



COST-EFFECTIVE APPROACHES TO IMPROVE GLOBAL LEARNING

*What does recent evidence tell us are “Smart Buys”
for improving learning in low- and middle-income countries?*

Recommendations of the Global Education Evidence Advisory Panel

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Launched in July 2020, the Global Education Evidence Advisory Panel is an independent, cross-disciplinary body composed of leading education experts from around the world. Its mandate is to provide succinct, usable, and policy-focused recommendations to support policymakers' decision-making on education investments in low- and middle-income countries. It is convened jointly by the UK's Foreign, Commonwealth & Development Office (FCDO) and the World Bank, and is hosted by Building Evidence in Education Global Group (BE2).



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What does recent evidence tell us are “Smart Buys” for improving learning in low- and middle-income countries?

This discussion note was produced by the Global Education Evidence Advisory Panel, with the support of its secretariat, which includes researchers at the U.K. Foreign Commonwealth and Development Office, and the World Bank. The categorizations are based on the evidence and on the deliberations of the panel. The judgments are the panel’s own, drawing on their reading of the available research and evidence; their conclusions do not necessarily reflect the policy positions of the panelists’ institutions, or of the convening and hosting institutions.

This high rate of [Learning Poverty](#) is just one indicator of the [wide learning gaps](#) that prevent education systems in these countries from providing the kinds of opportunities to their children that they should be able to. We need to understand not just what is effective at getting more children into school, but also how to improve learning outcomes once they are there. And given the scale of the challenge, resources within each country need to be directed to the most cost-effective approaches possible.

Investment over the past decade in research on cost-effective ways to improve learning gives us an opportunity to increase the value for money of education programs. In this note, we classify interventions based on their cost-effectiveness at improving learning outcomes, especially in low- and middle-income countries (LICs and MICs). We also provide guidance on the contexts in which a specific intervention is likely to be useful in improving learning, recognizing that even the best interventions will not be effective if they address a problem that is not present in a given context, or if they are implemented poorly.

Despite the rapid growth of the evidence base, there are also many important interventions for which rigorous, actionable evidence is still in short supply. These interventions are discussed below in the section titled “Areas where governments nevertheless need to make decisions or take action, but evidence on how to do it effectively is low.” This discussion, and the “promising but low-evidence” category, should help in setting future priorities for research.





Motivation

More than half of all children in low- and middle-income countries do not learn to read with comprehension by age 10, despite the ambitions of Sustainable Development Goal 4 for “inclusive and equitable quality education and lifelong opportunities for all.”

We group educational interventions and categories of interventions into the following tiers, reflecting their cost-effectiveness at improving learning and the strength of the evidence:





Approach to Classification

To classify interventions, the panel reviewed a range of recent, rigorous evaluative research on education and learning, primarily in low- and middle-income countries, that, where possible, included some measure of cost-effectiveness.¹ The interventions discussed in this note were chosen because they have been rigorously tested using methodologies that can distinguish the causal effect of an intervention. They are also backed up by a body of other evidence, including evidence that the problem that the intervention was designed to address is widespread in low- and middle-income countries.

The panel's approach to classification is summarized below, and elaborated on in Appendix C:

- **Outcome variable:** This synthesis focuses on identifying the interventions that are most cost-effective in improving learning in basic education, measured in terms of core cognitive skills (typically, literacy and numeracy).
- **Learning and equity:** Contrary to what is sometimes assumed under a dichotomous “access vs. learning” view, a focus on learning as the outcome variable in this context is a tool for improving equity, inclusion, and opportunity.
- **Evidence base:** The evidence in this note includes the many high-quality systematic reviews and meta-analyses published over the past decade (see References), as well as newer work that was produced to feed into the panel's deliberations.²
- **Cost-effectiveness vs. effectiveness:** Wherever possible, the panel prioritized evidence of cost-effectiveness in making its determinations; education systems face budget constraints, and they need to allocate scarce resources toward whatever interventions will deliver the most learning gains for the most children and youth on a given budget. However, because many evaluations lack cost data, we also draw on studies focused solely on effectiveness to identify which interventions tend to produce the largest learning gains, independent of cost.
- **Scale:** The panel has more heavily weighted the interventions that have been proven effective at a larger scale—whether systemwide or, at a minimum, in hundreds of schools. The areas that appear promising but have not yet been assessed at scale are included in the “promising but low-evidence” category.
- **Duration of impacts:** In making its assessments, the panel gives more credit to interventions that have been shown to have long-term positive impacts.
- **Interpretation of evidence:** Classifications are not a counting exercise; rather they reflect principles drawn from the evaluation results, combined with other knowledge about learning and behavior drawn from research in the fields of Education, Psychology, and Development Economics.

¹ Research conducted within the past 15 years.

² One new addition to the literature on which this note draws is Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal (2020), which estimates cost-effectiveness in terms of the Learning-Adjusted Years of Schooling (LAYS) achieved by specific interventions. The LAYS indicator, the education measure incorporated into the [Human Capital Index](#), provides a common metric that improves on the standard-deviation measure used in much past comparative research. In Angrist *et al* (2020), the preferred metric for cost-effectiveness is LAYS per \$100; this measures how many years of high-quality schooling can be bought for an additional \$100 spent on each intervention. (See Appendix D for details.)



How to Use This Note



Audience

This note is intended to be helpful for technical staff in Ministries of Education, donor agencies, local education groups, and non-profit organizations in thinking through appropriate interventions. This global evidence it presents should be used alongside context-specific analyses and system diagnostics. The classification and descriptions in this note aim to offer a greater sense of prioritization and clarity than has been possible in the past.



Context

Context is often crucial in determining whether an intervention will be successful or unsuccessful. Contexts vary by the stage of development of a country, but they also differ considerably within countries. To be used effectively, therefore, this guidance should be combined with an assessment of context-specific needs and implementation constraints, including context-specific mechanisms, the quality of implementation, and political-economy constraints.



Applicability during the COVID-19 pandemic

As this note was being finalized (in October 2020), education systems around the world were consumed with trying to keep children engaged in school and learning during the COVID-19 pandemic. As schools begin to reopen in the middle of a global economic downturn, there will be a premium placed on finding the most cost-effective interventions for immediate learning recovery. Some of the interventions described below might be even more relevant than they were previously; for example, targeted instruction approaches might be even more apt if students have fallen further behind grade-level expectations during school closures. Beyond that, countries will need to think about how to “recover better” so that they don’t simply replicate the failings of the pre-COVID status quo. This note can provide useful guidance for those decisions.



