Commentary

Equal opportunities to enhance growth

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ABSTRACT

Half of the students in low- and middle-income countries fail to achieve minimum learning levels in core subject areas like literacy and numeracy. This learning crisis reduces prodcutivity by close to a third in developing countries. Nobel prize winners Duflo, Banerjee and Kremer have produced evidence on the effectiveness of different strategies to address the learning crisis. Experimental evaluations show that teacher incentives created by linking employment contracts to performance and accountability, and face-to-face training strategies focused in specific subjects, are effective strategies to improve student learning. Randomized trials also show that complementing education systems with tutors or computer assisted learning to make instruction more relevant to the current level of students' competences has a significant impact on learning outcomes, particularly among lagging students.

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Randomized controlled trials (RCTs) have contributed to deepening our knowledge on the effectiveness of different policies to address one of the most pressing challenges in the development agenda: the global learning crisis. More than half of the students in low- and middle-income countries do not achieve minimum proficiency. This should be regarded as an underutilization and misallocation of resources, with negative effects on economic efficiency and long-term growth. A child or adolescent not achieving her or his full human capital potential is a lost opportunity to ensure that a future worker can make effective use of new technologies, has the capacity to innovate, and can ultimately become more productive. According to the World Bank (2019), failing to provide equal opportunities in the form of access to health and quality education forgoes half of the developing world productivity growth potential. This is equivalent to not utilizing half of the labor force simply because they were not provided access to health and quality education services. The same World Bank report shows that a significant share of this waste of resources can be explained by students not getting the minimum learning levels in core subject areas such as literacy and numeracy. The empirical findings of Duflo, Banerjee, Kremer and other researchers derived from RCTs provide policy makers with a set of policies that have proven their effectiveness in tackling the learning crisis, and hence in promoting economic growth, reducing inequality and enhancing social mobility in the developing world.

An achievement level below minimum proficiency is the outcome of deficiencies in the flow of all past family and school inputs. For instance, as shown in Fig. 1, applying a standardized test at grade 9 reveals a distribution of skills or learning outcomes; some students will be close to the normative benchmark (think of it as the curriculum) and some others far away from it. Grade 9 dispersion in learning outcomes can be traced back to inequality in learning in previous levels all the way back to grade 1 or preschool. Skills dispersion is manifest since the beginning of education trajectories, reflecting differences in students' initial conditions and an unequal access to early childhood development. Infants from marginalized households lack access to early cognitive stimulation, meaningful interactions, and adequate nutrition, all of which result in constraints to develop their full learning potential. Marginalized students need more resources to produce a unit of learning to compensate for adverse initial conditions. Instead of getting the best education services available, in most low- and middle-income countries, marginalized students tend to go to schools with poor infrastructure conditions, low-quality teachers, and insufficient learning materials. The outcome is an education system that replicates—or even exacerbates—existing inequalities, excluding a large share of the population from achieving minimum learning standards and therefore confining them to a labor trajectory characterized by unstable, informal, and low-productivity jobs.

