

Policies and Programs to Improve Secondary Education in Developing Countries

A Review of the Evidence Base

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Secondary education systems in developing countries are under pressure to serve more students and to do so more effectively. The Education for All movement and the adoption of free primary education in many countries resulted in remarkable progress in boosting enrollment at the primary level. In contrast, secondary enrollment rates remain stubbornly low. However, this is likely to change rapidly in the coming years as today's primary school students become old enough for secondary school and as countries strive to meet the targets set forth under the Sustainable Development Goals spearheaded by the United Nations and supported by more than 190 countries. At the same time, secondary schools need to do a better job of preparing students for adulthood—making sure that they actually learn while they are in school and equipping them with the soft skills they will need to become productive workers and full participants in their societies.

Policymakers, program implementers, and donors need evidence on effective strategies for increasing participation in secondary education, improving learning, and enhancing the relevance of secondary education in developing countries. This review summarizes the findings from a growing body literature, focusing on rigorous studies that quantify the magnitude of the impacts by using a credible comparison group to isolate the effects of an intervention from (1) other changes in the prevailing environment that occurred over time and (2) pre-existing differences between groups. Drawing on previous systematic reviews, updated with recent additions, we highlight what is known and identify the gaps that remain.

Given the magnitude and complexity of the challenges for secondary education in developing countries, the diversity of contexts, and the urgent need to improve outcomes, the evidence base is disappointingly sparse. A number of studies have shown that cash transfer programs can boost participation in secondary education, but little is known about strategies for overcoming nonfinancial barriers to participation. For youth who do enroll, the literature offers little guidance on how to optimize conditions for student learning. Finally, there are no studies on approaches to enhancing the relevance of secondary education, including curricular and pedagogical reforms that emphasize skills youth will need for employment or civic participation. Several studies have shown that informational interventions that provide students and/or their parents with more accurate information about the returns to education can lead to at least short-term increases in enrollment but not necessarily in learning outcomes.

Throughout the review, we identify critical areas in which research is needed to inform policy reforms, program design, and investments in secondary education improvements. Filling these knowledge gaps is vital to the prospects for improving secondary education, but we also suggest several additional cross-cutting *types* of studies that are needed—including long-term follow-ups, cost-effectiveness analyses, and adaptation and replication studies—as a precursor to the scale-up of proven approaches.

INTRODUCTION

The Education for All movement has catalyzed broad-ranging and systemic change in primary education, resulting in an increasing number of countries offering free primary education and in climbing enrollment rates around the globe. Given these advances, there is a renewed focus on the next step of transitioning students to secondary school as well as retaining them through graduation and ensuring that they receive the high quality and relevant education that positions them for success after school (Open Working Group 2014; Center for Universal Education at Brookings 2011; UNESCO undated). These are formidable tasks, given the low levels of educational access and retention at the secondary level. For instance, in Uganda, 88 percent of children were enrolled in primary education, but only 22 percent enrolled in secondary school in 2010, the last year for which data are available at both levels (UNESCO Institute for Statistics 2015). Even if they enroll, few students complete secondary school. In Malawi, the cumulative drop-out rate through the last grade of lower secondary education was 69 percent in 2011 (UNESCO Institute for Statistics 2015).

Furthermore, the poor quality of schooling results in gaps in basic learning outcomes. Less than 25 percent of lower secondary students in Ghana and South Africa who participated in the 2011 Trends in International Mathematics and Science Study (TIMSS) met the proficiency criteria (Filmer et al. 2014). Stakeholders in Africa and Asia are also increasingly concerned about the relevance of the education offered to their youth. Outdated curricula and pedagogies that do not address the needs of local labor markets produce secondary school graduates who lack the cognitive and non-cognitive skills needed to transition successfully into employment and adulthood (Africa America Institute 2015).

The potential rewards from improvements in secondary education are significant. According to economists, every dollar invested in education yields a return of 5 to 12 percent (Lee and Barro and Lee 2013), increases in cognitive skills are strongly correlated with increases in wages in several developing countries (Hanushek and Woessmann 2008), and the cognitive skills of a country's students are a key predictor of GDP growth (Hanushek and Kimko 2000; Hanushek and Woessman 2008; Hanushek and Woessman 2012). Given the high share of youth among the populations of many developing countries, preparing youth for adulthood through education could help reduce poverty and have several related effects, such as reducing fertility and population growth (Garcia and Feres 2008).

The PSIPSE

The Partnership to Strengthen Innovation and Practice in Secondary Education (PSIPSE) was formed in 2012 by a group of private donors and donor advisors (psipse.org) seeking to promote action on pressing challenges in secondary education.

Through strategic grant-making and partnership-building, the PSIPSE seeks to foster innovation, generate learning on problems and solutions and, most important, foster systemic change in secondary education. To this end, the partnership (1) supports the development and testing of innovative models designed to address barriers to participation and achievement in secondary education, (2) facilitates the scale-up of effective interventions through systemic change in its targeted countries, and (3) promotes efforts to expand the evidence base.

The authors gratefully acknowledge support from the PSIPSE for synthesizing the evidence on what works to improve secondary education outcomes in sub-Saharan Africa.

With the Sustainable Development Goals’ targets related to secondary education¹ and the African Union’s theme of “Harnessing the Demographic Dividend” in 2017,² there will be growing momentum around improving outcomes in secondary education.

This paper synthesizes the findings of several recent systematic reviews of rigorous evidence on approaches to increasing participation, improving learning, and enhancing the relevance of secondary education in developing countries. Written for policymakers, donors, and program designers, the paper also provides a high-level summary of the evidence base specifically on secondary education, supported by references to the original research for those who are interested in the full details of the various study designs and findings. We conclude by highlighting several important recommendations for future research.

