disseminating information about the returns to education to parents and students, to providing cash transfers in exchange for faithful school attendance, and to using performance incentives for teachers. For the purpose of promoting better policies and programs, the effect of these interventions should not only be statistically significant but also economically (or educationally) significant; they should also be cost effective and robust in the sense that they work in a variety of local circumstances and capacities.

Lessons from global meta-reviews

This section highlights key lessons mostly from North and South America, East Asia, and Europe that are relevant and potentially useful for Central America. The profusion of recent empirical evaluations and studies has spurred a number of meta-reviews.³⁵ In this section, instead of undertaking another review of individual studies, we present the main conclusions reached by the reviews themselves. Summarizing the lessons from these reviews is not a simple task as Evans and Popova (2015), who have taken stock of those reviews, point out:

[T]he main results ... for improving learning appear inconsistent. For example, using a subset of the conclusions for each review, Conn (2014) highlights pedagogical interventions as most effective, while McEwan (2014) finds the largest effects for interventions involving computers and technology. Kremer, Brannen, and Glennerster (2013) highlight pedagogical reforms that match teaching to student learning levels as well as the incentives associated with hiring teachers on short-term contracts. Glewwe et al. (2014) emphasize the impact of teacher knowledge, teacher absenteeism and the availability of student desks on student learning. Krishnaratne, White, and Carpenter (2013) underline the importance of learning materials. And Murnane and Ganimian (2014a) emphasize providing information about school quality and returns to schooling, among other findings.

It is obvious from the meta-reviews that conclusions about the effectiveness of specific reforms depend on design and context, but common recommendations from the reviews pertain mostly to teachers and teaching methods. Those are: (i) match teaching approaches to students' learning; (ii) support individualized, long-term teacher training; and (iii) boost accountability mechanisms, such as teacher performance incentives and contract teachers (Evans and Popova, 2015). These conclusions are strikingly similar to those discussed by Bruns and Luque (2014) for Latin America (see box 1).

³⁵ The six reviews together cover 301 studies from across the developing world: 227 of those studies report learning outcomes, and 152 report enrollment or attendance outcomes (Evans and Popova, 2015).

Box 1. Findings of Recent Meta-Reviews of the Impact of Education Interventions

This box briefly summarizes the findings of four recent meta-reviews. These reviews apply rigorous criteria to select the individual studies to cover, generally excluding those evaluations that do not have clear control groups. The selected studies use experimental and quasi-experimental evaluation methods, although even randomized trials do not always offer clear conclusions about impact. To obtain the full details of their selection criteria, the reader is referred directly to the reviews.^a

The review by Glewwe et al. (2014)^b focused on the impact of school infrastructure and pedagogical materials, teacher (and principal) characteristics, and school organization. The clearest findings from their review are: (a) “having a fully functioning school—one with better-quality roofs, walls, or floors, with desks, tables, and chairs, and with a school library—appears conducive to student learning,” while computers do not appear important for student learning; (b) “having teachers with greater knowledge of the subjects they teach, having a longer school day, and providing tutoring” leads to more learning, and that teacher absence, unsurprisingly, has a clear negative effect on learning; (c) while teacher background data are most commonly available for teachers’ education and experience, it is their knowledge of the subjects that they teach that is more important for student learning; and (d) higher teacher salaries are consistent with higher student performance; yet, despite the lower salaries of contract teachers, contract teachers have a significant positive effect on student performance compared to regular teachers, a result that may be due to the stronger incentives they have to perform well than regular teachers who are protected by civil services rules. Excepting (a), the conclusions of this review focus on teachers.

McEwan’s (2014) review focuses on the results of 77 randomized experiments involving 111 specific interventions. These experiments cover countries across the developing world, but most have been conducted in Sub-Saharan Africa and South Asia. The review finds that the largest mean effect sizes pertained to the use of computers or instructional technology; teacher training; having smaller classes, smaller learning groups within classes, or grouping students according to ability; hiring contract or volunteer teachers to expand the teacher force; using incentives to promote student and teacher performance; and augmenting the availability of instructional materials. The effects of some of these interventions are influenced by having supplementary interventions; for example, hiring contract teachers works better if the program also includes more training or smaller classes. The review finds effects close to zero and not statistically significant for monetary grants and deworming treatments, and only small mean effects for nutritional treatments, treatments that disseminated information, and treatments that improved school management or supervision.

(continued next page)

Box 1 (continued)

Kremer, Brannen, and Glennerster (2013) review 18 randomized evaluations, almost all in Africa and South Asia. They find the following: Reducing out-of-pocket costs, merit scholarships, and conditional cash transfers increase schooling; addressing child health issues and providing information on how earnings rise with education can increase schooling even more cost-effectively; among those already in school, test scores are remarkably low and unresponsive to inputs such as hiring additional teachers, buying more textbooks, or providing flexible grants. In contrast, pedagogical reforms that match teaching to students' learning levels are highly cost effective at increasing learning, as are reforms that improve accountability and incentives, such as local hiring of teachers on short-term contracts. Technology could potentially improve pedagogy and accountability. Improving pre- and post-primary education are major future challenges.

Finally, Murnane and Ganimian's (2014a) review covers 115 evaluations of policies in 33 low- and middle-income countries that have increased the school enrollment of students and those that aim to improve the quality of education. In a precis of their review, the authors pick out a number of lessons specifically for Latin America (Murnane and Ganimian, 2014b). These are: (a) reducing the costs of going to school and expanding schooling options increase attendance and attainment, but do not consistently increase learning; (b) more information about school quality, developmentally appropriate parenting practices, and the economic returns to schooling can affect the actions of parents and the performance of private schools; (c) more or better resources improve student achievement only if they result in changes in children's daily experiences in the classroom, such as changes in the quality of instruction; and (d) well-designed incentives can increase teacher effort, reduce absenteeism, and improve student achievement, but low-skilled teachers need specific guidance and support in order to reach minimally acceptable levels of instruction.

Notes: a. The reviews discuss how the individual studies address common methodological concerns in determining causality, including measurement errors, omitted variable bias, sample selection, and endogenous program placement.

b. When all 79 studies are examined, about half of these variables seem to have clear negative or positive impacts on student learning. However, when the evidence is limited to the 43 high-quality studies, only a few inputs appear to have unambiguous results.

The focus on teachers is well-deserved and appears to apply to many countries. For example, studies in the United States that measure the impact of individual teachers on student performance in a single year find compelling evidence: having a good teacher means an average gain of one school year; having a great teacher means advancing 1.5 grade levels or more; but having a weak teacher means mastering less than half of the expected subject content (Hanushek and Rivkin, 2010). The meaning of "great" is the critical question. The shift in pedagogy that is warranted to achieve these learning gains is characterized by Darling-

Hammond (2010): “education can no longer be productively focused on the transmission of pieces of information that, once memorized, comprise a stable storehouse of knowledge. Instead, schools must teach disciplinary knowledge in ways that focus on central concepts and help students learn how to think critically and learn for themselves so that they can use knowledge in new situations and manage the demands of changing information, technologies, jobs, and social conditions.”

