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# IMPROVING EDUCATIONAL OUTCOMES IN DEVELOPING COUNTRIES: LESSONS FROM RIGOROUS EVALUATIONS

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## ABSTRACT

This paper describes four lessons derived from 115 rigorous impact evaluations of educational initiatives in 33 low- and middle-income countries. First, reducing the costs of going to school and providing alternatives to traditional public schools increase attendance and attainment, but do not consistently increase student achievement. Second, providing information about school quality and returns to schooling generally improves student attainment and achievement, but building parents' capacity works only when focused on tasks they can easily learn to perform. Third, more or better resources do not improve student achievement unless they change children's daily experiences at school. Finally, well-designed incentives for teachers increase their effort and improve the achievement of students in very low performance settings, but low-skilled teachers need specific guidance to reach minimally acceptable levels of instruction.



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**Improving Educational Outcomes in Developing Countries:**

**Lessons from Rigorous Impact Evaluations**

## Introduction

Over the past decade, low- and middle-income countries have made considerable progress in increasing the number of children and youth who enroll in school and stay long enough to learn basic skills. However, they still have a long road ahead. From 1999 to 2011, gross enrollment in pre-primary education jumped from 27 to 45% in developing nations, but more than 63 countries are far from meeting the United Nations target of 70% enrollment at this level by 2015. During the same period, net enrollment in primary education has increased from 82 to 90%, nearly halving the number of out-of-school children. Yet, 57 million primary school age children (mostly in sub-Saharan Africa and South and West Asia) are still not enrolled. Gross enrollment in secondary school has also increased from 52 to 66%, but over 67 million adolescents are not in school (UNESCO, 2014).[1] Finally, while some developing countries (e.g., Brazil, Indonesia, Peru, Tunisia, and Turkey) have improved students' scores on international assessments of reading, math, and science, a country's income per capita remains a key predictor of performance on international tests, and learning in many low- and middle-income countries remains appallingly low (OECD, 2013; Pritchett, 2013).[2]

[1] Importantly, there is substantial heterogeneity in school enrollment at all levels across developing nations. For example, Sub-Saharan Africa only has 18% of children enrolled in pre-primary school, 78% in primary, and 41% of youths in secondary. Latin America and the Caribbean have relatively high pre-primary enrollment (73%), and near universal primary (95%) and secondary (90%) enrollment rates.

[2] By the beginning of school, many children in developing countries are already so far behind cognitively as a result of malnutrition and poor health that the challenge of educating these children is daunting (Schady et al., 2014). Regions like Latin America fare much worse than their income levels would predict (Ganimian & Rocha, 2011; Hanushek & Woessmann, 2012; Levy & Schady, 2013).

This paper distills lessons from rigorous impact evaluations of education policies in developing countries.[3] We reviewed 115 studies in 33 low- and middle-income countries.[4] Like similar efforts (see, for example, Banerjee & Duflo, 2011b; Banerjee et al., 2013; Bruns et al., 2011; Glewwe & Kremer, 2006; Glewwe et al., 2011; Kremer & Holla, 2009; McEwan, 2013; Murnane & Willett, 2011), we focused on studies with plausible identification strategies.[5] Our review differs from previous efforts in that we do not focus exclusively on a specific method (e.g., randomized evaluations), a specific topic (e.g., school resources or accountability reforms), or on papers produced for a specific organization or conference.

In our review, we identified four lessons for pre K-12 education in developing countries:

1. Reducing the costs of going to school and providing alternatives to traditional public schools increase attendance and attainment, but do not consistently increase student achievement.
2. Providing information about school quality and returns to schooling generally improves student attainment and achievement, but building parents' capacity works only when focused on tasks they can easily learn to perform.
3. More or better resources do not improve student achievement unless they change children's daily experiences at school.

[3] We refer to studies in developed countries, always in footnotes, when we want to contrast the evidence from high- and low-income nations, or when there are important insights from recent studies in developed countries that can help us interpret the evidence from the developing world.
[4] Fourteen from East Asia and the Pacific, 3 from Eastern and Central Asia, 43 from Latin America and the Caribbean, 5 from the Middle East and North Africa, 24 from South Asia, and 25 from Sub-Saharan Africa.
[5] Specifically, our review includes only studies that rely on randomized experiments or natural experiments. It does not include studies that employ matching methods.

4. Well-designed incentives for teachers increase their effort and improve the achievement of students in very low performance settings, but low-skilled teachers need specific guidance to reach minimally acceptable levels of instruction.

The first two lessons concern strategies for influencing the school enrollment and school choice decisions of families. The last two concern strategies for improving the quality of education. One theme of the paper is that it has proven much easier to design policies to influence families' school investment decisions, at least in the short run, than to design policies that increase educational quality. Of course, the demand-side and supply-side lessons are ultimately interdependent: parents are more likely to send their children to school regularly if they believe that schooling provides benefits. A second theme is that strategies to move from an education system that provides most students with basic literacy and numeracy skills to a system that provides students with higher order cognitive skills may be quite different and more difficult to implement than strategies to move from a totally ineffective education system to a minimally functioning one.

In this paper, we describe our interpretation of the evidence from well-designed evaluations of interventions. We report the effects that each intervention had on the group of students, teachers, or schools that experienced it (the "treatment" group) as measured against outcomes for a group of comparable students, teachers, or schools that did not experience it (the "control" group). To facilitate comparisons, we express the impacts of interventions in standard deviations (SDs).

**Lesson #1: Reducing the costs of going to school and providing alternatives to traditional public schools increase attendance and attainment, but do not consistently increase student achievement.**

***Reducing the Costs of Going to School***

While school fees have been abolished in most public school systems, families still must pay the costs of complements, such as school uniforms, transportation, eyeglasses, meals, and medication.

Commuting

Reducing the time that it takes children and youth to travel to school results in higher enrollments, and in some cases, in higher student achievement. One way to reduce commuting time is by building schools closer to the homes of potential students. Duflo (2004) found that an initiative in Indonesia from 1973 to 1978 that built 61,000 primary schools increased the educational attainment of its beneficiaries by about .2 years. Mocan and Cannonier (2012) evaluated a primary school construction program in Sierra Leone and found that it increased the educational attainment of girls by .5 years of schooling.[6] Burde and Linden (2009, 2012) assessed the impact of "community-based schools" (i.e., schools that serve only an individual village) in Guzara and Adraskan, Afghanistan, and found that their introduction boosted enrollment by 47 percentage points and improved children's math and language achievement by .59 SDs. Finally, Berlinski et al. (2009) evaluated the effect of a large expansion of universal pre-primary education in Argentina and found that it increased the average third grade test scores of beneficiaries by .23 SDs.

[6] Kazianga et al. (2013) found that a program devised to construct "girl-friendly" primary schools (i.e., schools with separate latrines for boys and girls, canteens and take-home rations, among other components) in Burkina Faso was even more successful in increasing the school enrollment of girls than increasing the supply of "conventional" schools.

The authors also found that pre-primary school attendance improved students' self-control, as measured by surveys of attention, effort, class participation, and discipline.

Another way to reduce commuting costs is by providing a means of transportation to school. Muralidharan and Prakash (2013) evaluated a program in Bihar, India that provided girls who enrolled in secondary school with a bicycle to travel to school. The program increased girls' enrollment in secondary school by 30% and reduced the gender gap in enrollment by 40%.[7]

School Latrines

Equipping schools with latrines also raises enrollments, through a combination of improved hygiene and reduction of anxiety. Adukia (2013) studied the impact of a large school-latrine-construction initiative in India in 2003, which was implemented jointly with a hygiene education program and other small-scale investments (e.g., providing buckets for water). She found that the initiative increased the enrollment rate of students in grades one through five by 12% and that of students in grades six through eight by 8%. The latrines also reduced dropout rates in lower primary schools by about 12% and in upper primary schools by roughly 5%.[8] The enrollment and dropout impacts are larger for females. At younger ages, girls and boys benefit from both unisex and sex-specific school latrines. At older ages, girls only benefit from sex-specific latrines.[9] Importantly, the effect of the intervention persisted for three years.

Uniforms

[7] In fact, the initiative was more cost-effective than cash transfers for families (reviewed below).
[8] The initiative had no impact on the share of students achieving high scores in an official exam, but this could be due to the fact that the intervention incorporated less academically able students.
[9] The author hypothesizes that this differential impact by latrine type suggests that the initiative might be affecting school enrollment and dropout rates through different channels: in lower primary schools, latrines might improve student health, while in upper primary schools, they might improve student outcomes through improved privacy and sexual safety.

Evans et al. (2008) found that free uniform provision in Busia, Kenya, reduced absenteeism by 44% for the average student and 62% for students who did not previously own a uniform. The program also increased test scores by .25 SDs after a year for children who received the free uniforms.[10]

Eyeglasses

Glewwe et al. (2012) assessed the impact of giving free eyeglasses to students in Western China. Students who benefited from the program for one year increased their test scores by .15 to .22 SDs, on average. Low-performing students benefited the most and the impact also depended on other characteristics of students and their families.[11]

School Meals

School meals typically have a positive effect on enrollment or attendance, but their effect on test scores is mixed. Vermeersch and Kremer (2005) evaluated an initiative in Busia and Teso, Kenya in 2000 that provided a fully-subsidized in-school breakfast on every school day to all children aged 4-6 who were enrolled in pre-school. This policy increased school participation by 8.5 percentage points in the first year and by 5.5 percentage points in the second year. However, it only resulted in higher scores on a literacy test in schools in which the teacher had significant teaching experience.[12]

[10] A similar study by Duflo et al. (2006) in two other rural districts in Kenya, Bungoma and Butere-Mumias, found free uniforms reduced dropout rates. By prolonging the time students spent in school, the uniforms also reduced the rates of teen marriage and childbearing.