Can randomized controlled trials (RCTs) help identify effective interventions to address the global learning crisis and promote equality of opportunities? There is a large literature showing, via RCTs, that early child development interventions providing adequate nutrition and stimulation are highly cost-effective to improve education and labor market trajectories, particularly among marginalized infants (Gertler et al., 2016, Berlinski & Schady, 2015). But, once children are in the education system,
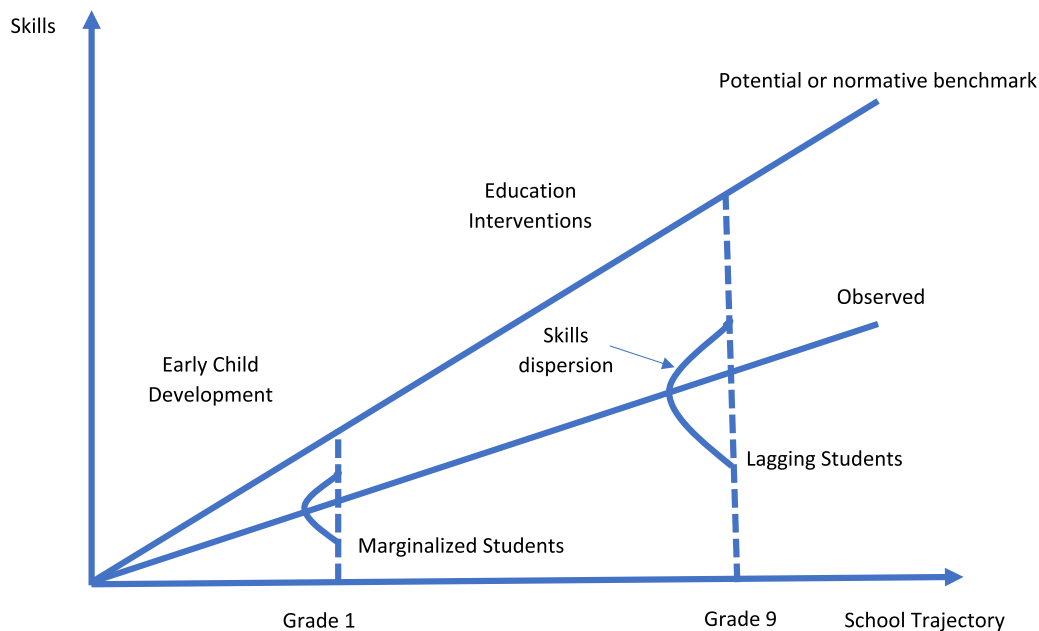
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Fig. 1. Cumulative skill gaps throughout the school trajectory.

the most effective strategies to improve learning, especially among the most marginalized ones, are less clear. Effective education interventions, as identified by systematic reviews of RCTs, can be classified in three broad categories: teachers, pedagogical, and other interventions (Kremer, Brannen, & Glennerster, 2013, Glewwe, Hanushek, Humpage, & Ravina, 2014, McEwan, 2015, and Evans & Popova, 2016). The latter include interventions that can improve learning but only under certain conditions or their impact is positive but economically small. Interventions in this category include nutritional treatments, the dissemination of information on returns to schooling, school-based management, and the provision of instructional material and basic school inputs.

As it is documented in the economics of education literature, within the education system, teachers are the single most important determinant of student learning (Rivkin et al., 2005). It is therefore not surprising that interventions improving teacher quality are among the most effective strategies to advance student learning. Teacher quality can be broadly defined in terms of their content knowledge, ability to transmit that knowledge (pedagogical competence), and motivation and commitment to student learning. Interventions that improve any of these three aspects have shown their effectiveness to increase student learning.

Experimental evaluations of teacher policies has identified three successful strategies: the use of incentives to enhance accountability, teacher contracts linked to performance, and teacher training strategies with certain characteristics. Duflo, Dupas, and Kremer (2015) show that hiring teachers via a decentralized, transparent process, and issuing renewable annual contracts subject to teacher performance reduces teacher absenteeism and improves student learning. Likewise, linking monetary or in-kind bonuses to student learning and teacher absenteeism improves learning (Glewwe, Ilias, & Kremer, 2010; Duflo, Hanna, & Ryan, 2012). Despite being one of the most commonly used education policies, in-service teacher training or professional development (PD) is rarely evaluated rigorously and among those evaluated, the effects are mixed. However, among the PD programs evaluated, the following characteristics tend to improve its effectiveness: linking training to career incentives, focusing on specific subjects as oppose to being general, starting the training with a face-to-

face session as opposed to solely online, and including follow-ups (Popova et al., 2019).

Perhaps the area that has seen the most advances in recent years is that of pedagogical strategies to improve learning outcomes among lagging students. These advances could not have been possible without the use of RCTs, particularly those undertaken by the recent Nobel laureates Duflo, Banerjee and Kremer. The researchers show that, by focusing on covering the curriculum, teachers assume—implicitly—that all students in a given grade acquired the necessary skills during previous grades (as marked by the curriculum). However, as depicted schematically in Figure 1 and shown empirically in Muralidharan, Ganimian and Singh (2019), this is an unrealistic assumption for many poor students in developing countries. Lagging students are benefiting the least from attending school since they are not receiving instruction that is relevant for their ongoing level of skills. Banerjee, Cole, Duflo, and Linden (2007) show that hiring tutors to provide instruction that is relevant for the level of competences of lagging student (that is, *teaching at the right level*) has a large and statistically significant impact on learning. The same study shows that the effects of teaching at the right level via tutors are comparable to the effects of a "computer assisted learning (CAL)" intervention. A third successful strategy to teach at the right level consists of sorting students in the same grade into different classrooms based on competency, which has proven to be effective in improving student learning without increasing learning dispersion (Duflo, Dupas, & Kremer, 2011).