Three Challenges for Secondary Education

Increasing participation	Making sure youth become students and stay in school
Improving learning	Making sure that once youth are in school, they actually learn
Enhancing relevance	Making sure that what they are learning in school will prepare them for adulthood

METHODOLOGY

A number of researchers have recently conducted systematic reviews of the literature on secondary education in developing countries. We leveraged the findings from these reviews and supplemented them with additional papers that meet the eligibility criteria and have been published since the systematic reviews conducted their searches. We focused on studies that included a credible comparison group to isolate the effect of an intervention from other changes occurring over time or from pre-existing differences between groups. Randomized evaluations and quasi-experimental research designs with a well-matched comparison group meet this criterion.

This review identifies effective strategies that address the key barriers to participation and learning in secondary education in sub-Saharan Africa. However, it also discusses null and negative findings because there is much to be learned from what *didn’t* work as well.³ We occasionally include findings from relevant studies conducted in other countries as well as appropriate findings from the literature on primary schools, recognizing that there are

¹ Sustainable Development Goal 4, “Ensure inclusive and equitable quality education and promote life-long learning opportunities for all,” includes specific targets related to gender equality and relevant learning outcomes at the secondary level, skills for employment, and literacy and numeracy for all youth.

² African parliamentarians have pledged to “propose and advocate laws to reform the education system and focus on innovation, skills development, science, technology and entrepreneurship” (allAfrica.com 2017).

³ Publication bias could prevent dissemination of null or negative findings. Conn (2014) presents evidence that publication bias is likely a problem among the sources she searched: fewer studies than expected have large standard errors. She and other authors address this concern by searching the unpublished literature, but this does not account for studies that the authors have decided not to release because of what could be viewed as disappointing findings. Nonetheless, Conn estimates that it would take three times as many null studies than the total number of studies included in her review before the combined estimates of successful interventions would average out to zero.

important differences in context and between primary and secondary students, teachers, and schools that must be carefully considered to attempt to generalize from one setting to another.⁴

As evidenced by the long list of recent reviews on this topic (Table 1, next page), there has been a surge in rigorous research on improving learning outcomes. However, the vast majority of this research has been conducted in primary school settings, so many of the conclusions from this literature are not directly relevant to secondary education.

Based on our analysis of these systematic reviews and other recent studies, we synthesized the evidence on effective strategies for increasing participation, improving the quality of instruction, and enhancing the relevance of secondary education. Our goal is not to present a review of each study—prior studies have done that well. Rather, we set out to distill the essence of what we learned from the literature. With this goal in mind, we have organized our findings by topic, and within each topic, by the key conclusions arising from our analytical review.

EVIDENCE ON EFFECTIVE STRATEGIES

A. Increasing participation

Cash transfers help to increase educational participation in terms of both enrollment and attendance, but they do not have much impact on learning

Conditional cash transfers (CCTs) have become an extremely popular type of social protection program in which poor households receive regular payments from the government as long as they meet certain conditions, such as keeping their children in school. Mexico's *PROGRESA* program was the first and remains the best known of these programs—which have now been implemented all over Latin America and in parts of Asia and the Middle East—largely because a randomized evaluation in the early years of the program documented how successful it was at improving education and health outcomes (Schultz 2004). A more recent trend has been to test the advantages of CCTs relative to unconditional cash transfers (UCTs), which are standard welfare programs in which beneficiaries qualify on the basis of some characteristic rather than their behaviors or following some conditions as a requirement of getting the benefits. Baird et al. (2014) reviewed 35 evaluations of CCT and UCT programs (10 of which include secondary school outcomes) to assess their impacts on enrollment, attendance, and test scores.⁵ Using meta-analysis to pool results from all 35 studies, they found that both CCTs and UCTs significantly

⁴ See Banerjee et al. (2013) for a useful discussion of the characteristics that distinguish post-primary education.

⁵ Two papers excluded from the review by Baird and coauthors used quasi-experimental methods, including regression discontinuity and double- or triple-differences, to estimate the impacts of the Female School Stipend Program in the state of Punjab in Pakistan, which provided a quarterly stipend of approximately \$10 to girls enrolled in grades 6 to 8 in the districts with the lowest literacy rates; eligibility was conditional on maintaining an attendance rate of 80 percent. Chaudhury and Parajuli (2010) investigated the short-run impacts of the program and found that female enrollment increased by about 9 percentage points in the first year of the program. Alam et al. (2011) found that four years after the program began, participating girls were 3 to 6 percentage points more likely to complete middle school. The program had slightly larger effects on younger girls who were exposed to the program for longer and who had an additional incentive to stay enrolled as the program expanded to high school. There was also suggestive evidence that participating girls delayed marriage by more than a year and had fewer children.

