



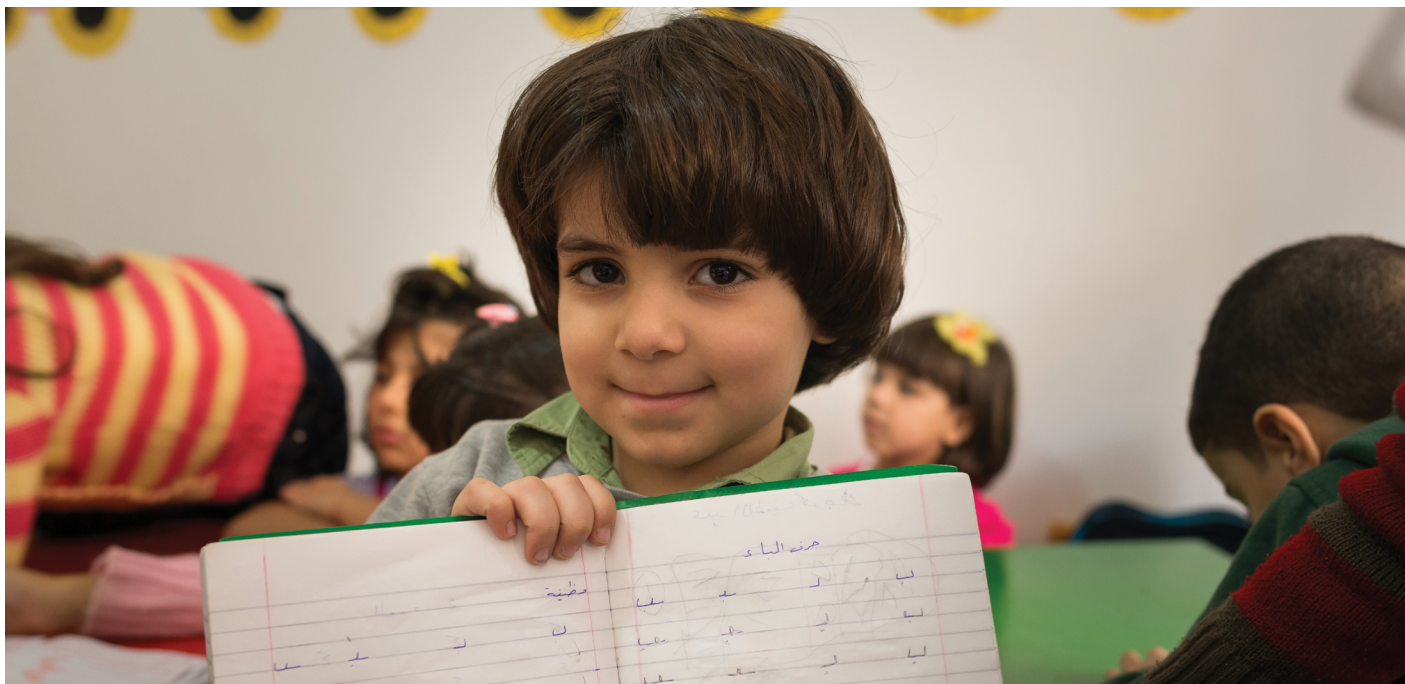
## SEMINAR BRIEF | STRENGTHENING THE EGYPTIAN EDUCATION SYSTEM TO BETTER REACH MARGINALIZED CHILDREN AND YOUTH: WHAT WE CAN LEARN FROM RANDOMIZED EVALUATIONS

Global Evidence for Egypt Spotlight Seminar Series: A collaboration between UNICEF in Egypt and The Abdul Latif Jameel Poverty Action Lab at the American University in Cairo

Sunday, February 23, 2020 | American University in Cairo



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## ABOUT THE GLOBAL EVIDENCE FOR EGYPT SPOTLIGHT SEMINAR SERIES

UNICEF in Egypt and The Abdul Latif Jameel Poverty Action Lab (J-PAL) at the American University in Cairo (AUC) have partnered to launch a Global Evidence for Egypt Spotlight Seminar Series in Cairo, Egypt. As part of this partnership, UNICEF in Egypt and J-PAL at AUC bring together Egyptian policymakers and leading J-PAL affiliated researchers to discuss pertinent policy issues that affect children and youth in Egypt. In doing so, the J-PAL affiliates focus on the issues from a global research perspective and then offer evidence-informed recommendations for tackling these issues. The policymakers then follow up, grounding the evidence into the local Egyptian landscape and offering concrete policy solutions.