[11] The authors found that girls were more likely to refuse free eyeglasses, and that level of parental awareness of vision problems, mothers' education, and economic factors significantly affected whether children in the control group wore eyeglasses.

[12] Earlier studies yielded similar findings. Powell et al. (1998) studied a program that provided free breakfast for children in grades 2-5 in Jamaica in 1994 and found that it increased attendance by 2.3 percentage points, but it had no effect on reading, spelling, or math test scores. Similarly, Jacoby et al. (1998) assessed the impact of a program that provided a free breakfast for children in grades 4-5 in Huaraz, Peru in 1993 and found that it increased attendance by 2.5 percentage points, but had no impact on reading, vocabulary, math, or coding test scores.

How meals are delivered to students seems to make a difference, but the pattern is not clear-cut. Kazianga et al. (2008) compared two school feeding schemes in the Sahel region of northern Burkina Faso: a school meals program that provided lunch at school every day and a take-home ration program in which girls received 10 kilograms of cereal flour per month, conditional on maintaining a 90% attendance rate. After a year, the authors found that the take-home rations increased girls' enrollment in school by 5-6%, depending on the age group, but found no such effect for the school meals.[13] Importantly, the school meals resulted in *higher* student absence.[14] Finally, non-enrolled younger siblings of recipients of take-home rations (aged 12-60 months) increased their age-adjusted weight by .38 SDs and their age-adjusted height by .33 SDs, but siblings of recipients of school meals did not experience these benefits. Adelman et al. (2008), however, compared two similar programs in Northern Uganda and found more positive effects for meals provided in schools.[15]

The type of food provided also seems to make a difference for schooling outcomes. Whaley et al. (2003) compared three programs that provided first graders in Embu, Kenya in 1998 with snacks that were meat-, milk-, or energy-based (all between 240-313 calories) for about two years. They found that none of the treatments had any

[13] Neither program altered student performance on a math test composed of four arithmetic questions, or other measures of cognitive development. Working children (mostly, girls) with access to the school feeding schemes shifted from farm and off-farm productive labor to domestic tasks, which are presumably more compatible with school hours.

[14] The authors showed that student attendance decreased in households with relatively low incidence of child labor and increased in households with relatively high incidence of child labor. They interpret this to me that, given the poor labor market, low-income households are labor constrained and adult and child labor are complementary.

[15] The authors compared the effects of two programs that provided food to children ages 6-17 who resided in camps in Northern Uganda for displaced families. One program, the World Food Program's school meals program, provided children with a snack and lunch. The second was a pilot take-home ration program with equivalent food transfers. Neither program had an effect on school enrollment, school attendance in the morning shift, grade, repetition, or math or literacy skills. The school meals program increased student attendance in the afternoon shift by 9.3 percentage points.

impact on reading or spelling test scores. However, the meat-based program improved beneficiaries' scores on the Raven's progressive matrices test by .13 SDs per year and their scores on a math test by .11 SDs per year, and the energy-based program improved students' scores on the math test by .15 SDs per year.[16]

Medications

Providing basic medication to children is a cost-effective way to increase enrollment and attendance; however, its impact on student achievement is mixed. Miguel and Kremer (2004) evaluated an initiative that provided deworming drugs to schools in Busia, Kenya. Provision of the drugs reduced absenteeism in treatment schools by one-quarter, and was far less expensive than alternative ways of boosting school attendance.[17] However, it had no impact on test scores. Luo et al. (2012) provided fourth graders in the poorest counties of the Shaanxi Province of China one dose of iron supplements (multivitamins with mineral supplements) per day for five months. In addition to reducing the prevalence of anemia, the intervention improved students' test scores. Finally, Bobonis et al. (2006) found that combining deworming drugs with iron supplements in Delhi, India increased the student enrollment rate by 5.8 percentage points, reduced student absenteeism by one-fifth, and improved children's health, as measured by their weight. Unfortunately, the authors did not measure the effect of the intervention on student achievement.

[16] The caloric content of school meals does not seem to make a difference in schooling outcomes. McEwan (2010) assessed the impact of Chile's School Feeding Program, which is one of the oldest, largest, and arguably one of the best-run among those in developing countries. It offers free meals to one third of the country's primary school students (i.e., grades 1-8), providing high-calorie meals to poorer schools and students. The author compared schools that were barely eligible to receive the high-calorie meals with those that were barely ineligible and found no evidence that the program affected the enrollment, attendance, repetition, or grade 4 achievement of children in eligible rural primary public schools during the period from 2001 to 2004.

[17] In fact, deworming substantially improved health and school participation among *untreated* children in schools that received the medication, as well as neighboring schools.

### *Compensating Families for Foregone Opportunities*

In many developing countries, low-income parents do not send their children to school because they need them to work at home or to earn money. For many poor families, this opportunity-cost is simply too high to justify school attendance.

Cash Transfers

Many developing countries have introduced programs that provide cash transfers to low-income families. In most programs, one condition for the transfers has been enrollment of children in school. Evaluations of these policies have found large positive impacts on primary and secondary school enrollment (Fiszbein & Schady, 2009).[18] The size of enrollment impacts, however, have depended on the share of students already enrolled in school,[19] the size of the transfers,[20] the timing of the transfers,[21] the age and grade of recipients,[22] the poverty level of its beneficiaries,[23] whether transfers are made conditional on a specific behavior (e.g., sending children to school),[24] who receives the transfers,[25] and whether the child benefiting from the transfers has any siblings.[26]

[18] Several of these programs are called "scholarships." However, since the cash transfers are conditional on school enrollment, we include them here.
[19] The lower initial enrollment, the larger the program's impact (Maluccio & Flores, 2005).
[20] Larger transfers do not always result in larger impacts. Some small cash transfers have had large effects (Chaudhury & Parajuli, 2010; Galasso, 2006). There is some evidence that there are diminishing marginal returns to transfer size (Filmer & Schady, 2011).
[21] Barrera-Osorio et al. (2011) evaluated different versions of a conditional cash transfer program in Bogotá, Colombia. They found that while all versions of the program increased attendance, the one that made part of the payment conditional on students' enrollment in the next grade increased the re-enrollment rate by 4 percentage points. This version, as well as one that made part of the payment conditional on high school graduation increased enrollment in tertiary education, by 9.4 and 48.9 percentage points, respectively.
[22] Schultz (2004) and Schady and Araujo (2008) evaluated cash transfers in Mexico and Ecuador, respectively, and found that they were most effective in the transitions from primary school to secondary school (grades 6-7) and from lower- to upper-secondary school (grades 9-10). Chitolina et al. (2013) evaluated a cash transfer in Brazil and found that it was more effective for males and when the child was the youngest in the household.
[23] The poorer the beneficiaries, the larger the program's impact (Behrman et al., 2005; Filmer & Schady, 2011; Glewwe & Olinto, 2004; Maluccio & Flores, 2005; Oosterbeek et al., 2008).
[24] Baird et al. (2011) and Benhassine et al. (2012) evaluated unconditional cash transfers in Malawi and Morocco, respectively, and found effects similar to those of conditional programs. Akresh et al. (2013)

Importantly, there is evidence that providing parents with cash transfers that are considerably less than the full value of the market wage of their children's labor results in increased school enrollment.[27] This suggests that cash transfers may "nudge" low-income parents to act in their children's best interest.

The evaluations also find that while cash transfers improve educational attainment (Behrman et al., 2011; Filmer & Schady, 2013; Mo et al., 2013b), they do not typically result in improved student achievement as measured by test scores.[28] One potential explanations for the lack of impact of cash transfers on test scores is that these programs

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found similar results in Burkina Faso. In fact, Benhassine et al. (2013) found that simply labeling transfers as intended for education makes parents spend them on education-related expenditures in Morocco, at least in the short run. Finally, Karlan and Linden (2013) found that a similar label on a savings account in Uganda increased savings and, when combined with a parent outreach program, increased expenditures on educational supplies.

[25] Benhassine et al. (2012) found that the impact of cash transfers in Morocco did not depend on whether the payments were given to mothers or fathers. However, Baird et al. (2011) randomly assigned households in Malawi to transfers that were divided differently between young women and their parents. They found that young women benefitted more when they received a larger share of the transfer.

[26] The direction and magnitude of these "sibling effects," however, remains unclear. Barrera-Osorio et al. (2011) found that the siblings of cash transfer beneficiaries in Colombia were less likely to attend school and more likely to drop out than the siblings of non-beneficiaries. However, Ferreira et al. (2009) found no evidence than siblings of cash transfer beneficiaries in Cambodia were less likely to attend school or work more than those of non- beneficiaries. Ambler et al. (2013) found no evidence of shifting of educational expenditures from other students in the household to the target student in a cash transfer program that matched remittances in El Salvador. Del Carpio and Macours (2010) found that boys in Nicaragua were more likely to be involved in agricultural work than girls, and that cash transfers reduced the time that boys devoted to agricultural work, thus helping them catch up with girls' school enrollment and attendance.

[27] For example, Filmer and Schady (2011) showed that a very modest transfer (about 2% of mean household consumption) had a very large effect on the school enrollment of girls in Cambodia, and that increasing the magnitude of the transfer (to about 3.5 percent) had no further effect on enrollment.