These meta-reviews present a rather bewildering set of conclusions about specific interventions. The findings from the hundreds of evaluations covered depend on differences in contexts studied (e.g., rural or urban), whether a specific intervention is implemented singly or in combination with other programs (e.g., a teacher performance incentive only or an incentive plus teacher training), and the evaluation method chosen (e.g., experimental or quasi-experimental). Conclusions could also differ depending on whether the outcome measured is in the short term or the long term (e.g., daily attendance over the semester or year vs. total years of schooling completed by adulthood), and whether the outcome measured is easily observed and verified or requires the development of an individual assessment (e.g., enrollment or daily attendance versus a measure of skills). Finally, there is no guarantee that the most effective individual interventions would add up to a profound and systemic reform. The closest statement from the reviews about how to effect a systemic reform seems to pertain to teacher recruitment, management, and support—a key perhaps to overcoming other obstacles in an education system.

Lessons from East Asia

As a group, the advanced East Asian economies have achieved impressive educational progress. In 1950, about one-half of the population in these countries had no education; by 2010, this fraction had shrunk to less than one-tenth. In 1950, one-tenth had secondary education; by 2010 this had increased to nearly one-half. Focusing on the past 20 years, the average years of schooling of the population aged 15 and over increased by about 2 years, faster than the increase in Latin America and the Caribbean or Eastern Europe (Barro and Lee 2013). The most recent numbers for Japan and Korea indicate that enrollment at the secondary level is close to universal, and Korea’s enrollment rate at the

tertiary level is among the highest in the world.³⁶ Even the record on education quality in these countries has been impressive. Based on international tests, students in these countries, on average, outperform students in all other countries. Singapore, Hong Kong SAR, China, Korea, Japan, Taiwan, China, and two cities of China (Shanghai and Macao) ranked in the top 10 in the 2012 PISA tests (OECD, 2013b) in mathematics (table 5). Shanghai, Singapore, Hong Kong SAR, China, Japan, and Korea also ranked as the top five performers in reading comprehension. Five of these countries topped also the 2011 TIMSS math and science tests for eighth graders (Mullis et al., 2012).

The educational success of the advanced East Asian economies puts pressure on the region's emerging, middle-income economies, defined here as Indonesia, Malaysia, the Philippines, Thailand, and Vietnam.³⁷ They too have greatly expanded their school enrollments, not only at the primary level but also at the secondary and tertiary levels. The latest average net enrollment rate at the secondary level for these countries is around 70 percent and their average gross enrollment rate at the tertiary level is 33 percent, so they have more to do to catch up with the East Asian Tigers with respect to enrollment and schooling years. But the largest education gap between these two groups of countries in East Asia pertains to the quality of education. The PISA test scores of 15-year-old Thai, Malaysian, and Indonesian students are between 68 percent and 77 percent of the average PISA math score of Korean students and between 74 percent and 82 percent of the average reading comprehension score of Korean students. The hopeful news on this score is the performance of Vietnamese students; they achieved 92 percent and 95 percent of the average math and reading comprehension scores, respectively, of Korean students in the 2012 PISA, outperforming even the average OECD student. Vietnam's performance demonstrates that it is possible for a low-income, emerging economy to push its education system toward academic excellence. The pace of Vietnam's progress is not too

³⁶ Korea's passion for university education which drove the tertiary enrollment rate to nearly 100 percent has been regarded as excessive by the government (Lee, 2013).

³⁷ China is a unique case with respect to education. Strictly speaking, China as a whole should be part of this list, but it is both very large and diverse. The numbers from the international tests, however, indicate that at least a few of its territories (Shanghai, Macao SAR, China, Hong Kong SAR, China, and Taipei) rank with the top East Asian countries.

surprising, given what Korea has been able to achieve in less than half century.

As discussed in the previous section, the global environment for education is changing. Much more is demanded from education systems—to equip students with high technical and vocational skills; develop other workplace skills such as team work, problem solving, communication, and leadership; implement effective strategies for skills development; and provide lifelong learning opportunities for career changes. A dynamic economy challenges its education system to be equally dynamic in producing graduates with the relevant technical and workplace skills. Korea demonstrates the benefits from having this kind of dynamic and responsive education system. Less than half a century ago, Korea resembled many developing countries with an annual per capita GDP of less than US\$100. Within a few decades, it transformed itself into an advanced economy in which policies for human resources development played a critical role. At each stage of economic development, its education strategies supported its economic policies. For example, in the 1960s, to meet increasing demand for junior secondary education, the government removed entrance examinations to that level and provided short-term teacher training to quickly grow its teacher force. In the 1970s and 1980s, the country's priority shifted to senior secondary education, two-year colleges, and open universities. The government introduced a High School Equalization Policy (HSEP), which transformed private schools into “private managed public schools” that could no longer charge more fees than public schools, while also providing subsidies to private providers. The policy effectively increased school supply at the secondary level and raised the enrollment rate from 70 percent in 1970 to nearly 100 percent in 2002 (Lee, 2013). This prioritized but sequential expansion of the education system ensured that the Korean economy could count on a labor force that possessed the basic skills it needed.

The success of the East Asian Tigers in transitioning from middle- to high-income status depended on their ability to push the technological frontier and move from importing to creating technologies of their own. This ability in turn demanded the development of a workforce with a diverse mix of skills that can promote innovation-driven employment growth, feed competitive pressure among domestic firms, and meet

competition from international firms (Dutz et al., 2011; Yusuf, 2007). For this reason, the low level of cognitive skills in the region's emerging economies, despite increases in their average years of schooling, is an obstacle to their continuing economic growth. Table 3 has shown that in the future, nonroutine analytic and interpersonal skills will be in highest demand. Unfortunately, there seems to be relatively little research mapping how these skills have been evolving in emerging economies and in Central America, and whether their education systems (schools at all levels and training programs) are equipped to form these skills. Finally, while the supply of skills is an important factor, it does not guarantee economic growth unless the economy has the policies and institutions that make it dynamic and competitive.³⁸