The second Global Evidence for Egypt Spotlight Seminar will take place on Sunday, February 23, 2020 and will focus on strengthening the Egyptian education system to better reach marginalized children and youth. The seminar will foster a conversation between Egypt's policy priorities and the relevant rigorous global evidence, ultimately providing insights into how Egypt can strengthen its education system to further improve learning outcomes for marginalized children and youth.

## ABOUT THE ABDUL LATIF JAMEEL POVERTY ACTION LAB (J-PAL) AT THE AMERICAN UNIVERSITY IN CAIRO (AUC)

The Abdul Latif Jameel Poverty Action Lab (J-PAL) is a global research center working to reduce poverty by ensuring that policy is informed by scientific evidence. Anchored by a network of more than 190 affiliated professors at universities around the world, J-PAL draws on results from randomized impact evaluations to answer critical questions in the fight against poverty. We build partnerships with governments, NGOs, donors, and others to

share this knowledge, scale up effective programs, and advance evidence-informed decision-making. J-PAL was launched at the Massachusetts Institute of Technology in 2003 and has regional centers in Africa, Europe, Latin America & the Caribbean, North America, South Asia, and Southeast Asia.

J-PAL at AUC, based within the School of Business, launched in 2018 and is conducting randomized evaluations in Egypt in sectors including labor markets, financial inclusion, and social protection. The Initiative works to improve the effectiveness of social programs in Egypt and across the region.

## ABOUT UNICEF IN EGYPT

UNICEF in Egypt is focused on promoting sustainable development with multidimensional equity for children, embodying the fair chance for every child principle. In line with national priorities, UNICEF's work in Egypt focuses on early childhood development, bridging the first 1,000 days through the first years of formal education, as a key means by which multiple threats to children may be addressed through cross-sectoral interventions. The expected results of UNICEF's work in Egypt will contribute to national efforts and priorities and the 2030 National Sustainable Development Strategy, as well as to the United Nations Partnership for Development Framework.

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## STRENGTHENING THE EGYPTIAN EDUCATION SYSTEM TO BETTER REACH MARGINALIZED CHILDREN AND YOUTH: WHAT WE CAN LEARN FROM RANDOMIZED EVALUATIONS

### THE CONTEXT: Learning Levels in Egypt

Across the Middle East and North Africa (MENA), several countries have made significant strides in increasing student enrollment, attendance, and completion in schools.<sup>1</sup> In Egypt in particular, primary school net enrollment rates have increased from 87 percent in 2000 to 97 percent in 2018,<sup>2</sup> while primary school completion rates have risen from 91 percent in 2000 to 100 percent in 2018.<sup>3</sup> Similarly, secondary school net enrollment rates have increased from 77 percent in 2014 to 83 percent in 2018,<sup>4</sup> while lower secondary school gross completion rates have risen from 72 percent in 2009 to 85 percent in 2018.

Yet despite overall increases in school participation, on average, schooling is not always synonymous with learning.<sup>5</sup> In the MENA region, students miss out on roughly three years of education: According to the World Bank, when the number of years of schooling in the MENA region is adjusted for the level of learning, the effective years of schooling are on average 2.9 less than the number of actual years of schooling.<sup>6</sup> Egypt's score on the Human Capital Index is a mere 0.49. This means that when a child born in Egypt today grows, she will be 49 percent as productive compared to what she could have been if she achieved complete education and full health. A child in Egypt who starts school at age 4 would complete 11.1 years of school by her 18th birthday. However, when the quality of education is considered (i.e., how much the average student in Egypt learns per year compared to a student in a country with a more advanced education system)—the Egyptian student only learns the equivalent of 6.3 school years (i.e., 4.8 years less). On TIMSS<sup>7</sup> 2015 and PIRLS<sup>8</sup> 2016 international examination results, Egypt ranked at the bottom of the participating countries: ranking 49 out of 50 countries in grade 4 reading, 34 out of 39 countries in grade 8 mathematics, and 38 out of 39 countries in grade 8 science. According to the World Economic Forum's Global Competitiveness Report, in 2017, Egypt was ranked 133 out of 137 countries with regards to the overall quality of primary education.<sup>9</sup>

The following factors may explain low learning levels in Egypt:

First, access to schools in Egypt can be limited in certain regions and among specific populations. In Egypt's rural areas, such as Upper Egypt, families live in small, rural hamlets which are generally located far from central village primary schools. Parents, as a result, are often reluctant to allow their daughters to walk long distances to attend local village schools.<sup>10</sup> Moreover, access to schools can be limited for refugee children in major urban centers with high refugee and migrant concentrations. For example, in Al Behira, Alexandria, Aswan, Greater Cairo, Kafr Al Shiekh, Marsa Matrouh, and the Red Sea, Egypt's refugee children often encounter burdensome school enrollment processes and unaffordable school fees.<sup>11</sup>