[28] Since children who do not receive cash transfers typically do not enroll in school, studies that compare treatment and control students using school-based tests are (unfairly) comparing most treatment children to only those control children who are enrolled in school. This has led more recent studies to use household-based tests. However, these studies have also not found any impacts on student achievement (Behrman et al., 2011; Filmer & Schady, 2011). There are two important caveats to the conclusion regarding the effect of conditional cash transfers on students' achievement. One is that cash transfers that are allocated on the basis of student merit (as opposed to on the basis of need) have shown positive impacts on student achievement (Barrera-Osorio & Filmer, 2013; Kremer et al., 2009). As Barrera-Osorio and Filmer (2013) argue, while this suggests that there is a tradeoff between efficiency and equity, it is not particularly stark if merit-based cash transfers are introduced into schools serving children from low-income families. Another is that cash transfers for saving purposes also influence children's achievement. Karlan and Linden (2013) compared a savings account fully-committed to educational expenses to one in which savings are available for cash withdrawal but intended for education in Uganda. They found the former had no impact and the latter increased scores on language and math by .14 SDs when combined with a parent outreach program.

bring to school the poorest children, who are more likely to have a hard time learning at school—both because they have cumulative learning deficits and because they place additional demands on teachers for personalized attention and also for remedial methods of instruction that teachers may not know or may not want to adopt (Banerjee & Duflo, 2011a; Filmer & Schady, 2013).[29] We revisit this issue when we discuss the potential of computer-assisted learning below.

### *Expanding Schooling Options*

Vouchers

Early evidence indicated that programs that provide low-income families with vouchers that paid all or part of the cost of sending their children to the private school of their choice increased educational attainments and student achievement. Angrist et al. (2002) evaluated a program in Colombia that used lotteries to allocate vouchers that partially covered the cost of private secondary school for students in families living in low-income neighborhoods.[30] Satisfactory academic progress was a condition for renewal of the voucher. After three years, lottery winners were 10 percentage points more likely to have finished eighth grade (mostly, because they were less likely to repeat grades) and scored .20 SDs higher on math, reading and writing achievement tests. Angrist et al. (2006) later found that voucher recipients were five to seven percentage points more likely to graduate from high school and scored .04 SDs higher on the college entrance

[29] Wong et al. (2013) found that a one-year cash transfer/voucher program in Lushan county, in China's Henan Province had no impact on test scores. The researchers hypothesized that this was because the quality of the available pre-schools was extremely low.

[30] Initially, vouchers could be used for both for-profit and non-profit schools, but after 1996, for-profit schools were excluded. To qualify for a voucher, applicants must have been entering secondary school, be less than 16 years of age, and must have been admitted to a participating secondary school.

exam.[31] However, recent evidence on vouchers has been somewhat different. Muralidharan and Sundararaman (2013a) evaluated a voucher program in Andhra Pradesh, India and found no difference between the test scores of voucher winners and losers on math and Telugu (the native language).[32]

It is important to keep in mind that the voucher programs in Colombia and India targeted low-income families. In contrast, until 2008 the long-standing universal voucher program in Chile provided all families with the same-sized subsidies to enroll their children in a private school. Hsieh and Urquiola (2006) showed that the Chilean universal voucher program, in operation since 1981, increased school segregation by income, with low-income students concentrated in different schools than those serving students from higher-income families. Moreover, these researchers found no evidence that the voucher system improved average educational outcomes as measured by test scores, repetition rates, or years of schooling.[33]

Subsidizing Private Schools

[31] The range of plausible estimates stems from initial differences between voucher winners and losers, which make the magnitude of the estimate of the effect of the program sensitive to the choice of pre-treatment covariates. Graduation was measured through a proxy, which was registration for the college entrance exam. At the time, 90% of all graduating high school seniors took this exam.

[32] The authors measured student achievement two and four years after the introduction of the program. The lack of effects on achievement in mathematics and Telugu may have been a result of private schools spending significantly less instructional time than public schools on these subjects, using the extra time to teach more English, Science, Social Studies, and Hindi. The authors note that lottery winners scored .13 SDs higher on average on a composite of all tested subjects (and that students who attended private schools scored .23 SDs higher on this composite). Yet, it seems inappropriate to emphasize this since the composite is an average of scores on tests in different substantive areas. These authors designed their study in a way that allowed them to examine the individual and the aggregate effects of school choice—including spillovers. They found no evidence that the voucher program affected public-school students who did not apply for the voucher or students who started out in private schools. The research team did find that the mean cost per student in the private schools was less than a third of the cost in public schools.

[33] Chile has recently introduced important reforms to its voucher system aimed at reducing the socioeconomic segregation of schools. In 2008, Chile adopted the Preferential School Subsidies law, under which low-income families receive educational vouchers that have substantial greater value than those provided to higher-income families. In 2009, the country enacted the General Education Law, which prohibited primary schools to select students based on their achievement or socio-economic status.

Yet another way to expand schooling options for children from low-income families is to subsidize low-cost private schools. Barrera-Osorio and Raju (2011) assessed the impact of a program in Punjab, Pakistan that offered low-cost private schools a per-student subsidy. The subsidy was conditional on these institutions offering free schooling for all of their students and on students achieving a minimum pass rate on a specially-designed standardized test. The program expanded enrollments by 37%.

Although some of these subsidies have been introduced with the goal of increasing the school enrollment of female children, they have typically increased enrollment for both genders. Kim et al. (1999) evaluated a program in Quetta, Pakistan that offered subsidies to private schools for each girl that enrolled for three years, as well as additional funds to defray start-up costs. While the program increased girls' enrollment by 33 percentage points, boys' enrollment also rose.[34] More recently, Barrera-Osorio et al. (2013) evaluated the introduction of publicly funded private primary schools in Sindh, Pakistan. The program increased average enrollment by 30 percentage points and improved achievement by .67 SDs in math and Urdu or Sindi tests, with no difference in impacts by gender.[35]

**Lesson #2: Providing information about school quality and returns to schooling generally improves student attainment and achievement, but building parents' capacity works only when focused on tasks they can easily learn to perform.**

Many low-income parents lack information pertinent to decisions about investing in the development of their children's skills. Providing relevant information improves

[34] This was partly because boys could attend new schools created under the program and because parents would not send their girls to school without also sending their boys.
[35] In fact, providing equal incentives for entrepreneurs to recruit boys and girls led to the same increase in female enrollment as providing greater financial incentives for the recruitment of girls.

children's development outcomes in many settings. It also increases the cost-effectiveness of schools, especially private schools.

### *Providing Parents and Students with Information*

Information on School Quality

In contexts in which private schools educate many children, information on school quality may create competitive pressure for schools to increase their performance. Andrabi et al. (2009) evaluated an initiative in Punjab, Pakistan that provided the parents of third graders attending public and private schools with school- and child-level learning "report cards." The initiative increased students' achievement in English, mathematics, and Urdu by .1 SDs and decreased school fees by 18%. The research team found that the initiative improved the performance of private schools more than that of public schools.[36] Camargo et al. (2011) assessed another report card initiative in Brazil and found similar results. They found that releasing information about the test performance of students increased the achievement of students attending private schools by .2-.6 SDs, but did not increase the achievement of students attending public schools.[37]

Mizala and Urquiola (2013) evaluated the effect of rankings based on schools' "value-added" in Chile, another country with a large share of privately-managed schools. They found no effects on schools' enrollment, fees, or the socioeconomic composition of student bodies. A key distinction between this study and the previous ones is that these rankings were not publicized, so they might have gone unnoticed by parents. The study

[36] In response to the initiative, student achievement in formerly low-quality private schools increased by .34 SDs, while relatively effective private schools reduced their fees. Public schools improved student achievement by .10 SDs.

[37] The range of estimates stems from sensitivity to the number of students included around the cutoff of 10 students that made disclosure of test information mandatory. The authors interpreted these results as suggesting that the main mechanisms driving the differences in performance were the increased levels of students', teachers' and principals' effort. They did not find evidence that treated private schools adjusted their inputs or that there was major changes in the student composition of treated schools.

also suggests that there might be diminishing marginal returns to information on school quality. Chile has published the results of its national assessments by schools for over 20 years in all major newspapers, so information on value-added might not be useful in "updating" parents' beliefs about school quality.

Information on Returns to Education

Even when the costs of schooling are low, many poor families do not send their children to school.[38] One hypothesis to explain this pattern is that many parents do not anticipate benefits from their children's schooling. Two experiments found that showing students and/or their parents the financial benefits of schooling increased educational attainment. Jensen (2010a) provided information to students in the eighth grade in the Dominican Republic about the wages of adults with different levels of education.[39] He found that recipients of this information reported dramatically higher increased perceived returns when re-interviewed six months later and, on average, completed .20-.35 more years of schooling over the next four years.[40]

Similarly, Dinkelman and Martínez (2013) conducted a randomized control trial of 6,000 eighth graders in 226 poor urban areas in Chile in which the treatment groups received standardized information (delivered through a short DVD program) about financial aid opportunities for higher education. There were two treatment arms: in one, only the students received the information (at school); in the other, both students and their parents received it (at home). The authors found that exposure to this information

[38] Banerjee and Duflo (2011a) argue this is because poor parents believe schooling pays only if a student can graduate (that is, that there is little value in each additional year of schooling). Therefore, parents only send and/or keep a child in school if they believe that he or she has a good chance of graduating.
[39] The information was only provided to students, although parents were interviewed in the second year of the study to collect additional information on socio-economic status.
[40] In a different study, Jensen (2010b) provided three years of recruiting services to help young, unmarried women in Indian villages obtain jobs in the business-processing industry. He found that girls in treatment villages were more likely to be in school and were healthier, as measured by their body mass index.

raised the probability of enrolling in a college preparatory high school by 6 percentage points and lowered student absenteeism by 8-10 percentage points. However, it did not improve test scores. Interestingly, they found that the information had almost the same impact when delivered to students alone or to students with their parents, even if parents learned and retained more details of financial aid programs that untreated parents.