5. Strategies to Break Existing Bottlenecks

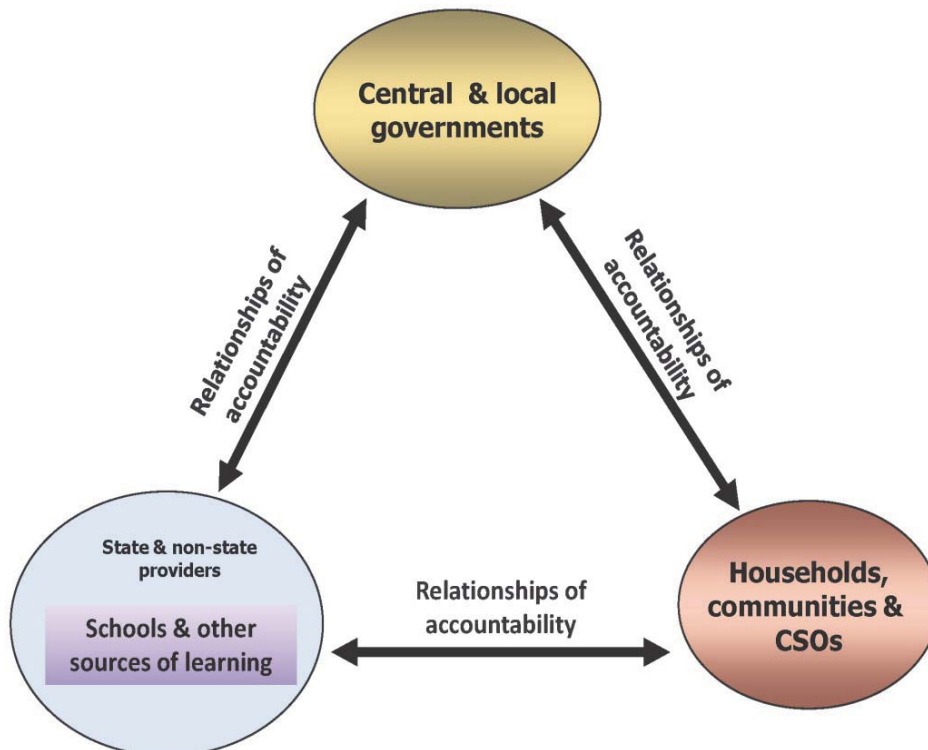
The two previous sections discussed a number of interventions—policies and programs—that have been adopted by countries for the purpose of raising education levels and building skills. Empirical studies have shown that several of those interventions have been strikingly successful while others have had little impact and still others have failed. Recent high-quality reviews of these studies have not identified one best solution that can transform education systems and solve whatever ails schools. Instead, the reviews call for an approach that deploys multiple interventions to address specific obstacles to more and better education for young people of different abilities, socioeconomic and ethnic background, and gender. The reviews also reveal the difficulty in ascertaining the impact—and cost—of specific interventions in various

³⁸ The Global Competitiveness Report 2014–15 of the World Economic Forum (WEF) assesses the competitiveness landscape of 144 economies and provides insight into the drivers of their productivity and prosperity. The report defines competitiveness as *the set of institutions, policies, and factors that determine the level of productivity of a country*, and the level of productivity, in turn, sets the level of prosperity that can be earned by an economy. These drivers include policies related to the economy's openness to domestic and international competition, the stability of its macroeconomic environment, and so on (Schwab, 2014).

contexts, even in the case of research that applies rigorous evaluation methods.

The complexity of the education challenge is obvious. Every country's education system is a large and complex human organization. An education system includes not only education officials, teachers, and school heads but also students and trainees, their families, and their communities. In large and small ways, the collective choices and voice of these stakeholders—and their interrelationships—influence the performance of the system and thus can be powerful drivers for improving it. To steer and manage this organization toward national goals requires the best talent a country has to offer and the best analytical and decision-making tools at its disposal. Figure 3 is a simplified illustration of the actors and their interrelationships within an education system; it is simply a reminder of the groups of stakeholders who have to be involved in order to implement well-designed reforms.

Figure 3. Actors and Their Interrelationships in an Education System



Source: Adapted from World Bank (2004).

There is no question that increasing the level and flow of resources for school inputs—whether these are school buildings, trained teachers, or textbooks—is crucial to a nation’s educational progress. Indeed, efforts by governments and communities to build more schools and equip them better have made it possible to enroll millions more children in school. But when it comes to promoting learning and skills acquisition—rather than just getting children into classrooms—there is no alternative to increasing also the knowledge about what reforms will work and about how an education system can use resources more effectively and efficiently. Whether an education system can do better depends on its capacity to formulate policy, set standards, implement quality assurance, assess student performance, manage human and financial resources, and take advantage of intergovernmental and external partnerships (Mourshed, Chijioke, and Barber 2010). Indeed, no single intervention on just one part of the education system will remedy low quality; it takes a systems approach to build a robust policy environment that promotes learning. In addition, while education systems have become increasingly more adept at tracking *inputs* (such as expenditures on education and the number of schools built, and teachers supplied) through administrative reports and school mapping efforts, they need to become more adept also at assessing and tracking *outcomes*, both student throughput and learning (World Bank 2010).

This section identifies five reforms that could be transformational for the education systems in Central America. Costa Rica and Cuba generally appear to have succeeded more than their neighboring countries (although the average performance of Costa Rican students on the 2012 PISA remains below the OECD average), so the discussion pertains primarily to the other countries in the region. The reforms to consider are based on the lessons from the policy and program experiences in Central America itself and some from other countries, and the large body of careful evaluations we have discussed in earlier sections. They are:

- Invest financial, administrative, and political resources only in approaches that raise the skills of the next generation

- Diversify post-basic education choices that are available in order to meet labor market demand, and engage with nonstate actors in diverse ways in order to meet this goal
- Address specific obstacles that face disadvantaged groups
- Ensure that children enter school equipped to learn
- Assess and monitor student learning and equality of access throughout the different levels of the education system

Invest financial, administrative, and political resources only in approaches that raise the skills of the next generation

We have discussed how new technologies, globalization, and the information revolution have significantly affected the world economy, as well as the production cycle and labor markets in individual countries. These changes require that teaching and learning must adapt. It is said that teaching for a knowledge economy and a globalized labor market requires pedagogical methods that focus more on such competencies as communication, interpersonal relationships, team work, and leadership. The challenge is to produce graduates who are good readers with basic math and science skills, but moreover have the technical, vocational, critical thinking, and problem-solving skills needed for future jobs.

Most of the countries in Central America appear trapped in a state of low standards for entry into teaching, with low-quality candidates, relatively low and undifferentiated salaries, low professionalism in the classroom, and poor education results. Moving to a new equilibrium will be difficult, requiring adequate expenditures of a country's financial, administrative, and political resources. Because these resources are generally constrained, greater selectivity, innovativeness, and more attention to performance and efficiency are called for. Bruns, Filmer, and Patrinos (2011) remind us that it is difficult to specify *in sufficient detail* how to achieve a transformation of teaching and learning. This is because teaching is:

- Discretionary, in that every teacher must use her own judgment to decide which part of the curriculum to deliver on a given day and how to do so

- Variable, in that in every classroom a teacher must customize a pedagogical approach to students who have different aptitudes, motivation, preparation, and learning styles
- Transactions-intensive, in that learning requires repeated and frequent interaction between teachers and individual students, day in and day out

In other words, while the right policies matter, there also have to be administrative mechanisms and financial incentives that are able to elicit changes in the attitudes and behaviors of individual actors such as teachers, school principals, and students.