Table 1. Reviews of Educational Improvements: Inclusion Criteria and Review Type

Students	Geography	Dates	Outcomes	Methods	Type ^a
Baird et al. 2014 <i>Journal of Development Effectiveness</i>					
Primary and secondary	All developing countries	1997—2012	Impact of (un)conditional cash transfers on enrollment, attendance, or test scores	Randomized or quasi-experimental evaluations	Meta-analysis
Banerjee et al. 2013 <i>Commissioned working paper</i>					
Post-primary	All developing countries	Not specified	Not specified	Randomized or quasi-experimental evaluations	Narrative
Conn 2014 <i>Dissertation (Columbia University)</i>					
Any formal education level	Sub-Saharan Africa	1980—2013	Test scores	Randomized or quasi-experimental evaluations or other statistical approaches ^b	Meta-analysis
Evans and Popova 2016 <i>World Bank Research Observer</i>					
Includes papers from Conn (2014), Glewwe et al. (2013), Kremer et al. (2013), Krishnaratne et al. (2013), McEwan (2015), Murmane and Ganimian (2014)					Meta-analysis
Glewwe et al. 2013 <i>Education Policies in Developing Countries</i>					
Primary and secondary	All developing countries	1990—2010	Impacts of school- or teacher-level programs ^c on test scores or enrollment	Randomized or quasi-experimental evaluations or other statistical approaches ^d	Vote-counting
Glewwe et al. 2009 <i>Brookings Institution</i>					
Primary and secondary	Kenya and India	Not specified	Impacts of teacher incentives on student test scores or teacher attendance	Randomized evaluations	Narrative
Kremer and Holla 2009 <i>Annual Review of Economics</i>					
Primary and secondary	All developing countries	Not specified	Not specified	Randomized evaluations	Narrative
Kremer et al. 2013 <i>Science</i>					
Primary and secondary	All developing countries	Not specified	Not specified	Randomized evaluations	Narrative and meta-analysis ^e
Krishnaratne et al. 2013 <i>3ie</i>					
Update of Petrosino et al. (2012) with additional papers for which the outcome was test scores					Meta-analysis
Masino and Niño-Zarazúa 2016 <i>International Journal of Educational Development</i>					
Primary and secondary	All developing countries	1990–(not specified)	Test scores	Randomized or quasi-experimental evaluations	Narrative
McEwan 2015 <i>Review of Educational Research</i>					
Primary ^f	All developing countries	Not specified	Test scores	Randomized evaluations	Meta-analysis
Murmane and Ganimian 2016 <i>Review of Educational Research</i>					
Primary and secondary	All developing countries	Not specified	Not specified	Randomized evaluations or natural experiments	Narrative
Petrosino et al. 2012 <i>Campbell Collaboration Systematic Review</i>					
Primary and secondary	All developing countries	1990–2009	Enrollment, attendance, progression, or graduation	Randomized or quasi-experimental evaluations	Meta-analysis
Snilstveit et al. 2015 <i>3ie Systematic Review</i>					
Primary and secondary	All low- and middle-income countries	1990–2015	Enrollment, attendance, progression, or learning	Randomized or quasi-experimental evaluations	Meta-analysis

^aMeta-analysis is a statistical technique that pools estimates from multiple studies grouped by a common theme, narrative reviews describe studies but do not attempt to calculate summary statistics for groups of studies, and vote-counting reviews count the number of studies with a particular finding (Evans and Popova 2016).

^bIncludes matching, instrumental variables, or time-series analysis with fixed effects.

^cIncludes programs related to school infrastructure, pedagogical materials, teacher or principal characteristics, and school organization.

^dIncludes ordinary least squares regression with at least (1) one general family background variable and school expenditure per pupil or (2) one family background variable, one teacher variable, and at least one additional school variable.

^eOnly studies in primary schools are included in the meta-analysis.

^fGrades 1–8 or ages 6–14.

increased school enrollment and attendance relative to a control group.^{6,7} Not surprisingly, the programs that included some element of conditionality tied to enrollment or attendance led to larger increases in these outcomes (a 60 percent improvement in the odds of enrollment in their sample) than did UCTs (18 to 25 percent improvement in the odds of enrollment).⁸ Only a few evaluations of CCTs or UCTs have collected data on test scores (only one of which looked at program for secondary school students); based on this limited evidence, it appears that CCTs, but not UCTs, might have a small but statistically significant impact on learning (Baird et al. 2014).

Two studies have actually nested direct comparisons of a UCT and a CCT program within the same population. Akresh et al. (2013) found that in Burkina Faso, CCTs were more effective than UCTs for increasing enrollment and attendance among children, including girls, who were less likely to have the opportunity to attend school. Families with children ages 7 to 15 were randomly assigned to a control group, a CCT group, or a UCT group with yearly transfer amounts of \$17 for children ages 7 to 10 and \$35 for children ages 11 to 15. The CCT and UCT had similar effects on enrollment of three groups of children traditionally favored for schooling by parents: boys, children ages 9 to 13, and higher-ability children.⁹ In contrast, the CCT outperformed the UCT for enrollment increases among girls, 7- and 8-year-old children, and lower-ability children. Similar patterns were seen for attendance.

The other study to directly test a UCT versus a CCT was Baird et al. (2011), which randomly assigned girls ages 13 to 22 in Malawi to a CCT group, a UCT group, or a control group that did not receive any cash transfers. The value of the cash transfers ranged from about \$5 to \$15 per month plus about \$20 per term for school fees, but the distribution of transfer amounts was the same in both groups regardless of conditionality.¹⁰

Both the CCT and UCT increased enrollment, but the gain in the CCT group (0.53 additional terms over six terms of follow-up) was more than twice the gain in the UCT group (0.23 additional terms), compared with control group girls who were enrolled for 4.8 terms on average. Girls in the CCT group also had significantly higher attendance rates (by 8 percentage points) than girls in the control group (who were present 80 percent of the time), according to school ledgers for the last year of the project. Compared with girls in the control group, girls in the CCT group scored significantly higher on a cognitive test, an English test, and a Trends in International

⁶ Of eight UCT programs considered, only one had a significant effect on enrollment, but five others had positive effects that were almost statistically significant, contributing to an unambiguously positive pooled effect that is statistically significant across the combined samples (see Figure 4 in Baird et al. [2014]). The one effective UCT program was in Morocco, and it is more accurately categorized as a “labeled cash transfer” in which there was no conditionality, but the program was called a child education benefit by the government, suggesting that the funds were intended to be spent on education (Benhassine et al. 2015).