How the information is provided, who delivers it, and who receives it, may matter. Nguyen (2009) compared two alternative ways of providing information about the economic returns to education in Madagascar: (i) one similar to the plan adopted by Jensen, in which teachers reported to *both* children and parents the average earnings at each level of education; and (ii) a "role model" intervention that sent a person to share his/her success story with students and their families. She found that the first intervention improved average test scores by .2 SDs (and by .37 SDs for students with initially low perceptions of education returns) and increased student attendance by 3.5 percentage points. The average effect of the "role model" intervention was not statistically different from zero. However, this intervention had a .17 SD effect on test scores in cases in which the individual sharing his/her story was from a poor background and a .27 SD effect when the students and families who were listening to the low-income "role model" were also poor.[41]

More information does not always lead to improved educational outcomes. In an intervention similar to the one Jensen studied, Loyalka et al. (2013) trained teachers in the Hebei and Shaanxi Provinces in China to give seventh graders in 131 junior high

[41] Another strategy to increase the schooling attainments of marginal students is to increase the minimum age at which adolescents may legally leave school. Spohr (2003) found that a compulsory schooling law in Taiwan that expanded compulsory (and free) schooling from six to nine years increased the schooling of males by .4 years and of females by .25 years. Fang et al. (2012) found that a similar law in China raised average educational attainment by about .8 years of schooling.

schools a 45-minute scripted lesson on the average wages of individuals with different levels of schooling and the availability and costs of high schools in their province. This intervention had no impact on dropout rates, math achievement, or students' plans to go to (academic or vocational) high school.[42] Using their survey data, the authors concluded that the financial constraints that students faced and the poor quality of their local schools may explain the lack of a positive effect.

Loyalka and his colleagues found that a similar "counseling" intervention in the same provinces in China had *negative* effects on student outcomes. In this intervention, teachers gave seventh graders four 45-minute scripted lessons on career-planning: (i) discussing the importance of skills in China's growing economy; (ii) helping students identify their career interests; (iii) presenting the returns to high school education; and (iv) teaching students how to navigate China's education system after junior high school. This intervention *increased* dropout rates by two percentage points and reduced math achievement by .14 SDs. The authors speculated providing information about the high (and growing) wages for unskilled labor may have dissuaded students from going to high school.

### *Building Parents' Capacity*

Capacity-building on Parenting Practices

Low-income families benefit from initiatives that provide parents with information on how to stimulate their children's learning and with support for changing their parenting practices. Gertler et al. (2014) evaluated the long-term effects of an early childhood development intervention for children with stunted growth (aged 9-24 months)

[42] These results are consistent with another informational intervention. Hicks et al. (2013) evaluated an intervention that informed individuals about the returns to vocational education in Western Kenya and found no effect on educational attainment.

in Kingston, Jamaica. The intervention entailed one-hour weekly visits for two years from a community health worker that delivered a structured curriculum focused on improving the interaction between the mother and the child, as well as teaching basic concepts of space, quantity, and position, among other activities. Twenty years after the intervention, the program had increased the average earnings of participants by 25% and the earnings of individuals in the treatment group caught up to those of a matched non-stunted comparison group.

Attanasio et al. (2012) evaluated an adaptation of the Jamaican intervention, targeting children aged either 12-18 or 19-24 months in 96 small municipalities in Colombia.[43] Beneficiaries were randomly assigned to: (i) weekly home visits for 18 months during which a local home visitor showed the mother a number of activities she could do with the child, following a semi-structured curriculum with a cognitive and language focus; (ii) a micronutrient supplementation consisting of "sprinkles" with iron, zinc, Vitamin A, and Vitamin C; or (iii) a combination of both treatments. The first treatment had a .26 SDs impact on a test of cognitive skills, the second treatment had no effect, and the combined treatment had a .21 SDs effect.[44] The impact of both interventions was larger for students who started the intervention when they were 19-24 months of age than for those who started when they were 12-18 months old.[45]

Banerji et al. (2013) assessed three different interventions designed to improve the home learning environment among rural households in India: (i) adult literacy classes for

[43] All participating families were beneficiaries of a cash transfer program cash transfer that targeted the poorest 20% of households in the country. The study included parts of Antioquia, Boyacá, Caldas, Cundinamarca, Huila, Risaralda, Santander, and Tolima.
[44] The authors hypothesized that the smaller effect of the combined intervention is due to the micronutrient supplementation crowding out the stimulation intervention.
[45] Even the micronutrient supplementation impacted cognition (by .13 SDs) at this age period.

mothers; (ii) training for mothers on how to enhance their children's learning at home; or (iii) a combination of the first two interventions. They found that the three programs had statistically significant effects of .04, .05, and .07 SDs on children's math scores, respectively, but only the combined intervention had significant effects on language scores.[46]

Capacity-building on School Management

Initiatives that train low-income parents to become more involved in school management (broadly known as "school-based management" reforms) have had a mixed track record. Pandey et al. (2009) assessed the impact of a campaign in 340 villages in Karnataka, Madhya Pradesh, and Uttar Pradesh, India to disseminate information about roles and responsibilities in state-mandated school management. The campaign included eight or nine public meetings in each village. The effects of the intervention varied widely among sites. For example, the campaign increased teacher attendance in schools in Uttar Pradesh by 7 percentage points, but not in schools in Karnataka or Madhya Pradesh. The initiative increased the share of teachers who were teaching, conditional on being present, in Madhya Pradesh by 9 percentage points, but not in Karnataka or Uttar Pradesh. In all three states, the campaign improved the delivery of entitlements (e.g., uniforms, stipends, meals). Impacts on reading and math tests were small and irregular. The authors interpret these differences as indicative of the importance of the different levels of already-existing parental capacity in these communities.

Banerjee et al. (2010) compared the effectiveness of three interventions in Uttar Pradesh, India: (i) small group discussions in neighborhoods or hamlets about the roles of

[46] The authors also found that the interventions increased women's empowerment, mothers' engagement in their children's learning and the presence of education assets in the home.

the Village Education Councils (VECs); (ii) the previous intervention plus training of community members to administer a simple reading test for children and create "report cards" on the status of enrollment and learning in the village; and (iii) the previous two interventions plus training of village volunteers to teach children in reading camps. None of the three interventions had an impact on community involvement, teacher effort, or learning outcomes inside the school.[47] However, the third treatment, which included the summer camp, increased the share of students who could read letters, words, or paragraphs.

**Lesson #3: More or better resources do not improve student achievement unless they change children's daily experiences at school.**

By far the most popular policies in education have been the provision of additional resources to schools, whether in the form of more (or better) teaching materials, new computer hardware or software, smaller class sizes, or more instructional time. These interventions do not consistently increase student achievement because, with relatively few exceptions, they do not result in changes in teachers' instruction, and consequently do not produce changes in children's daily experiences at school.

***Giving Schools More Learning Materials***

A number of rigorous evaluations of interventions that provided schools with basic teaching inputs, such as textbooks, libraries and flipcharts find that these resources

[47] Similar efforts have had mixed results on improving school outcomes. Gertler et al. (2012b) evaluated a program in Mexico that offered parent associations in primary schools funds on the condition that parents get involved in school activities. The program reduced repetition by 5.5% in grades 1-3, but not in grades 4-6, and it had no effect on dropout rates in any grade. Gertler et al. (2012a) doubled the funds that some of the schools received to isolate the impact of the funding and found that "double-funded" schools reduced repetition rates by 1.5-1.7 percentage points and increased student achievement in math (5-5.6%) and reading (6.3-8%) in grade 3, but not in grades 4-5, and had similar repetition and grade failure rates as "single-funded" schools.

are sometimes not used, and when they are, they do not consistently increase student achievement.

Textbooks

Textbooks have had little impact on student achievement in the two cases in which their impact has been rigorously evaluated. Glewwe et al. (2009) evaluated a program in Busia and Teso, Kenya that provided free official government books in English, math, and science in grades 3-8, as well as the associated teachers' guides. The program had no impact on the achievement of the average student. The only children who benefited were those who already had relatively high achievement. The authors argued that the explanation for the lack of effects was that most students could not read the textbooks, which were in English, the official language of Kenya, but not the first language of most students.

More recently, Sabarwal et al. (2013) evaluated a program that provided free textbooks in English to government, government-assisted, and community primary schools (but not private schools) in Sierra Leone that had students enrolled in grades 1-6 in 2008. The initiative had no impact on the enrollment, attendance, or math and English achievement of grade 4 and 5 students. The researchers hypothesized that the lack of effects on students may have been at least partly due to the actions of school principals who, fearing a shortage of textbooks in the future, stored the textbooks instead of giving them to students.

Libraries

Borkum et al. (2012) evaluated a program in Bangalore, India that introduced libraries where librarians provided regular reading-focused educational activities and

facilitated students' interaction with the books. Most schools used the libraries, but the program had no effect on students' language skills or attendance rates.[48]

Flipcharts

Glewwe et al. (2004) assessed a program that provided free flipcharts to primary schools in Busia and Teso, Kenya including two sets of science charts, a teacher's guide for science, a set of charts for health, a set of charts for math, and a wall map of East Africa for geography. They found that students in schools that received flipcharts did not score better on grade 8 examinations than students in control schools. This occurred even though 98% of teachers were aware that their school had been given flipcharts, 91% claimed to have used them, and 92% claimed they found them useful and that they had been used in 10-20% of school days in the year.[49] One potential explanation is that teachers lacked the knowledge of how to use these resources to improve instruction.

***Giving Schools Computer Hardware and/or Software***

A number of interventions have provided schools with computers and/or software. The evaluation results from these interventions are quite mixed. One likely explanation is that the quality of the software and the details of implementation are critical.