A key strategy to promoting quality in teaching and learning in Central America requires four basic components or features. *First*, schools and classrooms, from the primary through the tertiary level, must be environments conducive to learning. Considering the state of schools especially in rural or low-income areas, investments in the physical capacity of schools to deliver services adequately are warranted. Recall, however, that research findings cited in the previous section indicate that not all spending for infrastructure and school inputs adds to learning; these inputs tend to be more effective when they are accompanied by other improvements, such as curricular reform and teachers achieving greater mastery of their subject content. For example, the Dominican Republic is extending its school day from five to eight hours as part of its education reform—but more class time will not add to student learning unless the additional time is invested in high-quality teaching and better curriculum.

Second, teachers who have the capacity to diagnose and understand the learning needs of students in the classroom and who have mastered their subject matter are essential to improving learning. Available evidence suggests that Central America is not attracting the talented individuals it needs to build a competent teacher force. The hours-adjusted salaries of teachers in some countries may be too low to make teaching appealing, but as this is by no means the case in all the countries, raising salaries across the board will increase cost but not necessarily improve teaching quality. The extensive research on teachers in Latin America by Bruns and Luque (2014) point to the following measures to improve teaching:

- Recruit better teachers, increase the selectivity of teacher education programs by raising the standards for entry into these programs, improve the quality of those programs, and upgrade the hiring standards for new teachers. The authors cite the good examples of Cuba, where 72 percent of a teacher education program is dedicated to practice teaching, and El Salvador, which requires its teacher education graduates to pass a mandatory certification exam in order to be hired by the public sector.
- Give additional professional support to new teachers during their first five years of teaching; evaluate their performance in order to understand how to improve their work and also to hold them accountable; provide continuous professional development; and improve teacher deployment and management. The authors cite good examples in Central America—including the program in the Dominican Republic that establishes a probationary period for new teachers that also includes a comprehensive assessment, and Honduras’s SAT (or *Sistema de Aprendizaje Tutorial*) that makes a scripted training program available to middle-school teachers in rural areas.
- Motivate teachers to raise their performance by using financial incentives, accountability pressure, and professional rewards. In terms of financial incentives, consider the cases of Singapore, which pays teachers for undertaking 100 hours of professional development each year, and Finland, which allows teachers to spend substantial time to develop new curriculum content and learning materials. With respect to accountability pressure, Central America’s now long-standing experience of devolving greater decision-making authority to local stakeholders, including to school heads and teachers, in exchange for greater accountability has achieved some measure of success and deserves to be improved and continued. Professional support and recognition also can be potent motivators. China and Korea encourage teachers who teach the same subject to share information about their lessons and solve problems together (Wang, 2012; Lee, 2013). Vegas and Umansky (2005) identify

intrinsic motivation—the “opportunity to educate children, and thereby improve their well-being”—as well as social prestige and recognition as powerful incentives for attracting individuals into teaching.

Third, developing not only cognitive skills but also noncognitive skills—such as critical thinking, problem solving and teamwork, and adapting school curricula and pedagogical methods to facilitate the development of these skills—will support the focus on learning. Policies for the promotion of noncognitive skills should be reflected in teacher education and training, hiring practices, and teaching methods. Research shows that young teachers are more effective if they have “a well-balanced mix of competencies, including personality traits, such as conscientiousness and extraversion,” and that their own noncognitive skills make them more effective in imparting those skills to their students (Rockoff et al., 2011). Research also indicates that teaching methods that focus on the “development of self-awareness, social awareness, responsible decision-making, self-management, and relationship skills” help students prepare for life as well as school.

Fourth, given the constraints on financial resources, administrative and technical capacity, leadership skills, and political capital in any education system, selectivity and prioritization are essential in the design and implementation of a strategy for promoting education quality and learning. This is why the term “only” in this strategy is salient.

Reform post-basic education

As discussed above, the net enrollment rate in secondary education in Central America increased significantly over the past 15 years, except in Cuba, which already had the highest rate in Latin America. At the tertiary level, however, gross enrollment rates rose more modestly, again except in Cuba, which quadrupled its rate, and Costa Rica, which almost doubled it. It is more difficult to compare the quality of this expansion in post-basic education enrollment across countries since these countries generally do not participate in the international tests for older students or adults. However, high levels of unemployment, especially among youth, and the length of time it takes for employers to fill vacancies for

skilled jobs reveal the weakness of the education systems in preparing young people for today's jobs.

The quality of post-basic education is a critical issue for the region's growth prospects because secondary and higher education are the key provider of skills in the future. Although the earnings premiums for tertiary education across countries in Latin America have started to decline, they remain high enough to stimulate more household demand for tertiary education (Aedo and Walker, 2012). The countries in Central America should consider policies that can take advantage of this higher demand to expand and improve post-basic education. This proposed strategy has three principal components:

First, policies are needed to help students make sensible choices with respect to schools or universities and areas of study. The intervention in the Dominican Republic cited earlier (Jensen, 2010) indicates that students, especially adolescent boys, would benefit from better information about the demands of the labor market and the returns to schooling. In settings where there is a strong pull for adolescents to quit school and enter the labor market, better information could make a difference between continuing and dropping out, as the experiment in the Dominican Republic shows. More high-quality information is also needed on the performance of individual institutions to help students make better choices about where to enroll and what academic or vocational programs to pursue. According to the evaluation, this type of intervention is not costly but it requires a good understanding of how students form expectations about their future in the labor market. Moreover, at least in the formal employment sector, a mechanism to help with the job-search process could yield quicker and perhaps better matches between vacancies and job seekers.

Better information is important in other ways for improving education systems. For example, strengthening the links between post-basic institutions and businesses can stimulate the types of productive knowledge exchanges that can lead to higher-quality, more-relevant post-basic education, on the one hand, and more commercial innovations, on the other (Yusuf, 2007).

Second, also to improve education choices, an appropriate level of institutional diversification is needed—general and technical and vocational secondary schools, community colleges, polytechnics,

teaching universities, research-focused universities, and nonformal or short training programs. In addition to diversification, giving students the ability to transfer fairly easily between institutions and between programs also encourages and facilitates a better match between students' aptitudes, skills, and aspirations and their chosen educational program. Moreover, creating opportunities for continued learning available throughout adulthood allows individuals to upgrade and acquire new skills. This systemic flexibility allows students (and current workers) to respond to perceived changes in the demand and supply of skills.³⁹ Efforts to diversify choices need a strong oversight structure with accompanying enforcement mechanisms that put pressure for quality improvements and links to the labor market. There are already measures in the region to strengthen the regulation of university systems, but the same level of attention is lacking for nonuniversity tertiary education and for technical vocational education and training institutions. Since it is disadvantaged students who are more likely to enroll in nonuniversity and nonformal institutions, neglecting these institutions does not serve them well.