The importance of providing good information on effectiveness and cost-effectiveness

There can be substantial gains in children’s learning when systems shift from less effective to more effective education programs. Most education spending in developing countries is by the governments themselves. Therefore, advising partner governments and other donors to invest their financing toward Great Buys or Good Buys, or toward the system reforms described below, could be a very cost-effective use of aid.

See Appendix A for more detail.



The Importance of Systemic Reform

Although this note focuses on the impacts of various interventions aimed at improving learning, the interventions are not the only thing that matters. To drive systemwide improvements in learning and make them sustainable over the long term, systemic reform is likely to be extremely important. Ensuring learning for all children and youth requires an education system that is [coherent](#) and [aligned toward learning](#). While which reforms should be prioritized will depend on the specific context, this alignment toward learning should encompass the key system actors, policies, incentives, pedagogy, and capacity. This in turn requires [political commitment](#) to help systems [escape](#) low-learning traps—and it requires commitment not just from education ministers, but also from the heads of government. Good examples of sustained systemwide reform are rare, but it can happen with strong and consistent political leadership. The Brazilian state of [Ceará, for example](#), has made remarkable recent gains in learning during more than a decade of reforms, rising to become one of the country's top-performing states despite also being one of the poorest.

Yet even without systemic reform, interventions like the Great and Good Buys described below can still substantially improve outcomes for millions of children and youth. Indeed, they have already been shown to improve learning at scale, typically in systems that are not yet well-aligned toward learning. To maximize the chances for sustained success, policymakers should take several factors into account when they implement interventions, such as complementarities across interventions, dynamic complementarities, and the role of interventions in advancing or inhibiting systemic reform.

One major element of systemic reform, so comprehensive that it is hard to evaluate rigorously, is realigning the curriculum, assessment, and examinations—and the overall orientation of the system—away from elite students, and toward the actual skill distribution in the entire student population. Education systems in many low- and middle-income countries focus on schooling for the elite, at the expense of most students. This tendency may be compounded by international benchmarking (from aid consultants, as well as governments) and by aspirational standards. Overly ambitious curricula, textbooks, and exams are the practical result of this focus on the elite. Many of the most effective interventions, including some that are included in the Great and Good Buys lists below, attempt to solve this curricular problem by going around it—for example, by providing catch-up classes, or allowing teachers to go off the curriculum for part of the day. However, if there is political appetite for systemic change, addressing the curriculum and learning standards head-on could be highly cost-effective. It is not possible to cost out this type of change in the way that other interventions are costed, and it does require new materials and retraining of teachers, which could involve considerable outlays; but given that the impacts are felt by all students in the system, the cost per student is likely to be low. Some of the interventions described below, such as those that focus on teaching at the right level for students, show ways to make progress toward this goal without thorough systemic change.



Great Buys

The interventions in this category are likely to be highly cost-effective, either because of their large benefits, or because of their low costs. The cost-effectiveness of these interventions can be an order of magnitude greater than for interventions in even the Good Buys category.

Intervention

Giving information on the benefits, costs, and quality of education



Providing information to parents and children on the income-earning benefits of education (where these are not known or not prominent in people's minds); on sources of funding available; and on the quality of local schools has increased attendance and learning at low cost. This information can be shared through text messages or videos ([Chile](#), [Peru](#)), parents' meetings ([Madagascar](#), [Chile](#), and the [Dominican Republic](#)), or school report cards ([Pakistan](#)). In [Mexico](#), information on the income benefits of education improved learning outcomes, but not dropout rates, with larger impacts for girls. (An extension of this idea is providing information on student learning to educators; this proved very cost-effective in [Argentina](#), though not in [India](#), and not by itself in [Liberia](#).) These interventions have been tested at large scale, with a low cost per child when delivered at scale. Note that this is about providing specific and context-relevant information that shifts people's beliefs about the benefits of education or the quality of schooling, not general encouragement to consider education positively.

Context

This can be effective where specific, locally relevant information of decent quality from a trusted source is available. The delivery method of the information (for example, text messages or meetings) must be tailored to the country's specific needs. Also, recipients must have the means to act on the information; for example, there must be schools nearby so that families who are inspired to keep their girls in school are able to do so safely; and communities that receive the information need to have enough access to decision-making structures that they can spur action.



Good Buys

There is good evidence that the interventions in this category can be highly cost-effective across a variety of contexts.

Intervention

Structured lesson plans with linked materials and ongoing teacher monitoring and training



The most effective interventions change [how teachers teach](#). Where primary school teaching focuses on rote learning, and teacher knowledge is low [step-by-step lesson guides as part of multifaceted instructional programs can help improve pedagogy](#). Materials, ongoing training, and monitoring are required in order to enable teachers to use the plans effectively. A key benefit is that this approach can work even with weak teachers. In such contexts, well-designed interventions like this can support teacher professionalism by reinforcing good content and pedagogy and by freeing teachers to provide their students with more socioemotional support and personalized learning. In a randomized controlled trial (RCT) across 169 rural villages in the [Gambia](#), scripted lesson plans, after-school supplementary classes, and frequent monitoring and teacher coaching dramatically improved learning outcomes. To be effective, the pedagogy needs to be evidence-based and applied at the right level for the students. It is best delivered as system reform, with high-level buy-in about what is being taught. For example, implementation of the Tusome program in Kenya that combined these elements (building on evidence from an RCT) was associated with a [30 percentage-point increase](#) (from roughly 35 percent to 65 percent) in children reaching national benchmarks in both English and Kiswahili ([summary](#)). [Structured teachers' guides](#) can improve learning outcomes; however, overly scripted (word-for-word) teachers' guides are less effective than more simplified guides. Interventions to target teaching instruction by learning level, not grade, which are discussed below, also include structured teachers' guides, close monitoring, and linked materials. [Interactive radio instruction](#) could be another potentially effective pedagogical intervention; although less rigorously tested, it works on the same principles as other programs that do work effectively.

Context

This intervention can be effective where improvements in pedagogy, including moving away from reliance on rote learning, are needed. This approach is most useful where there are important gaps in teachers' knowledge of content and pedagogy; less structure is needed when teachers have strong content and pedagogical knowledge. There is also a need for a curriculum that is well-designed and pitched at the right level. In low-capacity settings, this approach may not be too challenging politically, because teachers welcome the chance to focus on classroom teaching; however, in other contexts teachers may resist these programs as infringements on their professional autonomy, so it is important to get their buy-in first (for example, by sharing evidence of effectiveness and including teachers in the implementation process).