Computers in Schools

Donating computers to schools does not, by itself, increase student learning. Barrera-Osorio and Linden (2009) evaluated a public-private partnership in Colombia that installed refurbished computers in public schools and encouraged teachers to use

[48] In fact, when the authors disaggregated the impact of the program by mode of delivery, they found that there were no effects when the libraries were provided directly to schools (i.e., "hubs"), but there were sizeable *negative* effects when the libraries were provided through a visiting librarian (i.e., "spokes"). One reason was that in the latter case, librarians visited schools on a pre-arranged schedule and could only interact with students during that time. Therefore, these visits disrupted the normal school schedule, and teachers adjusted by reducing the time spent on language arts.

[49] While teachers might have over-reported how often they used the flipcharts, over 90% of them gave specific answers that required experience with the materials.

software that provided instruction on how to use the computers in teaching reading. They found that the program increased the number of computers in schools but that it had no impact on test scores in any subject for any subgroup of students.[50] The main reason was that teachers of core subjects did not integrate them into their classroom instruction.

Giving students free laptops especially designed for educational purposes increases their basic computing skills, but the evidence is mixed on whether this intervention improves students' performance in core school subjects. Cristia et al. (2012) evaluated the One Laptop per Child (OLPC) program, which provided free laptops with 39 educational applications and 200 age-appropriate e-books in poor rural regions of Peru.[51] While the provision of laptops improved students' basic computing skills, it did not increase achievement in math or language, or affect the time allotted to school-related activities.[52]

Computers at Home

Giving students money to purchase their own computers leads them to acquire computing skills, but at the expense of their performance at school. Malamud and Pop-Eleches (2011) evaluated a program in Romania that provided low-income students in grades 1-12 in public schools with vouchers to purchase personal computers. They found that those who were offered a personal computer were more likely to own and use a computer, and performed better on a test of computer skills and on self-reported measures of computer fluency (.25 SDs). However, they performed *worse* than peers who were not

[50] There were no changes in the share of students who liked their school or the content that they were learning, or in their propensity to talk to teachers outside of class.
[51] These included: (i) standard applications (e.g., write, browse, paint, calculator, chat); (ii) games (educational and a variety of puzzles); (iii) music (to create, edit and play music); (iv) programming; (v) other (including sound and video recording and specific sections of Wikipedia).
[52] The majority of treatment students showed general competence in operating the laptops in tasks related to core applications and searching for information on the Internet.

offered a personal computer in math, English, and Romanian (.25-.33 SDs). The reason was that few computers were used for schoolwork.[53] Most children reported playing computer games daily and winning a voucher also reduced the time spent doing homework, reading, and watching TV.[54]

In fact, there is some evidence that the skills that children acquire by having a home computer may not be transferrable to computers different from the type they receive. Beuermann et al. (2013a) evaluated a version of the OLPC program in which 1,000 students in primary schools in Lima, Peru received specially-designed OLPC laptops. Interestingly, the authors found that treatment students scored .88 SDs higher on a test measuring proficiency in using the specific OLPC laptop, but no better than control students on measures of skills using a Windows PC and the Internet.

A recent evaluation of an OLPC program in Beijing, China, however, found very different results. The program distributed laptops to 150 third graders in 13 migrant schools, who were allowed to take the laptops home. In contrast to OLPC initiatives in other settings, the laptops included remedial math and Chinese tutoring software (i.e., animated reviews and remedial questions). This software was also set up so that it was aligned with the content that students were learning in their math class. Children were trained on how to use the software and were given an opportunity to practice using it with their parents at their side. Mo et al. (2013a) found that the intervention improved scores

[53] Few parents or children reported having any educational software for their computer and few children reported using the computer for homework or other educational purposes. These findings are consistent with those of the largest-ever field experiment that provided free home computers to students. The results of this randomized controlled trial, which Fairlie and Robinson (2013) conducted in California, were that the intervention had no effects on any educational outcomes, including grades, test scores, credits earned, attendance or disciplinary actions. Student surveys indicated no change in homework time or other "intermediate" inputs.

[54] Importantly, the presence of parental rules regarding homework helped mitigate some of the negative effects of winning a computer voucher without affecting the gains to computer skills and cognitive skills. .

on a measure of computer skills by .33 SDs and standardized math scores by .17 SDs after 6 months of intervention. In fact, the program also increased the time students spent using computer software for learning purposes and decreased the time they spent watching television. The main take-away from these studies is that home computers increased academic skills, at least as measured on standardized tests, only when they are part of an intervention purposefully designed to complement students' schoolwork.

Computer-Assisted Learning

Banerjee et al. (2007) assessed a program in Vadodara, India that offered fourth graders two hours of shared computer time per week to play games solving math problems, the difficulty of which responded to students' performances. One hour was during the school day and the second after the normal school day ended. The program increased math scores by .35 SDs in year 1 and .47 SDs in year 2. It had a larger impact for students initially in the bottom third of the achievement distribution than for those in the top third.

One potential explanation offered by Banerjee and Duflo (2011a) for this pattern of results is that low-achieving students stood to gain more from the computer-adaptive software because the material taught during regular class time was too difficult for them. However, this hypothesis is not completely consistent with the results of a similar intervention evaluated by Linden (2008). This intervention consisted of two similar versions of the same program in Gujarat, India in which children were assigned to either an after-school or to a pull-out version of the program.[55] Linden found that students

[55] This was not the only difference between the two programs. Unlike the program in Vadodara, the one in Gujarat entailed only one hour of computer practice per day and assigned a computer to each child. Also unlike the one in Vadodara, this one was designed to complement in-class math instruction and was delivered in a way that children required no support from their teachers.

performed .28 SDs better than control peers in the version taught after-school, but .57 SDs *worse* in the version taught during school in which children were pulled out of their regular classes to participate.[56] This pattern of results suggests that even low-performing students learn something from regular teacher-led lessons and that the difficulty of regular classes cannot fully explain the heterogeneous effects of these programs.

Computer-adaptive software does not always benefit low-achieving students more than higher-achieving students. Carrillo et al. (2011) evaluated an initiative in Guayaquil, Ecuador, in which schools received basic infrastructure for computer labs, four computers per school, software designed to facilitate students' learning in language and math, and training for teachers and administrators on the use of this software.[57] The intervention had a sizable impact on the math achievement of fifth grade students (about .30 SDs). However, this impact was much larger among students at the top of the achievement distribution, suggesting that the content of the software (not just the fact that it is computer-adaptive) and its alignment with test content may help explain which students stand to benefit the most from these programs.

***Reducing Class Size***

Evaluating the causal impact of class size on student skill development is difficult because school administrators, teachers, and parents tend to take actions in response to initiatives to reduce class size. Affluent parents that invest heavily in their children's

[56] Lai et al. (2013) evaluated an after-school computer-assisted learning program in the Shaanxi Province of China and found similar results. The authors implemented a remedial, game-based program in math in poor rural public schools and found that it improved the math achievement of the participating students by .12 SDs. Students from low-income families benefited more from the program.

[57] Like the interventions in Vadodara and Gujarat, this one also used computer-adaptive technology to allow students to learn at their own pace, providing students with exercises based on their initial performance on a diagnostic test and reviews of key concepts before, during and after each exercise. Also, as with the intervention in Gujarat, the one in Guayaquil did not require teachers' guidance and students could use the computers and software during *and* after school.

education may choose housing in the catchment area of schools with small classes. School administrators may decide to group low-achieving children or children with behavior problems in especially small classes. Experienced teachers may use their political influence to be assigned to small classes, leaving novices to teach larger classes. A consequence of these actions is that, even net of the influences of observed characteristics of students, differences between the achievement distributions of children enrolled in different sized classes may not stem from the influence of class size on skill development.

Angrist and Lavy (1999) developed a creative strategy for using class size limitations to generate plausibly exogenous variation in class sizes. This method has been used in many subsequent studies of the effects of class size. However, using data from Chile, Urquiola and Verhoogen (2009) show that estimating the effect of class size using variation generated by maximum class size rules is jeopardized by parents' and school administrators' responses to these rules. First, when high-income parents have a child assigned to a "large" class, they are more likely than low-income parents to take their son or daughter to another school where he or she would be placed in a "small" class. Second, when the enrollment of one additional student would trigger a maximum class size rule, private school administrators are likely to adjust the price (or enrollment) to avoid hiring an additional teacher. The net effect of these responses is to violate the assumption that students in cohorts of size just above and just below maximum class sizes do not differ discontinuously in ability and motivation and parental resources. Urquiola and Verhoogen's (2009) creative and detailed analysis calls into question evaluations that rely on class size maximums for exogenous variation in class sizes.

There is one important study in a developing country that used random assignment to examine the impact on student achievement of class size reductions coupled with innovations in teacher hiring and school governance. Duflo et al. (2011) assessed a program in western Kenya in which school committees in 140 out of 210 schools received funds to hire an additional first grade teacher. The provision of an extra first grade teacher resulted in a reduction from an average of 80 students in first grade classes in treatment schools to an average of 46 students.[58] In 70 out of the 140 treatment schools, students were assigned to small classes according to their initial achievement, resulting in one class in each school of relatively high ability students and one class of relatively low-ability students. In the other 70 treatment schools, students were randomly assigned to one of two first grade classrooms.[59]

Reducing class size dramatically in the absence of any other reform led to *lower* teacher effort and no discernible improvement in student achievement. However, combining class size reductions with one or more initiatives designed to improve instruction and change children's daily experiences in school resulted in improved student achievement. These initiatives included the hiring of contract teachers whose continued employment depended on performance, the tracking of students that provided a better match of instruction to students' needs, and training in school-based management that empowered school committees to monitor teacher actions, including their attendance. The achievement gains ranged from .19-.31 SDs in literacy and numeracy.