Second, Egypt's rapid population growth has placed enormous strains on the country's education system. At the primary level, the total number of children enrolled has increased from 9.5



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million in 2005 to 12.2 million in 2017, while at the secondary level, the total number of children enrolled has risen from 6.7 million in 2009 to 8.9 million in 2015. Investment in education has been unable to keep pace with this rapid increase in student enrollment.<sup>12</sup> As such, schools in Egypt are overcrowded (with sometimes over 60 students per classroom), infrastructure is limited (with playgrounds, laboratories, and music and art rooms often a rarity), and resources are scarce (with learning materials, library books, and school equipment oftentimes outdated and/or unavailable). Overall capacity is also limited, with meagre teacher salaries (roughly 274 to 894 EGP per month) and an influx of students leading to higher student-to-teacher ratios in Egypt in recent years.

Finally, the Egyptian education system has traditionally prioritized passive learning and rote memorization over active learning, critical thinking, and creative expression among students.<sup>13</sup> This results largely from the education system's heavy emphasis on end-of-session examinations as a means for continued education, which, in turn, drives educators to often teach to the test rather than focus on overall learning outcomes.<sup>14</sup> As a result, students are often taught at the standardized grade level and may in the process miss out on learning valuable practical skills.

In response to the above challenges, Egypt is in the early stages of overhauling its education system (known as Education 2.0) as part of its national sustainable development agenda (known as Egypt's Vision 2030). Education 2.0 includes a complete change of curricula to ensure that the content is up to date and relevant; changing teaching methods to ensure the adoption of more learner-centered approaches; building the capacities of students by focusing on teaching them how to think critically, negotiate, and problem solve; embedding life skills in each subject; and making the most use of technology for learning, teaching, performance evaluation, assessment, and data collection.<sup>15</sup>



PHOTO: SULE ALAN | J-PAL

### THE GLOBAL EVIDENCE: Insights on Improving Learning Outcomes

From 2000 to 2015, the portion of primary school age children enrolled in school worldwide increased from 83 to 91 percent.<sup>16</sup> Despite this dramatic rise in the number of students enrolled in school around the world, children and youth are struggling to master even basic reading and math skills. For example, in 2017, over 80 percent of grade 2 students in Ghana, India, and Malawi could not read a simple word, and over 60 percent of grade 2 students could not perform two-digit subtraction.<sup>17</sup> Across low- and middle-income countries around the world, overall learning levels remain low.

Many strategies to improve student learning, particularly among marginalized children and youth, have been rigorously tested using randomized evaluations. The resulting global body of evidence suggests the following insights around improving students' cognitive skills development and related learning outcomes: First, having access to schools can increase learning. Second, while adding school inputs alone may not improve students' academic outcomes, integrating them into school pedagogy may be more promising. And third, tailoring instruction to the learning level of the child is a particularly effective type of pedagogy. Finally, there is also some emerging evidence on the importance of developing students' non-cognitive skills to improve learning outcomes.

First, distance to school is an important factor for school participation, especially if social norms or safety concerns make it difficult to travel far from home. When the alternative is no school at all, reducing distance by creating schools may improve enrollment, attendance, and learning among students. This is particularly beneficial in underserved areas or areas with security concerns, as demonstrated by studies in Afghanistan and Pakistan,

where researchers found large gains in learning resulting from new primary schools in otherwise difficult-to-access areas.<sup>18</sup> In the case of Afghanistan, distances between villages can be great and traveling between them dangerous—especially for young children and girls. In the rural province of Ghor, in 2007, only 29 percent of the local population lived within five kilometers of a primary school, and of children aged 6 to 13, a mere 28 percent were enrolled in school. As such, Burde and Linden (2013) evaluated a five-year USAID-funded program that created schools directly in children's villages. Through this program, communities provided space for the schools, while USAID provided the educational materials and teacher trainings. As a result of the program, overall formal school enrollment increased by 42 percentage points and test scores improved by 0.40 standard deviations among boys and 0.65 standard deviations among girls. Researchers found that distance played a large role on student outcomes, with school enrollment rates falling by 16 percentage points and test scores dropping by 0.19 standard deviations for each additional mile a child had to otherwise walk to school.<sup>19</sup>