Interventions

Target teaching instruction by learning level, not grade (in or out of school)



Implementation approaches include providing targeted help for students who are falling behind, and grouping children for [all](#) or [part of the day](#) based on their learning level, not on their age. This can be done with government teachers, [volunteers](#), or [teaching assistants](#) and implemented during school, make-up classes after school, or [during holidays](#). A very specific and structured approach to doing this has been tested in Ghana, India, and Zambia. (See [here](#) for an overview of what works best where and a discussion of scalability.) A less structured approach is to introduce tracking, where children are grouped by their initial level of learning. This was highly cost-effective in [Kenya](#), but it often meets with [resistance](#). Although not implemented through the government, another cost-effective approach in [Botswana](#) has used mobile phones to send targeted messages based on children's levels, focusing on remediation for the students who are farthest behind.

Context

These interventions are effective where there is a wide variety of learning levels within a class and student learning levels are below grade-level curriculum expectations (as in many LICs and MICs).

Interventions

Reduce travel times to schools



Where access to education is low, improving access to school increases children's schooling and can also improve their learning. This is often incorrectly interpreted as a mandate for constructing new schools. School construction can pay off in settings where there are no schools nearby (for example, [Indonesia](#)'s program increased both access to schooling and long-run labor-market outcomes), but it is often an ineffective and inefficient way of achieving the goal of increased access because it is expensive and is not always well targeted to the neediest areas. Fortunately, there are other, more cost-effective ways to reduce travel time and increase access to schooling. Where many children live far away from a school, setting up community schools in existing community buildings or houses increases school participation and learning, and it does so at less cost than building new schools. Establishing new village-run schools with community teachers in rural northwestern [Afghanistan](#) increased enrollment and test scores among all children, but particularly among girls. (However, it is important to note that the sustainability of community schools can be an issue, so there need to be effective mechanisms for supporting them over the long term.) But improving access it is not just about establishing schools. Reducing travel time to schools in underserved areas can also have major impacts, for example through the provision of bicycles to adolescent girls in [India](#). Interventions like these may be more sustainable.

Context

This can be effective where marginalized, hard-to-reach, or conflict-affected children (especially girls) live far from school, and school participation is low, but there are safe ways to reduce travel times.



Interventions

Giving merit-based scholarships to disadvantaged children and youth



Need-based aid (for example, through conditional cash transfers) can be crucial for getting children to continue in school—especially at the secondary level, where families still incur costs (including opportunity costs), even for public schools. But need-based aid alone can fail to lead to learning gains, as was found in [Cambodia](#). Merit-based scholarships, cash payments, or prizes targeted at disadvantaged children and youth can act as a complementary incentive to improve attendance and student effort, resulting in higher learning outcomes within the mainstream school system. In [Kenya](#), scholarships were provided to girls who performed well in their 6th grade exams, and 10 [high-quality studies](#) in 7 other countries further support the finding of the effectiveness of such incentives. Long-term impacts on learning were also found for merit-based programs in [Cambodia](#).

Context

This approach can be helpful where it's possible to [design scholarships so they do not end up mainly going to students who are already advantaged](#) (for example, where inequality is low; or where it is possible to target merit only within a group of students who are from poor households). On the other hand, where the school system as a whole is failing the typical child, this approach will not be the best way to tackle the problem. Note that this intervention does not include voucher programs that move students from public to private schools, which can exacerbate inequality.

Interventions

Using software that adapts to the learning level of the child (where hardware is already in schools)



Computer hardware is often a very poor investment from a cost-effectiveness standpoint: it is more expensive than other inputs, and school systems often struggle to integrate the technology into their teaching and learning. (See below under “Bad Buys.”) However, using adaptive or self-paced software that targets learning to the level of an individual child can be highly cost-effective, especially if computers that can use the new software are already in place and can be maintained. Whether implemented [in](#) school or [after](#) school, this approach can increase learning substantially, according to studies from India and other [advanced countries](#). Uruguay implemented this approach at scale, with suggestive evidence of [positive](#) impacts that were [larger](#) for students from disadvantaged backgrounds (linked reports in Spanish). Note that this intervention is built around the idea of teaching at the right level; however, it is categorized separately because of the high priority that many policymakers place on finding ways to use technology to promote learning.

Context

An important caveat is that this approach is relevant only where electricity, internet connection, teacher training, and widespread availability of hardware—including lower-tech devices in the home—make this doable at low cost and in a way that is inclusive, and where the software has been shown to be well-designed for learning. This intervention has more evidence from high-income contexts and needs more evidence related to its use in LICs. There is less evidence at scale for this intervention than for others in this category, but it is included here because it is a very promising mechanism for implementing a well-supported Good Buy (teaching at the right level); also, there is now an explosion of innovation in this area that should soon yield more evidence, helping to assess its effectiveness.



Interventions

Pre-primary
education
(ages 3-5)

There is [substantial evidence](#) that millions of poor children show lower levels of language and cognitive development than their better-off peers over the first 5 years of life. The deficit becomes quite large by the time these children enter primary school. This is likely to affect these children's ability to benefit from standard schooling. Many scholars have emphasized the importance of learning in the early years, and many countries are currently expanding coverage of pre-primary education. A rigorous literature shows that pre-primary interventions can have important long-term economic benefits in high- and middle-income countries, provided that children attend regularly, and that the classroom experience offered is better than what children already experience in the home in terms of early stimulation and social-emotional support. There is [evidence from the U.S.](#) of the dynamic complementarity of such programs, with the effects of pre-primary education on adult earnings and educational attainment compounded when followed by strong primary education systems, and vice-versa. The evidence on the long-term impacts of preprimary education for low-income countries is less extensive, but there is now substantial and relatively consistent evidence from many different contexts that pre-primary education has positive impacts on learning and on cognitive development for children ages 3-5. Several of these studies have tested low-cost models at large scale (for example, [India](#) and [Kenya](#)) and models using national systems ([Uruguay](#)), and have found positive impacts on learning, suggesting that these interventions can be implemented effectively at scale. Some studies have found short-term but not long-term impacts ([India](#), [Brazil](#), and [Indonesia](#)), while other studies have found both short- and long-term effects such as higher levels of enrollment in future schooling ([Uruguay](#), [U.S.](#)) and more rapid cognitive development and learning in primary school ([Argentina](#), [Ghana](#), and [Mozambique](#)). This suggests that the dynamic complementarity between pre-primary and primary education found in the U.S. may be important in low- and middle-income countries as well.

Together, these studies suggest that pre-primary education typically improves learning for children ages 3-5 and that it can be done cost-effectively. Additional evidence on how to make such gains persist beyond the pre-primary years would be a useful area for future research, although it is worth noting that there is not always evidence of long-term impacts for the other interventions in this note either.