***Increasing Instructional Time***

[58] As explained in a subsequent section, the "extra" teachers were hired locally, at about a quarter of the cost of civil service teachers. The academic qualifications of the local hired "contract" teachers were similar to hose of the civil service teachers.

[59] More specifically, they were randomly assigned to either a civil service teacher or a teacher hired on a contract basis. We discuss that part of the experiment in a subsequent section.

A number of developing countries have increased instructional time, typically by increasing the length of the school year or school day.[60] The evidence indicates that additional time is more effective at increasing student learning when it is used to devote more attention to the needs of low-achieving students rather than to extend regular instruction.

Longer School Year

Unfortunately, there are no studies in developing countries estimating the effect of lengthening the school year. However, Agüero and Beleche (2013) assessed the impact of increasing the number of days of instruction prior to a national exam for third through sixth grade students in Mexico by exploiting variation across states and over time in the start of the school calendar and the administration of the test. They found that adding 10 days of instruction increased math scores by .04-.07 SDs (depending on the grade). They also found that there are diminishing marginal returns to extra days of school and that students in high-poverty schools benefited less from more days of schooling than students in schools serving more affluent student population. Differences between high-poverty schools and low-poverty schools in the quality of instruction may explain this pattern.

Longer School Days

To our knowledge, there has been only one quasi-experimental evaluation of the effect of extending the school day and providing additional resources to schools. Bellei (2009) assessed a "Full School Day" program in Chile, which lengthened the day by switching from two "shifts," consisting of two different groups of students attending the same school in the morning or afternoon, to an extended school session that included the

[60] A number of initiatives in developed countries have increased the length of the school year for low-achieving students by introducing mandatory summer school (Jacob & Lefgren, 2004; Linden et al., 2011). We discuss a recent experiment in India (Banerjee et al., 2011) in the section on school-based management.

morning and half of the afternoon in all publicly funded schools. It also included a one-time investment in school facilities (to construct or renew classrooms, cafeteria, bathrooms, etc.) and a permanent increase in the amount of the monthly public per-student subvention. The author found the program increased student achievement as measured on the national tenth grade assessment. The increase in Spanish achievement was .05-.07 SDs and in mathematics achievement .00-.12 SDs, depending on model specification.

After-School Tutoring

Programs that offer low-achieving students additional instructional time with volunteer tutors have not improved student achievement; however, instability in staffing arrangements may explain the lack of effects. Cabezas et al. (2011) evaluated a three-month program in two regions of Chile (Gran Santiago and Bío Bío) in which fourth-graders met 15 times for 90 minutes with college volunteers who read them age-appropriate texts. On average, the program had no impact on students' cognitive or non-cognitive skills. Yet, there were major differences in the implementation of the program in the two regions. In Gran Santiago, there was high volunteer turnover and, on average, each student was tutored by 3.5 different volunteers. In Bío Bío, volunteer turnover was lower and each student was tutored, on average, by two different volunteers. Students from the lowest performing schools in the Bío-Bío region scored .15-.20 SDs higher on a reading test than their control peers, suggesting that the connection between a volunteer and his/her students was an important factor.[61]

[61] Battaglia and Lebedinski (2013) evaluated a similar tutoring program in Serbia that also suggests that staffing arrangements matter. In the Roma Teaching Assistant Program, all the tutors were Roma and had backgrounds similar to those of their students. This led the authors to hypothesize that tutoring programs might have "role-model" effects, in which assistance from a successful person belonging to the same

**Lesson #4: Well-designed incentives for teachers increase their effort and improve the achievement of students in very low performance settings, but low-skilled teachers need specific guidance to reach minimally acceptable levels of instruction.**

Over the past two decades, studies conducted in several countries have documented a pattern that most parents of school-aged children recognize, namely, that some teachers are more effective than others in increasing students' skills. It has proven much more difficult, however, to formulate and implement policies that attract talented adults into teaching, prepare them well, create conditions that support effective teaching, and provide incentives that induce teachers to maximize their efforts to teach all students well.[62] Moreover, while a great many policies have been tried, only a modest subset have been evaluated using rigorous methods.

One theme of the evidence that does exist is that creating incentives for teachers to come to school regularly and to teach to the best of their abilities throughout the day is an effective improvement strategy when teachers are not already doing these things.[63] An important corollary is that creating incentives for people to achieve outcomes that lie beyond their capabilities often results in dysfunctional responses that do not enhance students' learning. Thus, improving the capabilities of the teaching force is an essential complement to appropriate incentives in moving from subpar to adequate education.

***Rewarding Teacher Effort or Performance***

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community motivates children (and in turn, their parents) to believe they can succeed. The authors found that parents of students in treated schools expected higher returns to education for their children and were more likely to expect them to graduate from high school.

[62] See, for example, Chetty et al. (2011); Kane et al. (2013); Kane and Staiger (2008, 2012); Rivkin et al. (2005); Sanders and Horn (1998). An ongoing study by Araujo et al. (2014) in Ecuador is particularly interesting because it finds that a substantial portion of the classroom to classroom variation in student achievement, net of background characteristics, can be accounted for by observational measures of teachers' behaviors and practices.

[63] In contrast, the track record of incentives to improve teaching performance in the United States is quite poor.

Offering teachers more money or in-kind prizes (e.g., bicycles) for increasing their effort (typically measured in terms of attendance) or their students' achievement (often measured as gains in test scores) has achieved positive results in schools with very low student achievement. However, the details of these incentive plans matter a great deal.

Pay for Attendance

Paying teachers to go to school reduces teacher absenteeism when the method of monitoring attendance is external (i.e., when it is executed by someone who has no direct stake in the service being delivered), impersonal (i.e., when it makes no allowances for the circumstances of the absence) and when there is someone who can enforce the rewards and punishments linked to absence (Banerjee & Duflo, 2006). Duflo et al. (2012) evaluated an intervention in Rajasthan, India, which provided a bonus to teachers based on the number of days they attended school. The researchers monitored teacher attendance by providing tamper-proof cameras and asking teachers to take a picture of themselves and their students at the start and end of each school day. The intervention reduced teacher absenteeism from 44% at baseline to 21% in 30 months.[64] A year into the program, student test scores in treatment schools were .17 SDs higher than in the comparison schools, and two and a half years into the program, children from treatment schools were 10 percentage points (or 62%) more likely to transfer to formal primary schools, which require passing a competency test.

Pay-for-attendance programs that rely on monitoring by school principals or parents have had no impact on attendance or student achievement. Kremer and Chen

[64] When schools were open, teachers in control and treatment schools were equally likely to be teaching, which suggests that the problem was primarily getting teachers to come to school regularly.

(2001) studied an initiative in rural Kenya that gave principals funds to reward the attendance of pre-school teachers. The program had no impact on teacher attendance, teacher pedagogy, student attendance, or students' test scores. In fact, principals counted all teachers as being present enough times to receive the bonus, but unannounced attendance verifications found that teacher absence was at the same high rate in both treatment and control schools.[65] Kremer and Vermeesch (2005) assessed an initiative that provided school committees in Kenya (mainly composed of parents) with information on teacher performance, including absenteeism, facilitated meetings between the committees and sub-district authorities (who could act on the information), and financed bonuses that committees could allocate to teachers who performed best, according to their judgment. This program had no effect on teacher attendance or any other meaningful outcome.

Pay for Performance

Well-designed programs that offered teachers financial incentives for improving student achievement have resulted in higher test scores in some settings in which student performance was extremely low (Bruns et al., 2011; Bruns & Luque, 2014).[66] Most impressive is the evidence from an experiment that Muralidharan and Sundararaman (2011) conducted in rural primary schools in Andhra Pradesh, India. These authors found that modest financial rewards to teachers for improving student achievement in

[65] The authors see this outcome as surprising, given that principals could use any funds not allocated to teacher bonuses for other school expenses. Yet, it is not obvious that the authority to use these discretionary funds provides a clear incentive for principals to do the right thing. Principals may not want the money if the bureaucratic processes in accounting for how it is spent are too burdensome or if it creates conflict inside schools about how to allocate it.

[66] This has not been the case in the United States. See, for example, studies on merit pay plans in New York (Fryer, 2011), Tennessee (Springer et al., 2011) and Chicago (Glazerman & Seifullah, 2012). The only exception to these null findings is a study that capitalizes on the potential influence of loss aversion in Chicago (Fryer et al., 2012). A limitation of this study is its brief, one-year duration.

mathematics and language, as measured by test scores, increased student outcomes by .27 and .17 SDs, respectively.

However, as Vegas and Umansky (2005), and later Bruns and Santibáñez (2011) have argued, the evidence from other experiments on pay for performance indicates that the impacts of these programs on student achievement depend on the student outcomes being rewarded (e.g., graduation rates versus test scores)[67] and whether the awards are for individual teachers who can directly influence these outcomes or for all teachers in a school.[68] Interestingly, the size of the reward (relative to the average teacher's salary) does not seem to matter; larger rewards have not consistently resulted in larger impacts.[69] Finally, most merit pay programs have rewarded test score *gains* rather than test score *levels*. While doing so seems to give all schools a fair chance of being rewarded, gains in test scores are much "noisier" than levels (i.e., more likely to be determined by factors outside the agent's control) and small schools are disproportionally more likely to make large test score gains in any given year (Barrera-Osorio & Ganimian, 2013; Chay et al., 2003).

[67] The impact of merit pay programs that reward test scores is positive (Lavy, 2009; Muralidharan & Sundararaman, 2011). The impact on programs that do not (primarily) reward test scores is mixed (Contreras & Rau, 2012; Lavy, 2002; McEwan & Santibáñez, 2005). However, these studies are also the ones that use less rigorous methods and monitor results for shorter time horizons, so it is not clear what explains their mixed results.