More recently Muralidharan, Ganimian and Singh (2019) show, via a RCT, that a CAL intervention designed to personalize instruction by identifying the level of competences of every student and then assigning them relevant exercises, has a large and positive effect on student learning, particularly among lagging students. The use of tutors or CAL to teach at the right level and reduce learning gaps is among the most promising strategies to implement at scale without loosing the effectiveness achieved in small, controlled trials (Banerjee, Banerji, Berry, Duflo, Kannan, Mukherji, Shotland, & Walton, 2016).

The advance in knowledge, in only a few years, on the effectiveness of education policies to improve student learning has been

impressive. This knowledge opens the possibility of designing and implementing effective interventions and policies to improve teacher quality at scale with a profound positive impact both on equity and efficiency. This could not have been possible without researchers designing RCTs, policy makers supporting them, and field staff implementing them. RCTs and any other sound evaluations (those with a valid control or counterfactual) are not merely academic exercises, they are a sign of responsible use of public resources and a commitment to design and implement public policies that improve well-being.

Acknowledgements

References

Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukherji, Marc Shotland, Michael Walton (2016). Mainstreaming an Effective Intervention: Evidence from Randomized Evaluations of "Teaching at the Right Level" in India, NBER Working Papers 22746, National Bureau of Economic Research, Inc.

Banerjee, A. V., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. *The Quarterly Journal of Economics, Oxford University Press, 122*(3), 1235–1264.

Berlinski, S., & Schady, N. (Eds.). (2015). *The Early Years: Child Well-being and the Role of Public Policy*. IDB Publications (Books). Inter-American Development Bank, number 7259.

Duflo, E., Dupas, P., & Kremer, M. (2011). Peer effects, teacher incentives, and the impact of tracking: evidence from a randomized evaluation in Kenya. *American Economic Review, 101*(5), 1739–1774.

Duflo, E., Dupas, P., & Kremer, M. (2015). School governance, teacher incentives, and pupil–teacher ratios: Experimental evidence from Kenyan primary schools. *Journal of Public Economics, Elsevier, 123(C)*, 92–110.

Duflo, E., Hanna, R., & Ryan, S. P. (2012). Incentives work: getting teachers to come to school. *American Economic Review, 102*(4), 1241–1278.

Evans, D. K., & Popova, A. (2016). What really works to improve learning in developing countries? An analysis of divergent findings in systematic reviews. *World Bank Research Observer, World Bank Group, 31*(2), 242–270.

Gertler, P., Heckman, J., Pinto, R., Zanolini, A., Vermeersch, C., Walker, S., Chang, S. M., & Grantham-McGregor, S. (2016). Labor market returns to an early childhood stimulation intervention in Jamaica. *Science, 344*(6187), 998–1001.

Glewwe, P., Hanushek, E. A., Humpage, S. D., & Ravina, R. (2014). School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010. In P. Glewwe (Ed.), *Education Policy in Developing Countries*. Chicago and London: University of Chicago Press.

Glewwe, P., Ilias, N., & Kremer, M. (2010). Teacher incentives. *American Economic Journal: Applied Economics, American Economic Association, vol. 2*(3), 205–227.

Kremer, M., Brannen, C., & Glennerster, R. (2013). The challenge of education and learning in the developing world. *Science, 340*, 297.

McEwan, P. J. (2015). Improving learning in primary schools of developing countries: a meta-analysis of randomized experiments. *Review of Educational Research, 85*(3), 353–394.

Muralidharan, Karthik, Singh, Abhijeet, & Ganimian, Alejandro J. (2019). Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India. *American Economic Review, 109*(4), 1426–1460.

Popova, Anna & David K. Evans & Mary E. Breeding & Violeta Arancibia, 2019. Teacher Professional Development around the World: The Gap between Evidence and Practice, Working Papers 517, Center for Global Development.

Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417–458.

World Bank (2019). *World development report 2019: The changing nature of work*. Washington, DC: World Development Report, World Bank.