Similarly, in Pakistan, school enrollment rates tend to be low, with more girls out of school than boys. In the agricultural province of Sindh, for example, only 49 percent of boys and 31 percent of girls ages 5 to 9 were enrolled in primary school in 2007. Barrera-Osorio et al. (2017) found that in areas where no school existed within 1.5 kilometers, granting per-student subsidies to local entrepreneurs to set up new private schools increased student enrollment rates by 60 percent and raised students' math and language test scores by 0.63 standard deviations.<sup>20</sup>

Both randomized studies in Afghanistan and Pakistan were conducted in contexts where security was a concern. These results are consistent with findings from non-experimental studies in more secure contexts as well, such as in Burkina Faso, India, and Indonesia.<sup>21</sup>

Second, across many low- and middle-income countries, classrooms tend to be overcrowded and have substantially fewer resources than those in higher income countries. While inputs, specifically teacher salaries, constitute about 75 percent or more of education budgets in many places, there is little evidence to suggest that investments in inputs alone help students learn.

Studies in Colombia, Honduras, India, Kenya, Peru, Sierra Leone, and the United States demonstrated that adding laptops, libraries, textbooks, and internet access did not improve learning outcomes for students. However, programs in India, Kenya, the Philippines, and Uganda, which added inputs such as storybooks and math and reading materials into schools and integrated them into innovative pedagogies found improvements in learning outcomes.<sup>22</sup> Existing evidence suggests that adding inputs as part of a larger effort to change the way students and teachers interact in the classroom can effectively support learning.

For example, in 2009, the Sa Aklat Sisikat Foundation implemented a 31-day read-a-thon in the Philippines, in which students were provided children's storybooks, reading diaries, and reading progress charts and encouraged to read as many books as possible in the allotted time frame. The marathon was preceded by a two-day training, in which grade 4 teachers learned how to incorporate reading activities, such as storytelling sessions and reading games, into the classroom. As a result, Abeberese et al. (2013) found that in the last month of the intervention, the number of books that students reported reading increased from 2.3 to 9.5 and student reading scores rose by 0.13 standard deviations. These positive effects persisted even after the conclusion of the read-a-thon.<sup>23</sup>

Third, one particularly effective and cost-effective pedagogy, evaluated through 15 studies in Chile, India, Kenya, Peru, and the United States, tailors instruction to students' learning levels and has led to increased student learning outcomes. This is especially beneficial in classroom settings where there can be large variations in learning levels, and in which teachers are often pressured to teach grade-level curriculum without having flexibility to support students who may be falling behind. This form of tailored instruction can be delivered effectively through multiple channels: during or after school; by tutors, volunteers, or teachers; or through education technology.<sup>24</sup>

In India, six randomized evaluations across seven Indian states found that Pratham's Teaching at the Right Level (TaRL) approach, which targets instruction to students' learning levels, improved students' reading and math skills between 0.07 and 0.7 standard deviations. While all students experienced gains in learning, the lowest-performing students learned the most.<sup>25</sup> Pratham and J-PAL are now working together with Ministries of Education to contextualize and scale TaRL across India and several African countries.<sup>26</sup>

Similar to the TaRL approach, Educational Initiatives' Mindspark platform uses computer-adapted learning as a form of tailored instruction. Rather than grouping children by their ability level, the technology adapts to the level of the child, thereby

offering personalized learning to each student. As a result of the program, Muralidharan et al. (2019) found that student test scores improved by 0.36 standard deviations in math and 0.22 standard deviations in Hindi over a four and a half month period.<sup>27</sup>

Ultimately, evidence suggests that greater access to schools, augmenting school-based inputs with pedagogical innovations, and instruction tailored to students' learning levels can strengthen children's cognitive skills.

Finally, some emerging research has focused on how to improve students' non-cognitive skills, which, in turn, may also influence cognitive skill development. For instance, in Turkey, Alan et al. (2019) worked with public elementary schools in Istanbul to evaluate the impact of an innovative education intervention on students' grit, patience, and educational outcomes. This research program was motivated by studies that document that non-cognitive skills, such as patience, self-control, and grit, affect educational as well as other socio-economically significant outcomes, such as criminal activity and health. Researchers found that as a result of the program, students exhibited higher resilience to negative feedback, greater willingness to engage in challenging tasks, and more openness to skill-building productive activities. This enhanced resilience to setbacks naturally led to an increase in math test scores by 0.31 standard deviations and verbal test scores by 0.13 standard deviations.<sup>28</sup>

Drawing from the existing evidence, policymakers and practitioners should consider how best to better support programs that can boost both cognitive and non-cognitive learning outcomes in Egypt. The Global Evidence for Egypt Spotlight Seminar on February 23, 2020 will draw on some of the above themes and work together with policymakers in attendance to explore how global evidence can be useful in strengthening education policies in Egypt.