[68] Muralidharan and Sundararaman (2011) compared school- and teacher-level incentives in Andhra Pradesh and found that the two affected student achievement equally well in the first year, but the latter outperformed the former after two years. At this time, schools with group incentives performed .15 SDs above control schools and those with individual incentives performed .28 SDs above control schools. It is important to note that the test used to assess student performance in the experiment evaluated by Muralidharan and Sundararaman (2011) was a new test with which teachers had no prior experience. It is not known whether teachers would have learned over time to focus instruction on the types of questions assessed on the test, thereby reducing the validity of the test scores as a measure of students' knowledge and skills. Behrman et al. (2012) found that a merit pay program in Mexico that rewarded students, teachers and principals based on students' math test scores was far more effective than the one that only rewarded teachers, suggesting that aligning incentives across the different agents at a school is important.

[69] To date, the program with the smallest average reward (again, in relation to teachers' monthly pay) has the largest reported impacts on student learning outcomes (Muralidharan & Sundararaman, 2011).

An important caution in considering such programs is to recognize that they sometimes elicit dysfunctional responses. Some merit pay programs have led teachers to unduly "teach to the test" and students to copy each other's answers. Kremer et al. (2010) evaluated a program in Busia and Teso, Kenya that rewarded schools based on the share of students in grades 4-8 who took the government exams and their performance on the exams. They found that the program affected students' performance on the government exam, but not on a complementary assessment of the same skills.[70] Behrman et al. (2012) assessed three monetary incentives schemes to reward improvements in math in Mexico: (i) one that only rewarded students; (ii) another one that only rewarded teachers; and (iii) yet another one that rewarded students, their teachers, and their principals. The authors found that the improvements in test scores in treated schools were partly due to student copying.[71] These studies highlight the importance of monitoring teacher responses to performance incentives. The potential for strategic, dysfunctional behavior may become greater the higher the stakes, the longer the program is in operation, and the less capable teachers and students are of earning rewards simply by working hard.[72]

[70] In fact, the authors found that teachers in treatment schools were no more likely to show up for work or assign homework. However, they were more likely to offer test-prep classes and to instruct students not to leave blanks on the multiple choice questions. Students in treatment schools were more likely to answer multiple choice questions correctly but not fill-in-the-blank questions; and the largest program effects were in subjects for which memorization was important.

[71] The authors noted an unusually large rate of agreement in correct and incorrect answers in test booklets. The estimated percentage of students who copied the answers of a classmate was between two to six percent in the control group and the treatment group that provided incentives only for teachers. Yet, the estimated percentage of copiers reached 20 and 24 percent in the first and third treatment groups, in which students received a monetary reward.

[72] Strategic behavior on the part of teachers does not always invalidate the gains of an incentives program. Behrman et al. (2012) found that, even after adjusting for the effects of cheating, schools receiving either incentives solely for students or incentives for students, teachers and principals still performed .17-.31 SDs better than their peers in schools without any incentives in the first year of the program—and these copying-adjusted effects were still high (.23-.57) by the program's third year. Schools with incentives for teachers only saw negligible effects, with and without copying.

An ongoing impact evaluation in Brazil is likely to increase understanding of pay for performance programs. Ferraz and Bruns (forthcoming) are studying the effect of the introduction in 2008 of a program that provides group-based incentives to schools that meet targets for improvements in test scores and passing rates in Pernambuco, Brazil.[73] This study is noteworthy for three reasons. First, it is among the first to evaluate a large-scale government pay-for-performance program, as opposed to pilot initiatives created for experimental purposes. Second, it is among the few that sheds light on the question of whether there is free-riding with group-based bonus systems. In fact, this is one of the few studies to have considerable heterogeneity in school size, allowing the authors to look at whether free-riding is more pronounced in large schools.[74] Third, the program is now in its fourth year, allowing the authors to study medium-term effects.[75]

***Hiring Contract Teachers***

Hiring teachers on one-year, renewable contracts (i.e., rather than as civil service employees) has consistently led to higher student achievement. However, most "contract teachers" are hired as a complement to regular teachers, and since many of them aspire to regular teaching positions, the experiments do not provide evidence about the consequences of altering the contract terms for all teachers.

Contract teachers seem particularly effective when they provide remedial education to students who are so far behind that they get very little out of regular instruction. Banerjee et al. (2007) evaluated a program in Mumbai, India that hired young

[73] The school system sets a target to attained by each school every year, based on an education index calculated for each tested subject (Portuguese and math) and grade (4th, 8th, and 11th). All managers, teachers, and staff from the schools that reach at least 50% of their target receive a bonus. The amount they receive varies by the individual's base salary and the percentage of the goal achieved.
[74] For a discussion of this issue, see Imberman and Lovenheim (2012).
[75] Similarly, an ongoing study by Barrera-Osorio and Raju (2014) will shed light on whether it is best to offer incentives to teachers, principals, or to both by comparing three alternative incentive schemes in Punjab, Pakistan.

women with a high school education from the community. These contract teachers took low-performing children in grades 3-4 out of their regular classroom for two hours a day (the school day is about four hours) and worked with them on basic numeracy and literacy skills. The program increased test scores in the treatment schools by .14 SDs in the first year and .28 SDs in the second year, and it was most effective with the lowest-performing students.[76]

Typically, contract teachers are hired to teach regular classes that are broken up into smaller classes. Muralidharan and Sundararaman (2013b) evaluated a program in Andhra Pradesh, India that allowed school committees to hire an additional teacher on a contract that is renewed annually. These teachers were not protected by civil service rules, they were paid about a fifth of the average salary of regular teachers, and were much more likely than civil servant teachers to be young, female, local, and live close to their schools.[77] At the end of the two years of the program, the mathematics and language achievement levels of students in schools with an extra contract teacher were .16 and .15 SDs higher respectively than those of students in comparison schools. Contract teachers were also less likely to be absent than regular teachers (18% v. 27%).

In some cases, the hiring of contract teachers has led regular teachers to work less. Duflo et al. (2012) evaluated a program in Busia and Teso, Kenya that gave school committees funds to break up first grade classes and hire contract teachers to teach the additional class. They found that the average math and reading scores of students of

[76] In the second year, children in the bottom third of the initial achievement distribution improved .40 SDs. These gains outlasted the program: one year after leaving the program, initially low-scoring students who were in treatment schools scored .10 SDs higher than their control peers.

[77] These teachers usually taught their own classes and were not "teacher-aides" who supported a regular teacher in the classroom. New hires were supposed to go through a brief accelerated training program before starting to teach, but this was inconsistently implemented.

contract teachers were .23 SDs higher than those of regular teachers and that contract teachers were 28 percentage points more likely to be found in a classroom teaching than their regular peers.[78] In fact, civil service teachers in schools that hired a contract teacher were 13 percentage points *less* likely to be found in class teaching than their peers in schools without contract teachers, suggesting that they took advantage of the presence of contract teachers.

***Providing Teachers with Scaffolding to Improve Instruction***

In most of the settings in which the introduction of pay for attendance or performance, or of additional contract teachers, have shown positive impacts on student learning outcomes, student achievement was extremely low and teacher attendance was irregular.[79] In such contexts, providing incentives for outcomes that teachers can easily affect by increasing their effort (e.g., more regular attendance and more "time-on-task") may produce gains that are "low hanging fruit."[80] However, once this low-hanging fruit has been picked, further increases in student learning may be constrained by the low skills of teachers. Increasing student achievement in these settings may require clear and specific guidance for teachers on what to do in class.[81] We refer to such guidance as "scaffolding."

Teacher Professional Development

To our knowledge, there is only one rigorous evaluation of a fairly intensive teacher professional development program in a developing country. Yoshikawa et al.

[78] However, these effects faded out once students were reassigned to regular classes in grade 2.
[79] Two exceptions are merit pay programs in Mexico (Behrman et al., 2012) and Chicago (Fryer et al., 2012), discussed in earlier footnotes.
[80] For example, Bruns and Luque (2014) document that teachers in Latin America and the Caribbean only spend 52-85% of class time on academic activities and devote the rest of their time to classroom management tasks or are entirely "off task".
[81] This is consistent with the lessons from the whole-school reform programs in the U.S., which target the lowest-performing schools, in which teachers are typically not well prepared (Borman et al., 2007).

(forthcoming) assessed a two-year teacher professional-development program for publicly-funded prekindergarten and kindergarten in Chile. After the first year, the program had moderate to large positive impacts on observed emotional and instructional support as well as on classroom organization in prekindergarten classrooms. After the second year, it had moderate positive impacts on emotional support and classroom organization. However, the program had no impact on five child language and behavioral outcomes. Thus, the evaluation showed that professional development can influence teachers' practices. One possible explanation for the lack of impact on measures of student outcomes is that the school attendance of students was quite low.

Providing Feedback to Teachers

Simply giving teachers diagnostic information about their students' performance with general tips on how to help them improve has had little impact on student learning. Muralidharan and Sundararaman (2010) evaluated an initiative in Andhra Pradesh, India that provided schools with diagnostic information on their students' performance.[82] At the end of the first year, teachers in the feedback schools performed better on their classroom observations than teachers in control schools. However, at the end of the school year, there was no difference in average test scores between students in the schools that received the feedback and those in comparison schools. Thus, while teachers in "feedback" schools worked harder while being observed, they were not able to improve the achievement of their students.

[82] This included a baseline test at the beginning of the school year, detailed written diagnostic feedback on the performance of students on the baseline test, a note on how to read and use the performance reports and benchmarks, an announcement that students would be tested again at the end of the year to monitor progress in student performance, and low-stakes monitoring of classrooms during the school year to observe teaching processes and activity.