⁷ When quantifying the impacts of CCT or UCT programs, it is important to account for any spillover effects on non-exposed children or families. Using data from the randomized evaluation of Progesa, Bobonis and Finan (2009) and Lalive and Cattaneo (2009) both found that even ineligible children who lived in villages with treatment children or who were the classmates of treatment children were more likely to also attend school. These sorts of social spillovers are important to identify because they could improve the estimated cost-effectiveness of a program by incorporating additional benefits that accrue to nonparticipating students.

⁸ See Figure 6 in Baird et al. 2014.

⁹ Higher ability is defined as children who have a baseline raw score that is lower than the mean on the Raven’s Colored Progressive Matrices test.

¹⁰ Girls in the UCT group received unexplained bonuses equal to the value of school fees in the CCT group to keep the value of the cash transfers equivalent. At the time of the study, a year (three terms) of public secondary school fees was equal to about eight percent of Malawi’s gross national income per capita (\$760 in purchasing power parity).

Mathematics and Science Study (TIMSS) math test, but not on a non-TIMSS math test. The UCT treatment had no effect on attendance or test scores.

The terms of a cash transfer can affect outcomes, although not always as much as classical economic theory would predict. By randomly varying the value of the cash transfer and the share that was delivered to the girl versus her guardians, Baird et al. (2011) found that increasing the minimum amount of the CCT from approximately \$5 per month to as much as double that amount had no impact on any of the outcomes they considered, nor did the impacts depend on how much of the transfer went directly to the girl versus to her parents.¹¹ Importantly, though, the UCT was more successful at preventing teen pregnancies and marriage than was the CCT because girls who dropped out of school in the latter group and then lost their payments were more likely to get married and pregnant than girls who dropped out of school in the UCT group, who continued to receive their payments. Pooling the outcomes of both the UCT and CCT groups and comparing them to the control group, Baird et al. (2012) found that the cash transfer programs also significantly reduced HIV and herpes (HSV-2) among girls who were enrolled in school at baseline. The trade-off between the advantages of a CCT for improving school outcomes versus the advantages of the UCT to prevent pregnancy and marriage led Baird and coauthors to suggest that the optimal cash transfer program in this context might be designed as a CCT for early adolescents that transitions into a UCT for older girls.

Linking incentives more closely with desired outcomes—such as reenrollment, graduation, and matriculation into tertiary school—can affect these outcomes specifically. In a study from Colombia, Barrera-Osorio et al. (2011) randomly assigned students to CCT groups with three different schedules for the cash payments, all of which were equal in value: (1) as a lump sum at the time of enrollment for the next school year, (2) as a lump sum at the time students graduated from secondary school, or (3) as traditional monthly transfers. The impact on reenrollment was greater among students who were eligible for lump-sum payments than among the monthly payments group. Moreover, the large effect sizes attributable to the lump-sum treatments arose primarily from the students in the lowest-income households and those with the lowest participation rates.

Access to credit could be another means of overcoming cost barriers to education, but more evidence is needed

To estimate the effect of access to credit, Gurgand et al. (2011) used data from a large private lender to compare potential borrowers who barely passed the credit-score threshold with those who barely missed it and therefore did not qualify for a loan. The researchers found that South African adults looking to upgrade their skills were more than 20 percentage points more likely to enroll if they had access to a loan to pay for university, with an impact that was twice as large for the lowest-income quartile. Using a similar design in Chile, Solis (2013) found that access to tuition loans increased college enrollment by almost 20 percentage points relative to students who barely missed the threshold, 16 percent of whom enrolled in college. Eligible students were also 20 percentage points more likely to reenroll in the second year of college than were students who barely missed the threshold. Overall, access to tuition loans eliminated the enrollment gap between the highest- and lowest-income quintiles among those who qualified for the loans.

¹¹ In their evaluation of a conditional cash transfer program for secondary students in Cambodia, Filmer and Schady (2009) also found that larger transfers did not improve outcomes proportionately more.

Youth with stronger social networks and more supportive cultural norms are likely to have better educational outcomes

The impacts of social networks are hard to study, since there is a “chicken and egg” problem in which similar people may be more likely to be part of the same network even as the influence of the network might be part of what causes them to be similar. Two studies circumvented this challenge by looking at differences in educational participation among social networks that were induced by Mexico’s CCT program and had nothing to do with who was part of which network. Bobonis and Finan (2009) and Lalive and Cattaneo (2009) both found that even children who were not eligible for the program but who lived in villages with treatment children or children who were the classmates of treatment children were also more likely to attend school. It is probably not possible for government- or donor-led programs to directly strengthen students’ social networks, but program designers should keep the effects of social networks in mind as a potential mediating factor even if it is not something that an intervention can address.

We identified one study that examined how cultural norms can lead to better educational outcomes (Beaman et al. 2012). Using a policy change in India that required that some positions in local government be reserved for women, the researchers used the variation in the number of female leaders created by the quota to estimate the causal effect of a change in social norms. They found that requiring a third of councilors to be women in two election cycles in rural West Bengal was enough to erase the adolescent gender gaps of 6 percentage points in school enrollment and 4 percentage points in the ability to read and write. In addition, adolescent girls in villages that had experienced two years of quotas were 19 percentage points more likely than girls in villages without the quotas to want to wait until after age 18 to marry and 8 percentage points more likely to want a job that requires an education. Clearly, only governments can mandate a quota system such as this one, but the fact that it led to such rapid and substantial changes in girls’ aspirations is remarkable.