And for students who have left the formal schooling system, good-quality nonformal training programs are a potential solution to the problem of lack of skills because they can complement as well as update their formal education. Firm and on-the-job training are options for providing additional job-relevant technical and vocational skills. Rigorous evidence on the impact of these programs in low- and middle-income countries is scarce—and most countries do not even have a complete inventory of existing training programs—but this alternative to skill formation deserves greater consideration. Box 2 summarizes key lessons from decades of workforce development policy in Korea.

³⁹ A lesson from Korea in this regard is that an intense (and almost exclusive) emphasis on university education may not help the student or the labor market (Lee, 2013). Korea's Meister High Schools are special vocational high schools which are an alternative to universities for students who want to receive specialized training for in-demand skills that will link them directly to jobs. Raising the profile of vocational high schools, as Korea has, makes alternatives to university education more appealing.

Box 2. Korea's Workforce Development Strategy

An abundant, appropriately skilled workforce has been a major factor in the rapid development of the Korean economy. The availability of the right workers to support industrialization and economic diversification is the product of the success of Korea's workforce development efforts. The two biggest changes it made were: (a) more and deeper linkages among training providers, industry, and researchers at the institution level; and (b) an increase in formality, regularity, and scope of assessments of provider and system performance. Governance through system-level standards and directives began to be supplemented by more granular, rigorous monitoring and evaluation, coupled with an increasing focus on providing institutions and staff with performance-based incentives. Public and private providers are managed in almost identical ways within the Korean system. Both receive considerable public funding, whose provision is contingent on adherence to robust standards regarding curriculum, facilities and staff recruitment, and management. The consistent enforcement of standards in line with economic development priorities has been a motive force behind the evolution of Korea's system into one of the best in the world today.

There are several key factors behind this success.

First, the link between workforce development and Korea's economic agenda has received consistent, institutionalized emphasis and attention from the very top levels of government. Indeed, workforce development has been integrated into Korea's economic development strategy since the elaboration of the first Five Year Economic Development Plan in 1962. Experience from implementation of the development strategy shows that benefits accrue to consistent, well-informed, and well-coordinated apex-level advocacy.

Second, the workforce development system has adapted to respond to each stage of economic development, enabling it to satisfy the skills demands of the labor market while also improving the quality of the skills of the workforce. As the economy developed, the government shifted its focus from basic training in skills needed by the manufacturing sector to providing both basic and advanced training in a much broader range of skills. As the economy developed, the emphasis shifted from the training of new recruits to in-service training and upgrading of existing skills. The structure of the system, which was driven by government-subsidized private training in the initial stage (1960s through 1976) and government-led public training in the next stage, is again transitioning to a private sector-led paradigm marked by voluntary firm participation and government support. The funding mechanisms for the system have also changed to suit each stage of economic growth, with the government-led system of obligatory in-house training supported by a levy being reorganized into the private sector-led Employment Insurance System in 1995.

Third, the government made funding for vocational education and training providers conditional on meeting system-wide standards for programs, facilities, and instructors. This top-down approach has allowed the government to adjust the system to meet evolving economic development needs and emerging economy-wide skills constraints. The homogeneity that this system of national standards created also simplified monitoring of institutional performance and created a simple, open system for student transfers.

(continued next page)

Box 2 (continued)

Fourth, early identification of the skills demanded by industry and addressing these demands through appropriate policy is essential for a successful workforce development system. During the early stage of industrialization, which focused on heavy and chemical industries, Korea instituted manpower planning, whereby the government estimated the required number of skilled workers needed by priority industries and took steps to calibrate the training system accordingly. This approach has evolved over time. The government no longer carries out detailed manpower planning but now annually conducts the Workforce and Training Demand Survey to measure skills mismatches at the regional level. Results from such surveys are used to provide information to job seekers about where their skills may be in demand and what additional skills it may be useful to acquire. However, no system-wide requirements for the use of information available through employment information services to improve programs and curricula have been established, leading some to argue that the link between training and employment service is still too weak.

Fifth, the workforce development system is an effective means to bring the workers in the informal sector and other vulnerable groups into the formal sector. The large-scale training for the unemployed in response to the Asian financial crisis helped contribute to a rapid reduction in the unemployment rate after the crisis. A large portion of this training was focused on the information and communication technology (ICT) industries. Public training for industries identified as strategically important for future economic growth is risky, but when it is carefully planned and monitored, it can help both employed and unemployed workers.

Despite Korea's successful workforce development, it faces future challenges. Secondary school graduates are transitioning to higher education at the highest rate in the world. In light of many families' strong preference for academic higher education, however, vocational education has become a second-choice option, in contrast to the 1970s and early 1980s when vocational education enjoyed parity in stature with the academic tracks. The government has taken measures to increase the employment rate among vocational high school graduates in an effort to increase the desirability of vocational education. For instance, the government has launched a "Work First-College Later" policy to encourage high school graduates to enter the labor market and work for several years before going to college. A new type of specialized vocational high school, the so-called "Meister High School," was also introduced in 2010 to help improve the stature of vocational education and address emerging strategic skills gaps.

Source: World Bank (2013b).

Third, given the higher cost of tertiary education, its cost-effectiveness, returns to investments, and sustainability of financing are principal concerns. Sustainability will require greater diversification of financing sources, while also promoting equitable access to these services by addressing the needs of low-income students. Diverse funding sources might include fees or cost-sharing coupled with appropriate

financial aid; contract research and fee-generating training activities; and expanding the role of the nonstate sector, including the private sector. The nonstate sector is already widely present in Central America in the provision of post-secondary education. To increase efficiency, performance-based funding mechanisms could be useful. However, accountability mechanisms are likely to fall short in improving performance when these tertiary education institutions do not have sufficient autonomy to determine and manage their academic programs.

Improve equity in education access and quality by alleviating the constraints facing disadvantaged groups

A well-functioning education system should have policies or programs that ensure coverage also of disadvantaged populations, target special resources to assist those groups, and address the specific obstacles they face. The reasons for early dropout behavior range from income poverty, gender, disability, and family catastrophes, to civil conflicts and high unemployment rates for skilled labor. The average effects of programs can hide substantially different effects on population groups, so it is critical to recognize and measure the extent of heterogeneous effects on different groups. This strategy would have three components: raising demand by reducing financial costs to disadvantaged groups, addressing language barriers faced by indigenous groups, and providing skills training and second-chance options to those who have left school.

First, research findings about demand-side programs indicate that fee reductions and conditional cash transfers have improved education outcomes for low-income, rural populations. The evidence from various countries presented in section 3 is persuasive in terms of cash transfer programs' beneficial impact on enrollment, grade repetition, grade-to-grade continuation, and number of years completed. There have been questions about the cost-effectiveness of these programs, but a benefit-cost analysis of the Mexican program, for example, demonstrates that its benefits (measured in terms of simulated future earnings) substantially exceed the costs of the conditional transfers (Behrman, Parker and Todd, 2011). An evaluation of the Ecuador program also implies that a well-designed program targeted toward the poorest families is likely to be more cost-effective because impact for them is greater than for less impoverished families (Oosterbeek, Ponce, and Schady, 2008). But it is

important to note that countries that adopt a cash transfer program face critical choices regarding its design—whether to use schooling-related conditions or not, the amount of the transfer, the direct recipient in the household, and its monitoring mechanism (Fiszbein, Schady and Ferreira, 2009; de Janvry and Sadoulet, 2006).