Diagnostic feedback has only positively affected student achievement when combined with clear and specific guidelines on classroom instruction. Piper and Korda (2011) evaluated two uses of an independently-administered reading assessment for second and third graders in Liberia: one that used school report cards to communicate the results of these assessments to the community and another one that also trained teachers on how to periodically assess student achievement, provided frequent detailed pedagogic support as well as teaching materials and books. The first intervention only affected two of seven literacy outcomes.[83] The second intervention had a much larger effect on all seven outcomes (.39-1.23 SDs, depending on the outcome). This study suggests that there is little that low-skilled teachers can do about learning deficits if they do not receive guidance on how to change their practices.

"Scripted" Lessons

Scaffolding that provides guidance on both *what* teachers should teach and *how* they should do it has proven effective in enhancing the skills of low-performing students. He et al. (2009) evaluated a scripted literacy program in pre-school and first-grade classes in Mumbai, India.[84] The program had two key components: (i) the use of storybooks, flashcards for word and letter recognition, and alphabet charts, and (ii) a "child library"

[83] The outcomes included letter naming, phonemic awareness, familiar word fluency, oral reading fluency, reading comprehension, and listening comprehension. The two impacted outcomes were letter naming (.21 SDs) and phonemic awareness (.18 SDs), the two most elementary skills.

[84] In fact, the authors evaluated four different variations of the program over three years. In the first year, they assessed two versions of the program for first-grade students in government schools: a version taught in the school during the regular school day and a community-based version taught during out-of-school hours. In the second year, the authors evaluated the impact of the program on pre-school classes specially designed for this intervention. In the third year, they assessed the impact of the program on existing pre-school classes, either run by a non-profit or run by the government.

with age-appropriate texts.[85] Instructions specified both the activities that should be carried out and when they should be conducted. The intervention had positive effects on a number of literacy outcomes ranging in magnitude from .12-.70 SDs.[86] One possible explanation for the wide variation in the impacts of the program is that some teachers lack even the basic skills needed to implement scripted lessons.[87]

Even providing teachers with scaffolding to prepare for "one-off" events has had a positive impact on student learning. Abeberese et al. (2013) evaluated a program in Tarlac, in the Philippines, in which fourth-grade teachers received training and reading materials to carry out a month-long reading marathon. One month after the program was implemented, the number of books students read increased from 2.3 to 9.5 and that students' reading scores increased by .13 SDs. Further, the effects persisted with time. Three months after the marathon, treated students still read 3.1 more books per month more, on average, than their control group peers and their reading scores were .06 SDs higher.

Student-led Learning

[85] The program was also highly supervised. In-field supervisors monitored teacher performance twice a week and "zonal heads" met supervisors once every 10 days to make sure that program implementation met the requisite standards.

[86] First-grade participants outperformed non-participants on a number of literacy outcomes (identifying letters, reading words, reading paragraphs and understanding stories) in both the in-school and out-of-school versions of the program. Pre-school students in the specially-designed classes only improved in their ability to identify letters. Finally, students in regular pre-school classes saw improvements of similar magnitude to those of the first-grade participants.

[87] Similarly, He et al. (2007) evaluated a quite scripted program designed to teach English to first to fifth graders in Maharasthra, India that could be implemented through a specially designed machine or flashcards. The electronic machine resembles a small notebook with a hard plastic shell. Children could use a stylus to point to pictures and hear a word pronounced aloud, practice identifying words, and take quizzes to check their understanding. The 440 flashcards, delivered together with instructional booklets for teachers, include activities (e.g., drills, chants and games) to promote oral communication and conversation. The version in which local teachers and their assistants used either the machines or the flashcards or both interventions combined had a .30 SD effect in English. The effect was roughly the same across the three treatment arms, ranging from .295 to .301 SDs. It also improved students' math scores by .31-.33 SDs. Externally hired tutors delivered another version of the program. The version of the program in which external tutors combined the machines and flashcards had a .29 SD effect on English achievement.

In recent years, some interventions have attempted to circumvent low teacher skill levels by giving students a more central role in the classroom. Those interventions that have been rigorously evaluated have had limited or negative impacts on student achievement. Beuermann et al. (2013b) evaluated an initiative in Peru that sought to develop the scientific thinking of third graders by providing their teachers with resources to guide student-led experiments. They included laboratory equipment and LEGO kits, teacher training in how to engage their students in active learning, and continuous student assessment instruments.[88] This program only had a positive impact in one out of three modules assessed by a science test, and the positive results were driven by male, urban, and high-achieving students.[89]

Similarly, Berlinski and Busso (2013) evaluated an intervention in Costa Rica designed to give seventh graders a more active role in math lessons.[90] There were four versions of the program: (i) one that simply introduced a student-centered curriculum; (ii) one that combined the curriculum with an interactive whiteboard; (iii) one that combined the curriculum with a computer lab; and (iv) one that combined the curriculum with a laptop for every child in the classroom. The authors found that students who did not receive any of the interventions actually learned .16-.36 SDs *more*, on average, than those who did, depending on the version of the program to which they were compared.

The lesson here is that implementing student-centered instruction effectively requires skills well beyond those of a great many teachers in developing countries. Indeed, many teachers in developing countries lack even the basic skills that are required

[88] Students were expected to elaborate their own experiments, record and report their results. The teacher was supposed to motivate students to explore new ideas and formulate interesting questions.
[89] The three modules included the human body, the environment, and the physical world. The program had an average impact of .18 SDs on the third module.
[90] The specific focus of the program was on improving student achievement in geometry.

to deliver scripted lessons. These studies suggest the importance of matching instructional materials and supports to the skill levels of teachers.

**Conclusion**

Our review of rigorous impact evaluations indicates that a variety of policies have proven effective in increasing the school enrollment of students from low-income families. More difficult is the challenge of improving the quality of education provided by schools. Well-designed incentives for teachers help in situations in which teachers are not coming to school regularly and doing their best to increase their children's skills. However, in many settings, the incentives alone strategy quickly runs up against the constraint of teachers' limited knowledge and skills. Initiatives that provide teachers with hands-on, focused training on how to teach highly scripted lessons effectively have improved student outcomes from very low levels.

Interventions such as those described in this paper 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.[91] 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.

[91] See, for example, Barber and Mourshed (2007); Mourshed et al. (2011); Sahlberg (2011); Vegas et al. (2012).

Unfortunately, providing even basic literacy and numeracy skills to millions of children remains a major challenge for many countries. For these countries the evaluations discussed in this paper provide insights about the promise of alternative strategies to achieve particular goals. Attention to the following guidelines may help in making constructive use of these insights. First, the details of design and implementation of educational interventions matter (Pritchett & Sandefur, 2013). The equity implications of "targeted" vouchers are different from those of "universal" vouchers (Angrist et al., 2002; Angrist et al., 2006; Hsieh & Urquiola, 2006). Interventions that fall under the title of "computer-assisted learning," but differ in design and implementation details, have different effects on student learning (Banerjee et al., 2007; Carrillo et al., 2011; Linden, 2008). A corollary of this lesson is that blanket statements about the effectiveness of particular reform strategies, including vouchers or the use of computers in schools, are neither accurate nor helpful.

Second, the average effects of interventions typically mask considerable heterogeneity across groups. High- and low-education parents responded very differently to initiatives to empower school councils in Niger (Beasley & Huillery, 2012); low- and high-achieving students derived very different benefits from free textbooks in English in Kenya (Glewwe et al., 2009); and rural girls did not profit nearly as much as urban boys from the use of LEGO kits to teach science in Peru (Beuermann et al., 2013b). It is critical to understand the effects of an intervention for specific groups because they sometimes drive average effects and because these impacts shed light on whether an intervention will work with a different population.

Third, the consequences of any school improvement strategy are likely to depend on the nature of the education problem in the particular setting and on institutional structures and cultures. In settings in which teachers are not devoting their best efforts to educating children, well-designed incentives have promise. However, the track record of performance-based pay in settings in which teachers are doing their best but lack the skills to teach effectively is much less encouraging. In settings in which governmental institutions operate relatively free of corruption, investing in improving the capacity of the public education system may make sense. In settings in which public institutions do not work well, incentives for low-income families to enroll their children in private schools may make more sense. A frontier challenge for researchers is to build and test theories about the roles of institutions and cultures and other aspects of settings in determining the promise of particular educational reform strategies.

Fourth, most of what we know about these interventions concerns short-term outcomes for students. The effect of scholarships for girls on political outcomes in Kenya (Friedman et al., 2011), the effect of early childhood stimulation program on adult earnings in Jamaica (Gertler et al., 2014), and the effects of vouchers on high school graduation and college performance in Colombia (Angrist et al., 2006) have highlighted the importance of understanding the long-run effects of educational interventions. In the United States, a number of interventions have had only short-lived impacts on test scores, but large effects on important adult outcomes.[92] Finding ways to examine longer-term consequences of potentially promising interventions is an important research challenge.

[92] See, for example, Chetty et al. (2011) on classroom quality, Kemple and Willner (2008) on career academies or Ludwig and Miller (2007) on Head Start.

Finally, the evidence described in this paper concerns the question of whether particular educational interventions improve schooling outcomes for low-income children. Of course, a subsequent question concerns the relative cost-effectiveness of those interventions that do have positive impacts.[93]

[93] The Abdul Latif Jameel Poverty Action Lab includes multiple cost-effectiveness comparisons about teacher attendance and incentives (http://www.povertyactionlab.org/policy-lessons/education/teacher-attendance-incentives), student learning (http://www.povertyactionlab.org/policy-lessons/education/student-learning) and student participation (http://www.povertyactionlab.org/policy-lessons/education/student-participation).

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