Building secondary schools to increase attendance is a costly approach for which there is actually relatively little evidence of impact

Perhaps because building secondary schools to increase accessibility seems like such an obvious proposition, there is actually very little evidence to substantiate it.¹² Andrabi et al. (2013) found that the construction of a girls’ secondary school in Pakistani villages more than doubled the stock of educated women in the median village. The state of Bihar, India, implemented an innovative and less costly approach to reducing the time and safety costs of school attendance by providing bicycles to girls who enrolled in grade 9. An evaluation of the program found that that this targeted in-kind transfer reduced the gender gap by 40 percent and increased girls’ age-appropriate enrollment, their participation in a state exam, and the passing rate on that exam (Muralidharan and Prakash forthcoming). In any case, the relationship between distance to school and enrollment is likely to be highly context-specific, so it is not advisable to generalize from the few studies that tackle this question. We found no rigorous studies based in violent or conflict areas that assessed the impacts of reducing the time or danger associated with traveling to school. Similarly, we found no rigorous studies on the potential of online programs or other forms of distance learning to bring secondary education closer to students.

¹² Several studies (Duflo 2011; Kazianga et al. 2013; Dumitrescu et al. 2011; Bagby et al. 2016) have shown that the construction of *primary* schools can increase enrollment.

There is little rigorous evidence on the effects that improvements in primary education or language of instruction might have on secondary school outcomes

Although it seems obvious that a solid foundation in primary school is a necessary pre-requisite for success in secondary school, our review did not identify any studies on this topic. Given the increasing number of evaluations that have randomized primary school students to different interventions (leading to differences in the quality of the primary education), there will be opportunities to track their long-term outcomes and provide evidence on how the quality of primary education influences outcomes at the secondary level.

We also did not identify any rigorous evaluations of the effects of the language of instruction in secondary school being different from the students' mother tongue. Admittedly, such studies would be difficult, but not impossible, to carry out given the widespread practice of transitioning from African languages in the early years of primary education to international languages such as English or French in the later years, particularly in secondary education. Indeed, only 25 percent of languages used in secondary education are African (Ouane and Glanz 2010). Given the wide range of practices cited by the two researchers across the continent regarding languages used for instruction—and in some countries, recent policy changes—the lack of solid evidence to support these policies is surprising.

Regardless of how much they desire to continue their education through secondary school, many students in developing countries are not equipped to succeed because of poor nutrition, infection, and insufficient cognitive stimulation early in life

Poor nutrition (leading to stunting, iodine deficiency, and iron-deficiency anemia), infection, and insufficient cognitive stimulation early in life can prevent children from achieving their full potential (Tanner, Candland and Odden 2015, Walker et al. 2011). Although few randomized evaluations have manipulated these conditions, the biological plausibility for long-term effects is strong, and a host of longitudinal studies have shown that stunted children have worse outcomes than non-stunted children, including impaired behavioral development, school enrollment, educational attainment, and cognitive abilities (Prendergast and Humphrey 2014). In a long-term follow-up of urban Jamaican children who were randomized to receive nutritional supplements (milk-based formula) and/or psychosocial stimulation (hour-long weekly home visits by community health workers) for two years starting at ages 9 to 24 months, stunted children who received stimulation had significantly higher scores on an intelligence quotient (IQ) test and on a battery of language tests at ages 17 and 18 compared with their stunted but not stimulated counterparts; there was no impact of the nutritional supplementation (Walker et al. 2005).¹³

A long-term follow-up building on a randomized evaluation of a CCT in Nicaragua found that boys born to pregnant mothers in the treatment group had better cognitive outcomes than boys exposed during the first two years of life, underscoring the importance of early intervention (Barham et al. 2014). Another study showed that students ages 11 to 16 who were offered intermittent preventive treatment for malaria as part of a randomized evaluation had faster growth in sustained attention than did their peers who received placebo pills; those who

¹³ An even longer-term follow-up of these children's labor market performance 20 years after the interventions found that stunted children who received the psychosocial stimulation saw an increase in average earnings by 42 percent, closing the earnings gap with a matched comparison group of non-stunted children from the same neighborhoods (Gertler et al. 2013).

received more doses or had an existing shistosomiasis infection had significantly greater gains (Gee 2010).¹⁴ A randomized evaluation of school-based treatment for soil-transmitted helminths in grades 2 through 7 in rural Kenya led not only to very large increases in the probability of secondary school completion among girls but also to better labor market outcomes for both boys and girls (Baird et al. 2015).¹⁵

Although this is a short list of relevant studies, the evidence suggests that better conditions in early life can have important long-term benefits that are relevant to educational outcomes.

B. Improving learning

There are very few rigorous evaluations of the characteristics of the educational system—such as length of the school day, class size, ability grouping, or private education—and there are no rigorous evaluations of improvements to physical infrastructure at the secondary level

Orkin (2013) exploited a policy change in Ethiopia in 1996 that eliminated double-shifting in schools, leading to additional instruction time in primary school. Using a difference-in-differences approach based on how the policy was phased in, Orkin found that the added time had a large, positive impact on writing and mathematics but no significant impacts on reading. Using a similar design, Bellei (2009) found small but significant increases in scores on a language test among secondary school students in Chile when double-shifting was eliminated.

Although there is a large body of literature on the effects of class size on student learning (Chingos and Whitehurst 2011), very few of these studies are rigorous evaluations (Angrist and Lavy's study in Israel [1999] is an exception), and almost none were conducted in developing countries. Duflo et al. (2015) in Kenya found positive effects of major class size reductions on student learning at the primary level, but the results are confounded by the fact that teachers seemed to have exerted less effort teaching the smaller classes.