Context

While gains made in pre-primary education may fade over time if children then transition to low-quality primary education—making pre-primary investments seemingly less cost-effective—those are the very settings in which expanded preprimary education may be most needed in order to improve learning outcomes. Since poor children tend to arrive at school with very lower levels of cognitive and language development, creating challenges in the classroom from the earliest grades of primary school, improvements to both preschool and primary education would ideally go together. Moreover, given the dynamic complementarity observed in both high- and low-income settings, further testing of pre-primary interventions in the context of weak primary education would be useful in fully understanding this link. The quality of pre-primary education itself also matters a lot: interventions will be cost-effective only where they can provide substantially more stimulation and care than the status quo (whether that is home-based care or private preschools).



Promising but low-evidence

For these interventions, the evidence is limited, but the available findings suggest that these approaches can be highly cost-effective. More testing to develop scalable models is recommended.

Intervention

Early childhood stimulation programs (for ages 0 to 2), targeting parents



There is promising evidence that early childhood stimulation programs for parents can generate benefits that last into adulthood, but the evidence of the long-term effects and scalability is more limited in low-income countries. Reviews have found consistently strong evidence of short-term impacts on children's cognitive, language, and sometimes motor development among disadvantaged populations ([Aboud and Yousafzai 2015](#), [Engle et al 2011](#), [Baker-Henningham 2010](#)). A few studies have evaluated the scaling of these early parenting stimulation programs. They have generally shown initial benefits in child development (Bangladesh study 1, [Bangladesh study 2](#), [China](#), [Colombia](#), [India](#), and [Pakistan](#)). Only two studies did follow-ups two years after intervention: in [Colombia](#), there were no remaining benefits, but in [Pakistan](#), the benefits to executive function, IQ, pro-social behavior, and pre-academic skills persisted. And a study in [Jamaica](#) found gains in educational [attainment](#), [IQ](#), [mental health](#), and [earnings](#) in adulthood of a home visiting program of early stimulation; however, more work is needed on how to replicate this kind of success at scale and cost-effectively.

Context

There is plenty of evidence of the efficacy of early stimulation programs, but more evidence on effectiveness, scalability, and the persistence of impacts in low-income contexts is needed.



Intervention

Teacher accountability and incentive reforms



Low levels of teacher attendance and low levels of effort (based on what is observable) are pervasive in LICs and MICs, compared to what is observed in high-performing systems. This is due to failings in the support and motivation provided by the education system, rather than the failings of individual teachers, but it is costly to student learning nonetheless. Test scores increase with more [teacher presence](#) (even when teacher quality is very weak). For this reason, there have been many attempts to improve the accountability of teachers. Paying teachers based on student performance or attendance has worked in some settings (for example, in [India](#) and [Mexico](#)), but such incentives often fail, as they are hard to design well ([Pakistan](#)), can be gamed ([Kenya](#)), or work best along with other inputs ([Tanzania](#), [India](#)). Also, they are hard to introduce because of resistance from both teachers and unions. Instituting a probationary or contract period for new teachers worked well in [Kenya](#), but this approach can meet with political resistance. More research and development in this area is needed.

Context

This approach is likely to be most effective where teachers' effort is low, so that there is a substantial margin for improvement (however, note that these are also the contexts in which these reforms are difficult to implement effectively). These reforms are politically very challenging to implement, even when well designed, and they can be reversed if they are not embraced by teachers. Therefore, working with teachers to design the reforms is important for sustainability.

Intervention

Community involvement in school management



Providing feedback to schools through community involvement (as has been done in [India](#), [Indonesia](#), and [Gambia](#)) or gathering better data on teachers and students ([Indonesia](#)) has often had little impact. Where involving community members in school management has worked, however, (as in [Indonesia's alternative approach](#), [Uganda](#), and [Kenya](#)), it is [very cost-effective](#). One feature of successful interventions, as in Indonesia and Kenya, has been explicitly linking school committees that involve community members that have high levels of authority. More work in testing various designs is needed to understand when and why this works, including a study of the composition, government structures, and complementary mechanisms, all of which appear to be important for effectiveness.

Context

This approach may be most promising where power asymmetries between school authorities and parents is not too great, and where there are potential complementary sources of accountability for schools (such as well-functioning local governments to which community members have good access); unfortunately, these are also the settings where the need for these interventions might be less acute.



Bad Buys

Any of the approaches listed above, if implemented poorly or in inappropriate contexts, could be classified as “bad buys.” But there are also other interventions where the evidence has repeatedly shown that the approaches—as typically implemented—are either not effective or not cost-effective. While it may not be politically or practically realistic to cut spending on these “bad buys,” school systems should strongly consider prioritizing the much more cost-effective interventions discussed above when they are investing any additional budget that may become available each year. Requesting funds for more cost-effective programs may also bolster the case for education spending within the overall government budget, to the extent that finance ministries take cost-effectiveness into account when they assess budget requests.

Intervention

Additional inputs alone, when other issues are not addressed, including:

- textbooks
- additional teachers to reduce class size
- school buildings
- grants
- salary
- libraries



One mistake that many systems make is to assume that simply investing more in inputs on the margin, without improving how they are used or for whom, will improve learning. This approach can be tempting if the intention is to show that something is being done about education, because new materials and infrastructure are more visible than some of the cost-effective approaches to pedagogy and classroom organization listed as Good Buys above. It is also tempting, because of course schools must have textbooks, other learning materials, teachers, and buildings in order to operate.

However, studies in many different settings have found that additional inputs alone, used in support of “business as usual,” without improving how they are being used, are not effective. Examples include textbooks ([Kenya](#), [Sierra Leone](#)), teachers ([Kenya](#), [India](#)), flip charts ([Kenya](#)), flexible grants to schools ([Gambia](#), [Indonesia](#), [Tanzania](#)), salaries ([Indonesia](#)), and libraries ([India](#)).¹ In many education systems a combination of rote learning, teaching to the top of the class, and an overly ambitious curriculum mean that providing additional inputs has no impact on learning, unless those inputs are accompanied by fundamental change in how teachers teach.

This does not mean that inputs are unimportant. Most of the Good Buys discussed above involve providing new inputs as part of a strategy to change pedagogy. Good materials, including appropriate-level textbooks and instruction at the right level, provided alongside pedagogical improvements, can make a big difference in learning outcomes, as discussed above. This is especially true in systems that lack even minimal levels of resources, such as those with badly overcrowded classrooms.