Second, the obstacles to education are not only financial costs. As we discussed in section 3, rural populations tend to have more limited access to information about their educational choices and labor market opportunities, and indigenous populations face additional problems related to language. We have discussed above the importance of better information more generally, so we emphasize here the benefit of using dissemination channels that are more accessible to low-income and rural households. With respect to indigenous populations, in Guatemala, which has the largest proportion of indigenous groups in its population, bilingual education has been shown to be effective in reducing dropout and grade repetition rates, especially for younger students, thus improving completion rates and increasing years of schooling completed (Patrinos and Velez, 2009).

Third, second-chance programs that develop in-demand skills are needed for young people who have left school without employable skills. Argentina, Brazil, Chile, Colombia, the Dominican Republic, Panama, Peru, and Uruguay have training programs for disadvantaged youth, and evidence from these countries suggest positive returns. Attanasio, Kugler and Meghir (2011) evaluate Colombia’s program *Jóvenes en Acción*, introduced between 2001 and 2005, which provides three months of in-classroom training and three months of on-the-job training to young people aged 18–25 in the two lowest socioeconomic strata of the population. The authors find differential impacts for women and men and only for the poorest stratum, suggesting that different program designs may be needed. For women, they find sizable and significant positive effects on the probability of paid employment (close to 7 percent), the number of hours worked per week (3 hours), and wages (about 20 percent). By contrast, these outcomes did not change significantly for men. However, young men who received training were 6 percent more likely to hold a formal contract, 5 percent more likely to have formal employment, and received 23 percent higher formal wages; young women who were trained were 8 percent more likely to have a

contract, 7 percent more likely to hold formal employment, and received 33 percent higher formal wages.

The results from an evaluation of a job training program in the Dominican Republic, however, suggest that these programs do not guarantee a second chance for youth and thus need to be closely tracked and rigorously evaluated (Card et al., 2007). Between 2001 and 2006 the government of the Dominican Republic operated *Juventud y Empleo*, a subsidized training program for low-income youth in urban areas. It provided several weeks of classroom instruction, followed by an internship at a private sector firm. A random sample of eligible applicants was selected for the training. Information from 10–14 months after graduation on the trainees and the control group indicates only a marginally significant impact on hourly wages, conditional on employment, and no significant impact on employability.

Ensure that children enter school equipped to learn

Early childhood development (ECD) may seem too remote in the past from the point of view of building a skilled workforce, but rigorous research have traced academic and labor market success back to measurable indicators of early learning and early health (Gertler et al., 2013; Behrman et al., 2006; Maluccio et al., 2009). Neuroscience offers particularly useful insights for investments of this type. The seeds for cognitive ability and personality traits take root before birth. A child's brain starts growing from conception, through the first 1,000 days, and continues to do so into adolescence and young adulthood. During infancy a child gradually develops sight, hearing, receptive language, and speech—and continues rapidly to develop executive functions, such as a working memory and self-control; higher cognitive functions, such as solving puzzles; fine motor skills, such as picking up objects and writing; and gross motor skills, such as walking and running. The elements of conscientiousness and self-regulation emerge in early childhood and these skills foster conscientiousness that is evident much later in life (Eisenberg et al., 2012).

Between the ages of 6 and 12, children can acquire the basic reading, mathematics, analytical skills, and capacity for language. Sufficient instructional time and appropriate pedagogy are critical for developing these skills. Early adolescence is generally marked by both emotional

immaturity and high cognitive potential; young people may benefit more from a strong general education at this stage, with specialized vocational and technical education deferred until upper secondary education. The period after age 16 is a time of transition from secondary school to higher education or to working life and even to parenthood. For those who drop out of school before completing basic education, second-chance programs offered through vocational or technical schools, as well as on-the-job training, can help ease life transitions.

An effective ECD program provides children a stimulating, responsive, and protective environment, ensuring that they have adequate nutrition, health care, and protection from abuse and neglect (Walker et al., 2011). The dividends from such a program have been documented: In Colombia, children who receive a comprehensive community-based ECD intervention are 100 percent more likely to be enrolled in third grade and have lower dropout and repetition rates than children in the control group. In Argentina, one year of preschool increases the average third-grade test scores in mathematics and Spanish by eight percent. Longer-term benefits on schooling and cognitive achievement have also been documented. In the United States, children who receive high-quality, comprehensive ECD services are 50 percent more likely to finish secondary school than those who do not. A review cites several studies that have estimated long-term benefits (in terms of cognition, academic success, and even higher earnings) from early childhood interventions.⁴⁰

⁴⁰ It is relatively rare to be able to measure long-term impacts into adulthood of early childhood programs in developing countries. Two examples are programs in Jamaica and Guatemala. In Jamaica, the intervention consisted of one-hour weekly visits from community health workers over a two-year period that taught parenting skills and encouraged mothers to interact and play with their children in ways that would develop their children's cognitive and personality skills. Gertler et al. (2013) re-interviewed the study participants 20 years later and find that the program has increased average earnings of participants by 42 percent. The findings show that psychosocial stimulation early in childhood in disadvantaged settings can have substantial effects on labor market outcomes and reduce later life inequality. In Guatemala, between 1969 and 1977, two nutritional supplements (a high protein-energy drink and a low-energy drink devoid of protein, randomly assigned at the village level) were provided to pre-school children, from birth to 36 months, in four villages in Guatemala. The program participants were traced about two decades later to measure their schooling attainment, reading comprehension, and nonverbal cognitive ability. Controlling for family background characteristics—parental

Stunting at 24 months was related to cognition at 9 years in Peru and, in the Philippines to IQ at 8 and 11 years, age at enrollment in school, grade repetition, and dropout from school. In Jamaica, stunting before 24 months was related to cognition and school achievement at 17–18 years and dropout from school. In Guatemala, height at 36 months was related to cognition, literacy, numeracy, and general knowledge in late adolescence, and stunting at 72 months was related to cognition between 25–42 years. In Indonesia, weight-for-age at 1 year of age did not predict scores on a cognitive test at 7 years, whereas growth in weight between 1 and 7 years did (Walker et al., 2005, p. 63).