More evidence is needed on the impact of grouping students according to ability or other characteristics, which is a more actionable approach for governments and school administrators. There is an extensive body of literature on the effects of different forms of ability grouping (for example, by ability within classrooms, across levels of the same courses, in tracks or programs of study, and within schools) in developed countries,¹⁶ but far less attention has been given to this topic in developing countries. Garlick (2014) used a policy change that occurred at the University of Cape Town in South Africa that switched housing assignments from tracking on the basis of high school grade point average (GPA) before 2005 to a random placement approach starting in 2006. He found that low-performing students did worse under tracking (that is, when students are placed with peers who also performed poorly) than under random assignment, whereas the GPAs of high-performing students' were not influenced by their residential peers.¹⁷ A study by Jackson (2012) tested for impacts of attending single-sex

¹⁴ Shistosomiasis is a parasitic infection transmitted through contact with water in tropical and sub-tropical climates. Severe cases can result in serious organ damage, whereas even children who have even mild infections can repeatedly develop anemia, malnutrition, and learning difficulties (Centers for Disease Control and Prevention 2012).

¹⁵ Ascaris, whipworm, and hookworm are intestinal worms transmitted through contact with soil. Each infects more than 500 million people and can cause anemia, malnutrition, and stunting (Centers for Disease Control and Prevention 2013).

¹⁶ Taken together, the results of individual studies as well as systematic reviews conducted since the 1980s have been mixed (Kulik and Kulik 1982; Slavin 1990) and often show that potential effects vary for different subgroups of students, perhaps suggesting that the key to this and other forms of organizing instruction rely on the efficacy of the teacher in adapting instruction to meet the needs of the students, instead of organizing the students to facilitate instruction (Deunk et al. 2015).

¹⁷ High performance is defined on the basis of scoring above the sample median on the high school graduation test.

secondary schools in Trinidad and Tobago by using an algorithm that assigned students to schools on the basis of standardized test scores and students' preferences. Controlling for the fact that single-sex schools are more selective than coeducational schools, he found no benefit of attending a single-sex school, on average. Among those who strongly preferred single-sex schools, getting to attend one had a significant positive impact on the likelihood of taking the secondary exit exam and the number of exams taken and passed, effects that were almost entirely driven by the girls in the sample. Interestingly, Jackson also noted that girls at single-sex schools actually took fewer math and science courses than girls at coeducational schools.

Last, private education plays an important role in many countries. The percentage of secondary students who attend private schools is nontrivial (around 20 percent or higher) in many countries (UNESCO Institute for Statistics 2015). Although the government plays a large role in determining the quality of education provided by the private sector through the regulation of private schools, the leadership of private schools also has an important role in improving learning outcomes among the students they serve, thereby contributing to improved outcomes at the national level. For example, in Uganda, where 40 percent of secondary students are enrolled in private schools, the government is seeking to further increase the supply of secondary education through a public-private partnership in which it provides low-cost private schools with a per-student subsidy. A recent evaluation comparing outcomes at private schools that applied for the program and were randomized into the first or second cohort of schools to receive the subsidies found that students in the first cohort of participating schools experienced small but significant increases in learning outcomes relative to students at private schools that had not yet started the program. That said, this result was largely a product of the fact that participating schools admitted students who were more likely to succeed (i.e., they were from households with more education, resources, and more involved parents) (Barrera-Osorio et al. 2015). Although this evaluation is a promising first step toward evaluating an important government program, it was not designed to answer key questions about whether the program is actually enabling more students to participate in secondary education (as opposed to just providing an alternative schooling option to students who would have otherwise enrolled—and paid tuition—at a different school) or whether students at participating schools receive an education that is at least as good as what they would get through the public system (because the comparison group is other, similar, low-cost private schools).

There is no rigorous evidence on how to train and support secondary school teachers

Despite the critical role of teachers in secondary education, we found no rigorous evaluations of programs that provided pre-service or in-service training to teachers, nor did we find any rigorous evaluations of programs that offered other forms of support from supervisors or peers.

Engaging pedagogical approaches and well-integrated technology likely improve learning, at least in the short run

Several studies conducted in Nigeria and Kenya suggest that more engaging pedagogical approaches are beneficial for student outcomes, at least in the short run, when measured by researcher-designed pre- and post-tests. Table 2 (next page) summarizes the randomized evaluations of pedagogical interventions identified by Conn (2014), all of which were found to have significant positive impacts on test scores. Effective approaches included using problem-solving, cooperative experimentation, and other methods that were more engaging than the status quo of rote learning.

A handful of studies have found mixed evidence on the use of computers or technology in the classroom. For example, a study in Colombia found that computers alone had no impact on test scores, likely because the technology was not actually integrated into the pedagogy (Barrera-Osoria and Linden 2009); a study in Peru found no effect of computers on drop-out or repetition rates (Cristia et al. 2014). In contrast, Kremer and Holla (2009) discussed several effective computer distribution programs at the primary level that had positive effects when they supported the curriculum and/or enabled students to move through material at their own pace.

Table 2. Evaluations of Engaging Pedagogical Approaches

Country	Pedagogical approach	Subject	Exposure duration
Abdu-Raheem 2012			
Nigeria	Problem-solving method	Social studies	Six weeks, retention test after another six weeks
Ajaja and Eravwoke 2010			
Nigeria	Cooperative learning strategy	Integrated science	Six weeks
Bimbola and Daniel 2010			
Nigeria	Constructivist-based teaching strategy	Integrated science	Not specified in available information
Githau and Nyabwa 2008			
Kenya	Advance organizer strategy	Math (commercial arithmetic)	Not specified in available information
Wachanga and Mwangi 2004			
Kenya	Cooperative class experiment teaching method	Chemistry	Five weeks

Source: Conn (2014).