¹ In a few cases, providing additional inputs such as textbooks alone has been shown to have significant impacts on learning in rigorous studies, as in a very early randomized controlled trial from [Nicaragua](#). However, even that case emphasized the importance of complementary interventions like programs to improve teaching. That study noted that a radio-lessons intervention evaluated in parallel had much larger effects, probably because of the “inconsistent application of the textbook treatment (in the hands of teachers with relatively low levels of education).”



Intervention

Investments in laptops, tablets, and other computer hardware alone



Computers and other educational technology are just another type of input, but they deserve special mention, because they are often especially enticing to policymakers and other stakeholders (and are expensive). As with other inputs, investing in hardware alone is a bad buy. When not accompanied by well-thought-out complementary measures—including personalized adaptive software and teacher training teachers on how to use the software—adding computers has no impact at all ([Peru](#) and [Colombia](#)). This is also true in the [U.S.](#) and other [advanced countries](#), even though the level of computer literacy is higher there. Implementation issues are a recurring challenge in hardware programs; an example is the lack of a coordinated approach in the One Laptop per Child scheme in [Brazil](#). It can be more cost-effective to improve learning using technology that is already available, such as mobile phones (see examples in [Niger](#) and [Botswana](#)).

Intervention

Cash transfers (as a tool for improving learning)



Cash transfer programs are not a cost-effective tool for improving learning. This may be unsurprising, since promoting education is not the primary objective of the transfers, but the literature has often discussed their impacts on education outcomes. Cash transfers have consistently been found to have beneficial effects on school participation (both enrollment and dropout rates) where participation is low, but relatively few have found statistically significant impacts on learning. While this could be partly because few evaluations had samples large enough to pick up learning impacts in a setting where most children were already attending school, the high cost also reduces cost-effectiveness even where there are learning impacts. Cash transfer programs are an expensive way to improve learning, because they aim to increase incomes substantially, and because targeting is costly. This suggests they are poor value for money as an education intervention—and indeed analysis of their impact on Learning-Adjusted Years of Schooling (LAYS) suggests that they are not as cost-effective as other interventions—although they are effective for other objectives, such as social protection. (See examples from [Malawi](#), [Mexico](#), [Mexico](#)².)





Areas where governments nevertheless need to make decisions or take action, but evidence on how to do it effectively is low





Beyond the interventions categorized above, there are many areas in which governments consistently invest, but where unfortunately there is little evidence on how to do it well, at least as the interventions are typically framed. For example, governments must train, select, and allocate teachers, support girls' education, make education inclusive for students with disabilities, and ensure student safety. These are aspects of schooling and learning where the government is obliged to act, but there is relatively little robust evidence of ways to do so successfully. This may be because too little evaluation has been done, as with interventions to improve access for children with disabilities; or because the evidence that is available is inconclusive, or even discouraging, as in the case of in-service teacher training on general skills. There is an urgent need for more research and careful evaluation in these areas, to find the most cost-effective approaches.

Some illustrative examples are:

General-skills teacher training (in-service)

In-service teacher training as typically provided is generalized, overly theoretical, off-site training that does not respond to demonstrated teacher needs—and thus is usually not a good investment. Of course, professional development for teachers is essential, and specific, practical professional development (for example, through in-school mentoring and induction programs) that support specific well-evidenced changes in pedagogy can be highly effective. In fact, it is an integral part of most of the Good Buy interventions, such as structured lesson plans. However, there is little evidence showing that the typical stand-alone general-skills in-service training is cost-effective. Indeed, much of the rigorous evidence that is available suggests that it does not improve student learning outcomes, because the typical training rarely incorporates the characteristics that make some professional development programs effective. For example, a large-scale randomized controlled trial of a national teacher professional development program in [China](#) showed no impacts from 15 days of training at a centralized location, even when the training was reinforced with follow-up reminders or evaluation. And in [Costa Rica](#), a program to train teachers in active learning techniques in math at the secondary school level actually resulted in lower rates of learning.

Context

In-service professional development can be highly effective when it is an integral part of a well-evidenced specific pedagogical reform (see Good Buys for a list of such programs); and when it includes practical training, classroom practice, and reinforcement over time. It is most likely to be effective where targeting teachers for training based on pedagogical gaps is feasible, and where the environment allows a focus on practical training. It is unlikely to be effective where there is strong institutional inertia favoring the delivery of low-quality, overly theoretical training to all teachers.



Selection and allocation of teachers

All countries must select and allocate teachers, and high-performing systems appear to do it well based on objective factors. But there is a shortage of good evidence on how to do this effectively, making this an important area for further experimentation and research. Patronage-based recruitment of teachers likely undermines system credibility and learning, and some work on the effects of a new meritocratic hiring system for teachers in [Mexico](#) found that even though the test wasn't good at predicting who would be a good teacher, just having the test weeds out a lot of bad candidates. (The test's lack of predictive power is consistent with findings of earlier work in [Ecuador](#).) Given that the allocation of teachers across schools can be quite uneven, and driven by favoritism, information about how to improve this process would also be helpful. However, there is little evidence yet on how such reforms affect learning.

Context

Reforms to prioritize merit, and objective standards are most likely to be effective where policymakers are willing to forgo politically beneficial selection and deployment, where it is technically feasible to set up meritocratic processes, and where there are enough qualified candidates to allow merit-based selection.



Differentiating support by gender

While some effective access programs target only girls, most of the interventions referenced in this note have impacts for both girls and boys, with some general access interventions proving particularly beneficial for girls (for example, in [Afghanistan](#)). Most evaluations of programs that did not specifically target girls have found [bigger impacts on girls'](#) access than on boys' (where girls were the disadvantaged gender), and [general interventions deliver gains for girls](#) in access and learning that are comparable to gains from girl-targeted interventions. But given that girls' participation rates remain lower than those of boys in 53 developing countries, with particularly large disparities in West Asia and Sub-Saharan Africa, more research is needed on the effectiveness of programs that specifically target girls, especially in areas where girls are far behind boys. This is especially true for adolescent girls: gender disparities are highest at that age, and keeping girls in school has major benefits (including for health outcomes). A study in [Ghana](#) found that secondary-school scholarships had the biggest impact on girls' attendance. Once in school, girls appear to learn at rates similar to or higher than boys in most contexts.

Context

Differentiating support by gender is most likely to be effective where one gender is at a strong disadvantage in terms of school participation.





Targeted support for children living with disabilities

Over half of the 65 million children with disabilities in LICs and MICs are not in school. Some interventions (such as inclusive teacher training, training for parents, and some computer-based interventions) might be effective in improving the foundational skills of primary-school-aged children with disabilities, but the quality of evidence is generally low, in part because small sample sizes make these programs difficult to evaluate.