Country experiences in delivering ECD services demonstrate that an integrated approach requiring some coordination among public agencies with responsibility for health, education, and social protection of very young children is not only a smart but also realistic approach. The administrative burden of this coordination is less at local levels than at the national level, and the financial cost of an integrated delivery system is also less than—and its effectiveness greater than—separate and redundant delivery mechanisms by different local providers. An integrated delivery system starts with good maternal nutrition and health during pregnancy, continues with proper nutrition and health interventions for infants, cognitive and psychological stimulation through the preschool years, and parental education and support throughout. There are several programs to learn from or emulate in Latin America and elsewhere. For example, the impact of a combined preschool and nutrition program in Bolivia, based on earnings gains from observed increases in height, cognitive skills, and educational attainment, generated benefit/cost ratios in the range of 1.7–3.7 (Behrman, Cheng, and Todd 2004).

schooling, parental age, and a wealth index measured at the time of the intervention, and relevant observed time-varying community-level factors that might otherwise adversely affect their accuracy and precision—Maluccio et al. (2009) find significantly positive, and fairly substantial, effects of the nutritional intervention. The authors note increases of 1.2 grades completed for women and one-quarter standard deviation on standardized reading comprehension and nonverbal cognitive ability tests for both women and men.

Assess and monitor learning and skills

Only by assessing and monitoring student performance on a regular basis can an education system begin to craft and implement an effective strategy for improving learning and building skills. While there may be no simple formula for achieving this, better information can be transformational for the different actors in the education system. The objective of more and better data is ultimately to be able to identify and understand the weak links in the education system and thus inform the policies and actions that are needed to fix them. More and better data can also be useful in eliciting political support and civic participation, and not only to ensure accountability. Fullan's (2011) caution about using data primarily to achieve accountability goals to drive system reform deserves consideration:

As the 'right drivers' progress (capacity building and team work, for example) transparency of results and practice will be key to securing public commitment to education, and to elevating the status of the profession. This vertical accountability (transparency at the classroom, school, district, state levels) is essential for sustainable progress. However, it must be wrapped in a prevailing attitude of capacity building, engagement, and trust building—the latter producing greater lateral accountability among peers, which is absolutely critical for whole system reform" (Fullan, 2011, p. 9).

Many countries already have education management information mechanisms that monitor school supply and the physical state of infrastructure, resource flows, deployment of teachers, and student throughput. Few countries do so annually and with complete system coverage (e.g., all cycles, state, and nonstate), or ensure that decision-makers, teachers, school heads, parents, and students have easy access to the information. Although administrative data are invaluable for planning, budgeting, and tracking expenditures, using a variety of data sources ensures that there are no major data gaps and serious inaccuracies. Student throughput is typically reported by school heads themselves, but more reliable data about student and teacher attendance, fiscal resources received and spent by the school, and fees charged may be obtained from parents and students or through household surveys.

To assess learning outcomes, testing students is the most direct method. In the past two decades, more and more countries have

established their own national or other standardized assessments, and/or are participating in international or regional tests such as those we have already mentioned. This increased participation sends a strong message about the importance that these countries give to the availability of performance measures and benchmarking. In Central America, only Costa Rica participated in PISA and only in 2012; El Salvador participated in TIMSS in 2007; nearly all countries participated in the three rounds of LLECE, at least in reading and math. Some people argue that student assessments, especially those that go beyond the classroom, are costly and do not yield sufficient information to help students and their teachers improve.⁴¹ However, once-off assessments such as the international and regional tests are snapshots of a system's performance that can generate broad discussion and debate about education quality. Regular assessments, if done well, also allow for monitoring trends over time and a better understanding of the relative contribution of various inputs and educational practices to learning.⁴²

One data gap in Central America—as well as in many developing countries—that deserves attention and resources pertains to post-basic educational institutions, in both the academic and vocational-technical streams, in the public and private domains, and formal and nonformal. As countries shift toward higher levels of education, a systematic inventory of the quantity and quality of these institutions, if made available to stakeholders, can inform the schooling and training choices by individuals and the resource allocation decisions by policy makers. In this regard, Korea (and other advanced East Asian countries) has consistently exemplified good practice by investing considerable

⁴¹ Two estimates of costs: Hoxby (2002) finds that even the most expensive state-level, test-based accountability programs in the United States cost less than 0.25 percent of per-pupil spending. For estimates of the costs of several student assessments, see Wagner, Babson, and Murphy (2011); the authors highlight broad variation in the total cost of assessment and the cost-per-learner.

⁴² According to Darling-Hammond and Wentworth (2010), the assessment systems in high-performing countries closely align curriculum expectations, subject, and performance criteria, and desired learning outcomes; provide feedback to parents, students, teachers, and schools about what has been learned, as well as information that can improve future learning; engage teachers in assessment development and scoring as a way to improve their professional practice and their capacity; and engage students as a means to improve their motivation and learning.

resources to support these activities. As a result, those responsible for managing Korea's system for service delivery benefited from a wealth of both macroeconomic and institution-level data and have effectively leveraged this to improve performance. Specific performance incentives were not widely used in Korea, especially before 2010; instead, the government used its extensive analysis of skills demand and supply to manage overall system inputs and outcomes and provided guidance to providers in the form of directives, supported by adequate resources to fulfill them.

Cautionary words

The overarching messages from numerous studies (and reviews of them) about education reform is that no one solution or intervention will fix most problems in an education system. Mid-course corrections or refinements to a reform are going to be the norm. Frequent and rigorous assessments of education outcomes can help improve the reform as well as build political support for its continuation or improvement. So we end this section as we began it, with appropriate recognition of the immense challenges for the education systems in Central America and of the system-wide responses that are called for. Murnane and Ganimian (2014a) give us words of caution in the same vein:

Interventions ... will not enable countries to develop high-performing education systems such as those in South Korea and Singapore. The remarkable progress of these educational systems results from system-wide efforts over several decades. These efforts included defining learning standards in core subjects for every grade level, developing curricula well-aligned with the learning standards, producing assessments that measured student mastery of the standards, and developing teacher training programs that attracted talented students and prepared them to teach the demanding curriculum effectively. Designing and managing such systemic change successfully requires a remarkably high level of governmental capacity" (Murnane and Ganimian, 2014a, p. 13).

6. Setting Priorities and Creating Policy Momentum

The countries in Central America have made great strides in improving their schools and raising their educational indicators in the past decade. Many years of civil conflict caused massive destruction of schools and interrupted the schooling of more than a generation of children. But afterwards, the poorest countries in the region adopted bold, innovative programs that have expanded enrollment rates at the primary and secondary levels and provided basic education to hard-to-reach or disadvantaged groups. The future challenge includes building cognitive and technical skills that are relevant to the needs of their society and economy today. This requires an education system that can produce competent, creative, and critical thinkers and problem-solvers who are able to continue acquiring new knowledge and skills throughout their lives.

Principles for achieving education reform

On the basis of lessons from diverse country experiences and research findings, the previous section presented five broad strategic directions for education systems in Central America and, for each strategy, specific measures that hold promise of success. The success of these strategies depends, of course, on matching the details of their design to specific contexts in Central America, and on the availability of adequate resources for their implementation. Country experiences and analyses of those experiences also point to a few key principles that enable successful transformations of whole education systems.