Similarly, Aker et al. (2012) found that augmenting a basic adult education curriculum with a mobile phone component increased test scores over those of students in the basic curriculum.¹⁸ The mobile phone component appeared to have increased the students' effort and motivation in the classroom and enabled them to practice their skills outside the classroom. Importantly, at least in this context, the effects of the additional technology were greater among better teachers, suggesting that the technology served as a complement to traditional teaching. Banerjee et al. (2013) suggested the need for more research on the potential benefits of information and communication technology at the secondary level.

In their review of reviews, Evans and Popova (2016) concluded that three types of interventions related to instruction have been consistently effective at improving learning: (1) pedagogical interventions (including computer-assisted learning) that tailor teaching to students' skills, (2) repeated teacher-training interventions, such as long-term mentoring or in-school coaching for teachers, often linked to another pedagogical intervention, and (3) improved teacher accountability through contracts or performance incentives. It must be noted, however, that the evidence base underlying all three of these approaches is largely from primary settings.

¹⁸ The basic curriculum consisted of eight months of basic literacy and numeracy skills in the native language. Classes were held five days per week for three hours per day, taught by community members trained in adult education by the Ministry of Non-Formal Education. The mobile phone component consisted of providing a shared simple mobile phone for every five students and instructions on how to use it. The mobile phones were provided after the first three months. The mobile phone instruction included turning the phone on and off, recognizing numbers and letters on the handset, making and receiving calls, and reading and writing text messages.

Even without other improvements to the school system or to quality of instruction, motivating teachers and students to work harder in school could lead to better learning outcomes

Teachers are likely to be motivated by a combination of an intrinsic desire to serve their students, status in their communities, and financial compensation for their work. Our review of the literature identified only two studies that addressed financial compensation and none that considered status or intrinsic motivation. Kingdon and Teal (2010) used data from private secondary schools in India to estimate the effect of teachers' union membership status (as a proxy for higher wages) on test scores. They found a union wage premium of 9.5 percent, but they also found that students performed worse in classes taught by unionized teachers. Their analysis could not identify the mechanism for this decline, which could either reflect selection bias (if worse teachers join the union) or unionized teachers' intrinsic motivation being crowded out by the wage increase. Menezes-Filho and Pazello (2007) exploited a policy change in Brazil that increased the share of financial resources allocated to teachers' wages in order to estimate the effects of a wage increase on students' proficiency. They found that doubling teachers' wages could drastically increase test scores, although they could not identify whether this was the result of a sorting effect, in which better teachers moved into high-wage positions, or of an incentive effect in the teachers' appreciation of the higher wages.

Similarly, payments to students (in the form of competitions with cash prizes) can motivate them to work harder. Competitions can even be designed such that the prize also motivates students who do not have a high likelihood of winning. In rural Kenya, Kremer et al. (2009) found that offering girls a scholarship that paid school fees for the next two academic years (\$6.40 paid to the school directly each year) plus a grant for school-related expenses (\$12.80 paid to the girl's family) had the effect of raising test scores for all girls (not only those who were likely to qualify for the scholarship by scoring in the top 15 percent of the district on an academic exam). In addition to the increase in girls' test scores, there was suggestive evidence that boys' test scores also increased, possibly because teachers were less likely to be absent from work in the prize treatment group. Another possible channel is peer effects: the indirect influence of one student's attitude or effort on another's by association (for example, if it becomes "cool" to do well in school or if a student decided to spend more time studying because that is what her friend also does). Blimpo (2014) tested the effect of motivating students individually versus in teams by randomly assigning students to a control group or one of three types of competitions based on test scores on the standardized secondary school certification examination in Benin, which about half of students usually passed. In one competition, students received \$10 if they passed the exam ("individual target"), whereas in two other competitions treatments, prizes were determined on the basis of the average of the team of four (randomly assigned) students' scores—either \$40 for the team if their average score was greater than or equal to the passing threshold ("team target"), or \$640 for the team if they had one of the three highest average scores among the 84 teams participating ("team tournament").¹⁹ All three types of prizes significantly increased test scores relative to the control, with similar average effect sizes, but only the team tournament led to improvements in test scores for lower- and higher-performing students, possibly because it eliminated the incentive to "free-ride" on teammates' scores to pass the threshold. The individual target prize affected only students who were close to the borderline of passing or failing because high-performing students did not have to try any harder, and low-performing students knew they probably would not cross the threshold no matter how hard they tried. Among

¹⁹ In the individual and team target groups, the prizes were tripled if the student's or the team's average score was equal to or greater than the threshold for honors.

these borderline students, the individual target prize had a huge effect (two-thirds of a standard deviation in test scores).

C. Enhancing relevance

Rigorous evaluations of alterations to curricula or pedagogies intended to better equip students for the labor market or civic participation are lacking

Low educational relevance is often cited as a barrier or disincentive to participation in secondary education. We did not identify any evaluations of school-based curricula or pedagogical approaches that emphasized skills needed by employers and communities, such as problem solving and critical thinking, communication and negotiation capabilities, how to be an effective team member, computer literacy, or basic principles of financial management.²⁰ (Note that this review was not intended to include the evidence base on technical and vocational education or extracurricular programs. Although a valuable complement to general education, the availability of such programs does not address the need for secondary schools to equip all students with the academic and soft skills that will prepare them for adulthood.)