Interventions to safeguard students from violence

Despite legal prohibitions, corporal punishment and other violence inflicted on and perpetrated by students are highly prevalent in many countries. The violence is not only damaging in itself, but it has other long-term impacts because it discourages access to schooling and hinders learning. Promoting student safety is paramount; and if students feel safe, it is likely to have knock-on effects on schooling persistence and learning. However, there is not yet a strong evidence base about how to tackle violence in the education sector, although there are some encouraging studies. For example, a socioemotional skills program in El Salvador showed improved behavior and grades, partly by reducing students' propensity toward violence; and efficacy trials in Jamaica show that teacher violence can be reduced with intervention in preschools and primary schools, using targeted teacher training and coaching.

There are many other examples of “necessary but limited-evidence” intervention areas that deserve more research. As more evidence becomes available on these topics, the panel will evaluate them in future meetings.





Appendices



APPENDIX A

More Detail on How to Use This Note



Audience

This note is intended to be helpful for technical staff in Ministries of Education, donor agencies, local education groups, and nonprofit organizations in thinking through appropriate interventions. It should be used along with context-specific analysis and system diagnostics. The classification and descriptions are not definitive; they simply aim to offer a greater sense of prioritization and clarity than has been possible in the past, in part due to the paucity of data concerning costs until recently. It will be especially useful in thinking through where to invest additional marginal resources—for example, is it better to invest new resources in general teacher training, or in training focused on the use of structured lesson plans? But it can also help in more closely examining where large parts of the education budget are being spent, and exploring whether that money could be used more cost-effectively.



Context

Context is often crucial in determining whether an intervention will be successful or unsuccessful. Contexts vary by the stage of development of a country, but also differ considerably within countries. To be used effectively, therefore, this guidance should be combined with an assessment of context-specific educational needs and implementation constraints. This starts with prioritizing objectives, given that in some countries the key challenge is still increasing access to education, while in others, children are in school but are not learning; and in still others, learning has improved on average, but disadvantaged children do much more poorly than the average. With these objectives set, as an aid, the tables above have described the types of contexts in which each intervention is most likely to be cost-effective. For example, information interventions can be incredibly cost-effective, because they are inexpensively delivered; however, exactly what kind of information is useful and relevant to parents and children in shaping their decisions about education will differ in different contexts. One key element of context is **political economy**. The categorization in the table does not reflect the political feasibility of each intervention, but only its cost-effectiveness at improving outcomes. But because political economy is central, the descriptions do note which interventions are likely to be more politically challenging to deliver. The impacts on learning also depend on the **quality of implementation**. For example, although “teaching at the right level” interventions have typically been very cost-effective, just calling a program “teaching at the right level” will not automatically make it a Good Buy; it needs to be effectively implemented in order to have an impact.

How to use during the COVID-19 pandemic

As this note was being finalized (October 2020), education systems around the world were consumed with trying to keep children engaged in school and learning during the pandemic. As schools begin to reopen in the middle of a global economic downturn, there will be a premium placed on finding the most cost-effective interventions for immediate recovery of learning. Some interventions might be even more relevant than before; for example, targeted instructional approaches might be even more apt if students have fallen farther behind grade-level expectations during school closures. Beyond that, countries will need to think about how to “recover better” so that they don’t simply replicate the failings of the pre-COVID status quo. In that regard, this note can provide useful guidance for these purposes.²



The importance of providing good information on effectiveness and cost-effectiveness

Moving from less to more effective education programs delivers substantial gains in learning, and most education spending in developing countries is by the governments themselves. Therefore, advising partner governments and other donors to invest their financing toward Great Buys or Good Buys, or toward the system reforms described below, could be a very cost-effective use of aid. Some recent [experimental work](#) indicates that policymakers value good evidence, and act on it when they receive it. However, providing such advice requires substantial advisor time, very high-quality embedded technical assistance, or research teams, and the advice needs to be closely tied to the evidence or it can be counterproductive. That said, where education spending is inefficient but there is the will and capacity to improve, the provision of good evidence-based information on the relative cost-effectiveness of various approaches and interventions could in itself be highly cost-effective.



This note is not intended to provide a comprehensive view on all possible interventions in the education sector. As governments and teams design programs and portfolios, they should be drawing on context-specific diagnostic work and evidence from a range of sources.

Comparable evidence does not yet cover the universe of all possible interventions in this sector. Despite all the progress made in recent years, the evidence base in education remains small and fragmented (compared to the evidence base in the health sector, for example); and only a small number of evaluation studies collect data on costs. Some interventions have had too few rigorous evaluations to be assessed well. Even where there is evidence, many of the evaluations looked at single interventions rather than packages of interventions, even though a growing literature shows that greater impact is often achieved when several good interventions are combined. In addition, for some interventions that might be Great or Good Buys, we still know too little about the politics of effective implementation at scale. While many of the interventions discussed above have been delivered in challenging contexts, the capacity and accountability of the education system is

² During the pandemic, there has been substantial innovation and testing in educational technology, parental engagement, and remote learning. While in most cases it is too early to draw lessons learned for inclusion in this note, as a result of these experiences, such innovative strategies may lead to new cost-effective interventions that could be integrated into the education system beyond the pandemic.



likely to have major effects on the sustainability and scalability of impacts. Finally, some very large-scale interventions have not been evaluated rigorously at all. For all of these reasons, expanding this evidence base should be a priority, with more investment in building the data and the evaluation capacity of low- and middle-income countries.

Beyond the well-evaluated and well-researched interventions summarized in this note, there are other policies and programs that may be appropriate in specific contexts. However, policymakers should strongly consider whether any of the well-researched, highly cost-effective approaches (Great and Good Buys) are relevant in their context, especially as many of those interventions address problems that are very common. If there is a strong case for an intervention that has not been well researched, especially in secondary schooling, policymakers should include a careful monitoring plan and consider whether a robust evaluation of impact is possible (recognizing that a poor evaluation will not add to the knowledge base). There should be a higher burden of justification for investing in Bad Buys: the business case for an intervention identified as rarely cost-effective should have a well-developed and well-supported theory of change, including consideration of the opportunity cost of the intervention, and a plan for monitoring its effectiveness.

Future “Smart Buys,” and further work. The panel will convene periodically to review additional categories of interventions, and to review the evolving evidence base for past categories. Examples of additional categories of interventions that are important, but were not reviewed in this first review, include school leadership and instruction in the mother tongue. Another category of interventions could include research emerging from the COVID-19 pandemic.