One overarching principle is to not expect that a single, albeit effective, intervention or program will bring about systemic and sustainable change. To transform an education system requires an approach that considers the interrelationships among the critical parts of the system and addresses misalignments among the governance framework, management, financing mechanisms, and performance incentives in the system. It requires a shift in perspective: “In the absence of a system mindset, individual pieces, each of which contains half-truths, are pitted against each other as vested interests bash each other with proverbial baseball bats. No one wins; the system loses every time”

(Fullan, 2011, p. 16). At the same time, in practice, a reform that tries to change everything in the system all at once is bound to run aground, partly because of the unrealistic expectations that such an approach creates and partly because of its huge management and administrative challenges. Understanding the drivers that can effectively build and sustain a momentum for change should inform selectivity and prioritization. Ultimately, the focus should be on how to achieve the goals of the system—more young people completing their schooling and acquiring the knowledge and skills they need for life and work—and advance from there in successive stages.

Because public resources are generally constrained, greater efficiency and innovativeness in the allocation of those resources are warranted. Using a performance-based approach in the way public funds are allocated across institutions and better targeting of those resources and administrative capacity to critical goals should lead to greater efficiency. Being able to mobilize and energize the nonstate sector to participate in financing, operating, managing, and improving education services, while also protecting the rights of children and young people in educational institutions, calls for innovative measures, especially in contexts where the prospects for economic growth, and thus the promise of returns, are not obviously bright. It is often assumed that the nonstate sector primarily serves students who can afford to pay, but evidence shows that this sector provides services to even the poorest communities, including in direct collaboration with the state. In many countries, for example, governments subsidize or contract nonstate organizations to provide education, or specific services within education institutions, while covering much of the cost. Recognizing the value of nonstate sector involvement does not mean that governments are shirking their responsibility: governments typically have to provide appropriate regulation and oversight to ensure the quality and relevance of nonstate provided services, as well as provide the financial resources to ensure broad and equitable access to education.

Because education reform is likely to be a complex and involved process, the implementation of promising ideas requires attention to the details of design and implementation (Pritchett and Sandefur, 2013) and high-quality managers who are committed to the final goal and have the technical skills to implement efficiently. For example, the design of the

conditional cash transfer programs in Latin America and other parts of the world have been critical to the effectiveness of those programs, and their sponsors, including governments, have been willing to modify their design in response to findings from evaluations.

Because education reform is not about a mechanistic transformation but about changing certain behaviors of many groups of actors, success depends on creating the appropriate incentives that would elicit the desired behavioral responses. In this paper, we have discussed the changes needed in teaching and learning, and the accountability mechanisms that could induce those changes—pressure from competition, local monitoring, compensation, and other performance measures. We also cited research findings that demonstrate the need for these accountability mechanisms to be accompanied by support in the form of, say, more resources, freedom from corrupt managers and a degree of institutional autonomy.

Finally, because education reform produces winners and losers (whether or not only as perceived), strong champions in the political leadership are needed to ensure its success and sustainability. It is unrealistic to assume that sensible policy changes will necessarily produce corresponding shifts in political positions. Rather, one hopes that sensible reforms will produce at least an ongoing interplay between policy and politics and also an increased involvement by stakeholders. Transformative change will require consistent effort over a number of years, so support from leaders of different political parties, local stakeholders (such as teachers, parents and students), and business could determine the survival of reform efforts. Fear and impatience with difficult reforms can result in costly but avoidable mistakes and failures; it can also result in promising programs being terminated prematurely. The role of a strong leadership has been emphasized by Mourshed, Chijioke, and Barber (2010) in their study of 20 high-performing education systems in the world:

The injection of new leadership appears to be by far the most important factor: all 20 of the systems ... have relied upon the presence and energy of a new leader to jumpstart their reform program. New technical leaders were present in all of our sample systems, and new political leaders present in half. These new leaders tend to follow a common “playbook” of practices upon entering

office. Once installed, they have staying power: the median tenure of the new strategic leaders is six years and that of the new political leaders is seven years, thereby enabling continuity in the reform process and development of the system pedagogy. This is in stark contrast to the norm (Mourshed, Chijioke, and Barber 2010, p. 28).

Short-term versus long-term priorities

Most of what we know about specific interventions pertains to their short-term outcomes. Such interventions and outcomes include cash transfers increasing daily attendance of students and reducing grade repetition; performance-based pay for teachers improving student performance on tests; greater parental monitoring of schools reducing student and teacher absenteeism; and so on. However, a few studies have measured long-term outcomes in developing countries. One study traces toddlers who were part of a study two decades ago to measure the impact of an early childhood stimulation program on adult earnings in Jamaica (Gertler et al., 2014); another measures the effects of vouchers given at the beginning of secondary education on high school graduation rates and college performance in Colombia (Angrist et al., 2006). Longitudinal studies of this type reveal the fact that experimental studies that measure only short-term impact underestimate the total potential benefit from specific interventions. When annual average gains in learning continue throughout the schooling cycle, might the impact on skills add up to more than the sum of those gains? When students reduce their absences from school, might this short-term effect translate in the long run into more responsible behavior when students have become workers or parents?

Short-term priorities do not have only short-run impact; they can have also compelling long-run consequences. For example, to skill up today's workforce quickly, policy makers might choose to invest heavily in training and retraining programs, rather than tackle complex issues related to, say, the performance of teachers, which involves not only financial resources but also political capital to work with teacher unions. Prioritizing effective training programs for young people out of school and out of work could accelerate the formation of skills needed to spur employment and economic growth. In turn, increased employment raises the expected returns to skills, which could have the longer-run

benefit of increasing the schooling and graduation rates of younger cohorts. However, largely avoiding the persistent problems related to low cognitive achievement earlier in the education cycle means living with a low-performing school system that produces school-leavers who are unprepared for jobs and needing training programs later. It is useful to remember that skills formation is a cumulative, lifelong process that is more effective and less costly when it begins early. A broad perspective, informed by a better understanding of short-run and long-run impacts of specific reforms, can be useful in deciding on short-term and long-term priorities.

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Evidence demonstrates that education contributes to economic development, lowers poverty and inequity, and improves lives. A solid foundation of reading, writing, and basic math learned in school can equip young people with a set of competencies and skills, behaviors, and attitudes, as well as a sense of cooperation and social responsibility, that enables them to participate in society as productive workers and responsible citizens. It can impart young people with the ability to innovate and apply knowledge that supports a dynamic economy, determines the type of work they do, and raises their productivity and earnings. More schooling can benefit society in other ways too—in terms of better health, enhanced ability to cope with economic and environmental shocks, and greater social cohesion, among others. Given these benefits, it's not surprising that individuals, families, and governments have been investing increasingly in education.

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The Growth Dialogue is a network of senior policy makers, advisors, and academics dedicated to sustainable and shared economic growth. Towards this end, it aims to promulgate new views and insights on policies that can help shape global thinking; to be an independent voice on economic growth; and to be an active platform for policy dialogue among those entrusted with producing growth in developing and emerging market economies.



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