Changing students' and parents' perceptions of the value of secondary education is another approach to addressing relevance barriers and appears to be a promising strategy for boosting participation

Inaccurate perceptions of the value of secondary education among parents and students is another barrier to participation. Several studies have shown that interventions that provide students and/or their parents with more accurate information about the returns to education can boost enrollment (but not necessarily learning outcomes), although other studies have found no effects of such interventions. One novel evaluation randomly assigned rural villages in India to a control group or a treatment group in which professional recruiters for the business-processing outsourcing industry raised awareness about this new career path and assisted young women in treatment villages to help them get jobs. After three years of exposure to recruitment services, girls in treatment villages were more likely than those in control villages to enroll in vocational schools or training institutes, and younger girls in the same villages were also more likely to be in school than younger girls in control villages (Jensen 2012). In the Dominican Republic, individual counseling on the average earnings of workers with different educational levels led to an increase of 0.33 years of schooling among the least poor students over the four years that followed the counseling (Jensen 2010). Other studies (Dinkelman and Martinez 2014; Loyalka et al. 2013) have found that providing students and their parents with information on the costs of and financing for tertiary education did not have lasting impacts in terms of enrollment and test scores in Chile, nor did the information campaign affect the share of exposed students who received need-based government grants for college or the probability of repeating the college entrance exam in China.

²⁰ Several countries have formally integrated entrepreneurial skills into the national secondary curriculum, but approaches to operationalize this mandate are still being developed. Randomized evaluations of entrepreneurial training programs in secondary schools are currently underway in Uganda and Rwanda. The first round of data collection in Uganda found promising short-run impacts on students who participated in an 18-month, experiential learning program focused on business development and management skills that was facilitated by mentors rather than teachers. At the conclusion of the program, participants were more likely to report owning a business and had higher income (*Educate!* 2014).

GAPS IN THE LITERATURE

Our search for evidence on effective strategies to improve secondary school participation, instruction, and relevance has identified relatively few strategies for which there is sufficient evidence to argue for scale-up. The vast majority of the evidence base pertains to the ability of cost reductions such as scholarships or CCTs to increase enrollment, but these programs have not been shown to be successful at improving learning outcomes for youth who are already in school.²¹ There is also suggestive evidence that enhancing the understanding of the value of secondary education can increase enrollment, but again, this has not been shown to improve learning.²² Aside from a handful of small studies that show that more engaging teaching methods can improve learning in the short-term,²³ there is very little research on teaching methods, curricula, teacher characteristics, or school conditions, although all of these are very likely to be important determinants of students' participation and performance.

Our review of the literature revealed three cross-cutting gaps that are related to both research focus and research methodology.

Research focusing on longer-term impacts is needed. Most research has investigated relatively short-term impacts, which are likely to be a necessary but not sufficient prerequisite for long-term impacts, such as improvements in labor market outcomes.

Studies of program adaptation and replication will be important pre-conditions for scale-up even if rigorous evidence is available in some settings. Randomized evaluations are the gold-standard for determining the impact of a given program, but the results are not necessarily generalizable to different settings.²⁴ Adaptation and/or replication—which allow for program effectiveness to be tested in a range of contexts—are critical steps that should precede scale-up.

Measuring impacts rigorously is important, but so is assessing the cost-effectiveness of interventions. Very few studies have attempted to estimate the cost-effectiveness of the program in question,²⁵ and no systematic reviews could identify the most cost-effective strategies for improving secondary education. Granted, it is often challenging to quantify the costs and benefits of an intervention or to make comparisons across alternative

²¹ See Appendix Table D1 in Baird et al. (2014) for the characteristics of cash transfer programs that have been evaluated. Of 35 programs, almost all targeted poor children, roughly half had some component of geographic targeting (often rural), and a handful targeted girls specifically.

²² We qualify this as “suggestive” because only a few studies have explored this topic. Much remains to be done to understand how the perceived value of education affects demand in a wider variety of contexts.

²³ None of these studies provide any description of the schools, teachers, or students being studied other than to name the state, district, or school in which the evaluations were conducted. These schools could have drawn from fairly large geographic areas encompassing both rural areas and towns, but we do not know anything about the ratio of boys to girls or about the socioeconomic characteristics of students or teachers. None of the studies were conducted in conflict or post-conflict settings.

²⁴ This is the difference between internal validity—the study's ability to isolate the true effect of the program—which is maximized with a randomized evaluation, versus external validity—the study's relevance in other contexts. In general, even a randomized evaluation is not necessarily generalizable beyond the context in which it was conducted (in other words, it might not have “external validity”).

²⁵ The two comparisons of UCTs and CCTs in Malawi (Baird et al. 2011) and in Burkina Faso (Alam et al. 2011) discussed earlier include some discussion of the cost-effectiveness of the two approaches.

interventions, but this has been done only for primary education.²⁶ In addition, several resources can guide program implementers and researchers in estimating cost effectiveness (McEwan 2012; Dhaliwal et al. 2013). For example, models calibrated by data from randomized evaluations can be used to predict how to achieve bigger impacts for the same program costs.²⁷ Such studies complement impact evaluations and may provide policymakers, donors, and other stakeholders with information that is crucial to effective decision making.

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²⁶ Kremer et al. (2013) presented a comparison of cost-effectiveness estimates for 18 interventions in primary schools that had been rigorously evaluated.

²⁷ For example, Todd and Wolpin (2006) predicted that for the same cost, the *PROGRESA* program could have increased the proportion of children who attended at least nine years of education by shifting the subsidy from lower grades, for which attendance rates were already high, to upper grades, when students are more likely to drop out of school.

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