APPENDIX B

More Detail on the Importance of Systemic Reform

Although this note focuses on the impacts of various interventions on learning, interventions are not all that matters. To drive systemwide improvements in learning and make them sustainable over the long term, systemic reform is likely to be extremely important. Ensuring learning for all children and youth requires an education system that is [coherent](#) and [aligned toward learning](#). While which reforms should be prioritized in a particular setting will depend on the context, alignment toward learning should encompass the key system actors, policies, incentives, pedagogy, and capacity. This in turn requires political commitment, to help systems [escape low-learning traps](#)—and the commitment needs to be not just from the education minister, but from the head of government as well. This includes a durable commitment to consistent implementation and regular review of what is working. Good examples of sustained systemwide reform are rare, but it can happen with strong and consistent political leadership. The Brazilian state of [Ceará](#) has made



remarkable recent gains in learning during more than a decade of reforms, rising to become one of the country's top-performing states despite being among the poorest.

Yet even without systemic reform, interventions like the Great and Good Buys discussed in this note can still substantially improve outcomes for millions of children and youth. Indeed, they have already been shown to improve learning at scale, typically in systems that are not yet well-aligned toward learning. To maximize the chances for sustained success, policymakers should take several factors into account when they implement interventions like those discussed below:

They should look for horizontal complementarities across interventions. A deep understanding of the specific context is essential in order to design programs that have a chance of success; and part of this context is how a given program interacts with other interventions. In the example of Ceará, Brazil, numerous interventions that supported each other were combined—the setting of clear foundational learning goals for all children; regular assessment to inform teaching; practical teacher trainings; and financial incentives provided to municipalities. Another example of complementarities is pairing the right curricula and the right kind of coaching in kindergarten, as has been done in the [U.S.](#)

They should also recognize the importance of dynamic complementarities. Complementarities in interventions over time also matter. For example, in the [United States](#) higher-quality preschool delivers larger long-term gains in educational and life outcomes when it is followed by higher-quality primary schooling, and vice versa.

They should think about how the interventions will advance (or inhibit) systemic reform. Systemic reform takes at least several years to show substantial impacts on a range of outcomes. In the meantime, policymakers should focus on interventions that will not inhibit that reform. Some implementation challenges involve behavioral change needed from key stakeholders and may require more political and systemic reform; others are technical challenges with implementing the reforms with fidelity at scale. Noting these differences is important for systemic reform. Some interventions may make complementary interventions more effective or easier to introduce later. For example, if a country already has a system of practical, classroom-based professional development for its teachers, introducing an improved curriculum is more likely to be implementable and to have the desired effects in the classroom.



APPENDIX C

More Detail on Classification Parameters

Detailed considerations made in assessing the evidence for inclusion within this report include:

Outcome variable

This synthesis focuses on identifying the interventions that are most cost-effective in **improving learning in basic education, measured in terms of core cognitive skills** (typically literacy and numeracy). These skills are relevant everywhere around the world: they improve employment, income, health, civic participation, and a host of other development goals. Consequently, children who do not acquire them will be at a disadvantage throughout their lives. Educational interventions also have other important impacts, such as reduced crime, improved employment prospects, and better health status, that are not always mediated by improvements in learning; future meetings of the panel will consider interventions that advance those goals directly. Moreover, because improving learning has proved far more challenging than expanding access to education, this note has focused on that goal. In cases where impacts on cognitive skills are often not measured, such as in early childhood development, the panel has relied on proxies, such as the effects on school readiness.

Learning and equity

Contrary to what is sometimes assumed under a dichotomous “access vs. learning” view, a focus on learning as the outcome variable in this context is a tool for improving equity, inclusion, and opportunity. There is a reason that Sustainable Development Goal 4 highlights foundational literacy and numeracy skills as a key indicator to be tracked: because the children and youth most harmed by the learning crisis are those who fail to acquire those skills during basic education. The panel’s goal is to highlight those interventions that will advance learning for those students. The evaluations it draws on generally either focus on disadvantaged schools and children, or have been tested systemwide; in the latter case, the panel recommends only those interventions that are shown to be effective for less advantaged students.

Evidence base

The evidence reflected here includes the many high-quality systematic reviews and meta-analyses published over the past decade, as well as newer work that was produced to feed into the panel’s deliberations (see References).³ Of course, this rigorous evaluation

³ One new addition to the literature on which this note draws is Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal (2020), which estimates cost-effectiveness in terms of the Learning-Adjusted Years of Schooling (LAYS) achieved by specific interventions. The LAYS indicator, which is the education measure incorporated in the [Human Capital Index](#), provides a common metric that improves on the standard-deviation measure used in much past comparative research. In Angrist *et al* (2020), the preferred metric for cost-effectiveness is LAYS per \$100, which measures how many years of high-quality schooling can be bought for an additional \$100 spent on each intervention. (See Appendix D for details.)



literature, although it has greatly expanded over the past 20 years, still has numerous gaps; so the panel has supplemented it with other types of evidence where necessary. While the primary evidence base is from low- and middle-income countries, the panel has also drawn on evidence from high-income countries, where relevant and necessary, to fill out the evidence base.

Cost-effectiveness vs. effectiveness

Wherever possible, the panel prioritized evidence of cost-effectiveness in making its determinations; education systems face budget constraints, and they need to allocate scarce resources toward whatever interventions will deliver the most learning gains for the most children and youth on a given budget. However, because many evaluations lack cost data, we have also drawn on data on effectiveness—evidence on which interventions tend to produce the largest learning gains, independent of cost. Because the estimated impacts from this larger group of effectiveness interventions appears to share the same range as the cost-effectiveness group, drawing on those findings is a reasonable strategy.⁴

Scale

Many interventions that succeed as smaller pilots fail to achieve results when scaled up, whether because in scaling up implementation quality declines, or because political resistance to the intervention increases. Therefore, while it has considered a range of evidence, the panel has weighted more heavily the interventions that have been proven effective at a larger scale—whether systemwide or, at a minimum, in hundreds of schools. The areas that appear promising but have not been assessed at scale are included in the “promising but limited-evidence category.”

Duration of impacts

In making its assessments, the panel gives more credit to interventions that have been shown to have long-term positive impacts. However, this criterion cannot be applied blindly. Interventions are often evaluated over only a couple of years, so there is not always evidence of whether the impacts persist or fade over time. Furthermore, in many cases the initial intervention may need to be repeated or complemented by other policies or programs to have its full impact. Therefore, the panel has considered duration of impacts only as one of multiple factors. Unlike most of the other categories, preschool and early stimulation interventions do have long-term evidence, which has influenced the categorization of those two sets of interventions.

Interpretation of evidence

Synthesizing these lessons is not just a counting exercise, both because there are gaps in the evidence and because the context of the implementation matters. Therefore, the classifications also reflect principles drawn from the evaluation results, combined with other knowledge about learning and behavior from educational research, psychology, and development economics.

⁴ Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal (2020).



APPENDIX D

Effectiveness and Cost-Effectiveness Measured in Terms of LAYS

The key to making judgments about relative cost-effectiveness (and effectiveness in general) is to have good data and a common metric. Past studies (such as [Kremer, Brannen, and Glennerster 2013](#)) have made these comparisons by measuring effectiveness in standard-deviation improvements on learning assessments and then dividing by cost. The new paper that informed this note ([Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal 2020](#)) assesses cost-effectiveness in terms of **Learning-Adjusted Years of Schooling (LAYS)**, a measure of education that was introduced in the [2018 World Development Report](#) and that forms a core component of the World Bank's [Human Capital Index \(HCI\)](#). (See also the [background paper](#) introducing LAYS; [published version here](#).) LAYS combines the quantity and quality of schooling into a single metric of progress. It is calculated by multiplying a country's average number of years of schooling by its average test score performance relative to a high-performance benchmark. For example, if this high-performance benchmark is Singapore's performance, this procedure produces a measure of learning-adjusted years of schooling expressed in Singapore-equivalent years. LAYS was initially developed for country-level comparisons; it has since been expanded to compare specific interventions and policies evaluated in 150 studies across 46 countries (Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal 2020). The LAYS conversion uses globally comparable learning outcomes produced by the World Bank for the HCI (Angrist, Djankov, Goldberg, and Patrinos 2019).

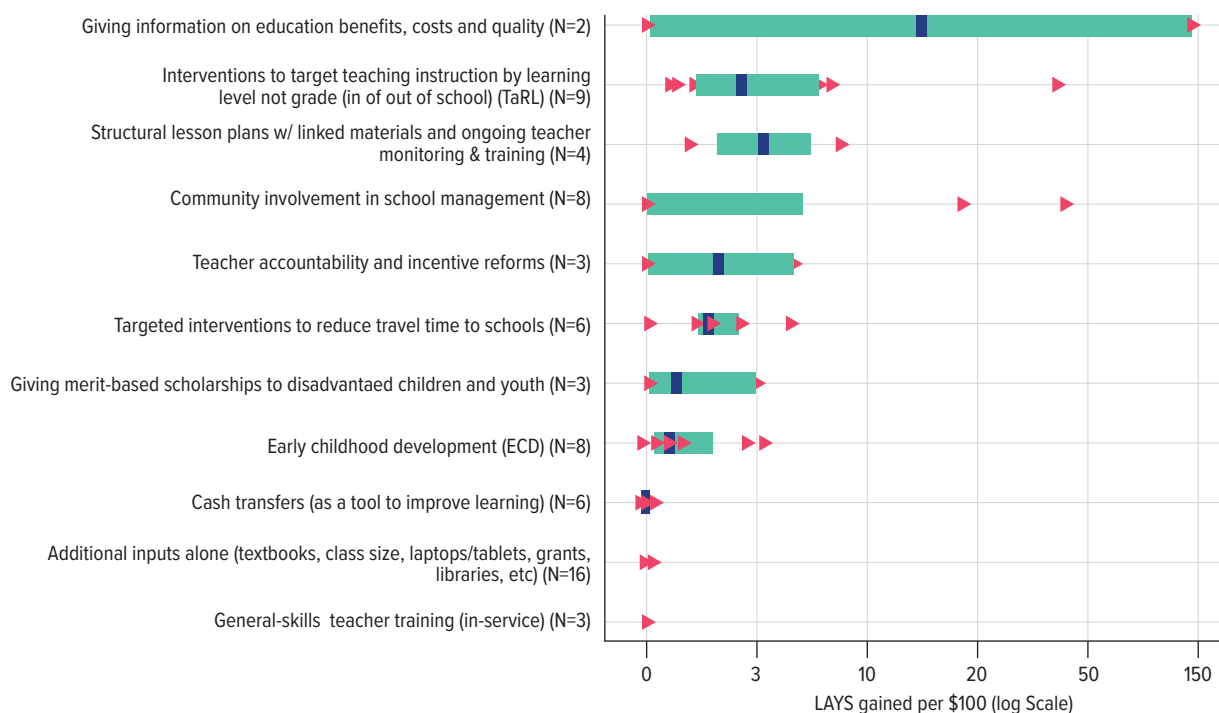
LAYS offers two advantages over previous metrics for making such comparisons.

First, because it expresses intervention impacts in terms of additional years of high-quality schooling delivered, it allows direct comparison of the interventions that affect both the quantity and the quality of schooling. By contrast, previous analyses have typically looked at either one or the other. Second, the notion of “additional years of high-quality schooling” or “additional years of schooling, adjusted for quality” is easier for a non-specialist audience to understand than “standard deviations of learning.”

The figures below, reproduced from Angrist *et al* (2020), show cost-effectiveness (Figure 1) and effectiveness (Figure 2), for various interventions and categories of interventions. Given this note's focus on cost-effectiveness, Figure 1 provides the most relevant guidance for policy. Figure 2 is included as background, to show that the effect sizes from the Figure 1 subset of interventions (those for which data on cost-effectiveness is available) are reasonably representative of the effect sizes from the larger set of well-evaluated interventions. As noted earlier, this study was not the only evidence that the categorization in this note relies upon, but it was one important input to the panel's judgments.



Figure 1: Learning-Adjusted Years of School (LAYS) Gained Per \$100, by Category



Source: Adapted from Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal (2020)

Note: Each category of education intervention shows the learning-adjusted years of schooling (LAYS) gained from a given intervention or policy across more than 150 impact estimates in 46 countries. Study categories are ranked by mean impact, from highest to lowest. The shaded boxplot delineates the 25th and 75th percentiles. The y-axis is reported on a natural log scale.

Figure 2: Learning-Adjusted Years of School (LAYS) Gained, by Intervention Category



Source: Adapted from Angrist, Evans, Filmer, Glennerster, Rogers, and Sabarwal (2020)

Note: Each category of education intervention shows the learning-adjusted years of school (LAYS) from a given intervention or policy across more than 150 impact estimates in 46 countries. The boxplot is ordered from largest to smallest mean cost-effectiveness (see Figure 1), and the shaded boxplot delineates the 25th and 75th percentile.

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