TaRL CLASSROOM IN INDIA. PHOTO: PUTUL GUPTA | J-PAL

## THE CASE FOR EVIDENCE: Why Evaluate? What are Evaluations? What are Randomized Evaluations?

### Why Evaluate?

The purpose of evaluation is not always clear, particularly for those who have watched surveys conducted, data entered, and then the ensuing reports filed away only to collect dust. This is most common when evaluations are imposed by others. If, on the other hand, those responsible for the day-to-day operations of a program have critical questions, evaluations can help find answers. As an example, the NGO responsible for distributing chlorine pills may speak with their local field staff and hear stories of households diligently using the pills, and occasionally see improvements in their health. But each time it rains heavily, the clinics fill up with people suffering from diarrheal diseases. The NGO might wonder, “If people are using chlorine to treat their water, why are they getting sick when it rains? Even if the water is more contaminated, the chlorine should kill all the bacteria.” The NGO may wonder whether the chlorine pills are indeed effective at killing bacteria. Are people using it in the right proportion? Maybe our field staff is not telling us the truth. Perhaps the intended beneficiaries are not using the pills. Perhaps they aren’t even receiving them. And then when confronted with this fact, the field staff claims that during the rains, it is difficult to reach households and distribute pills. Households, on the other hand, will reply that they most diligently use pills during the rains, and that the pills have helped them substantially. Speaking to individuals at different levels of the organization, as well as to stakeholders, can uncover many stories of what is going on. These stories can be the basis for theories. But plausible explanations are not the same as answers. Evaluations involve developing hypotheses of what’s going on, and then testing those hypotheses.

### What are Evaluations?

The word “evaluation” can be interpreted quite broadly and have varying meanings to different people and organizations. Engineers, for example, might evaluate or test the quality of a product design, the durability of a material, the efficiency of a production process, or the safety of a bridge. Critics evaluate or review the quality of a restaurant, movie, or book. A child psychologist may evaluate or assess the decision-making process of toddlers. The researchers at J-PAL evaluate social programs and policies designed to improve the well-being of the world’s poor. This is known as program evaluation. Put simply, a program evaluation is meant to answer the question, “How is our program or policy doing?” This can have different implications depending on who is asking the question, and to whom they are speaking. For example, if a donor asks the NGO director “How is our program doing?” she may imply, “Have you been wasting our money?” This can feel interrogatory. Alternatively, if a politician asks her constituents, “How is our program doing?” she could imply, “Is our program meeting your needs? How can we make it better for you?” Program evaluation, therefore, can be associated with positive or negative sentiments, depending on whether it is motivated by a demand for accountability versus a desire to learn.



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J-PAL works with governments, NGOs, donors, and other partners who are more interested in learning the answer to the questions: How effective is our program? This question can be answered through an impact evaluation. There are many methods of conducting impact evaluations; J-PAL focuses on randomized evaluations.

### What are Randomized Evaluations?

A randomized evaluation is a type of impact evaluation that uses random assignment to allocate resources, run programs, or apply policies as part of the study design. Like all impact evaluations, the main purpose of randomized evaluations is to determine whether a program has an impact, and more specifically, to quantify how large that impact is. Impact evaluations measure program effectiveness typically by comparing outcomes of those (individuals, communities, schools, etc.) who received the program against those who did not. There are many methods of doing this, but randomized evaluations are generally considered the most rigorous and, all else equal, produce the most accurate (i.e. unbiased) results.

At a very basic level, a randomized evaluation can answer the question: Was the program effective? But if thoughtfully designed and implemented, it can also answer the questions, “How effective was it? Were there unintended side-effects? Who benefited most? Who was harmed? Why did it work or not work? What lessons can be applied to other contexts, or if the program was scaled up? How cost-effective was the program? How does it compare to other programs designed to accomplish similar goals?”

- <sup>1</sup> World Bank. "Education in the Middle East and North Africa." 2014. Accessed January 30, 2020, <http://www.worldbank.org/en/region/mena/brief/education-in-mena>.
- <sup>2</sup> UNESCO Institute for Statistics. "School Enrollment, Primary (% net) - Egypt, Arab Rep." 2018. Accessed January 30, 2020, <https://data.worldbank.org/indicator/SE.PRM.NENR?locations=EG>.
- <sup>3</sup> UNESCO Institute for Statistics. "Primary Completion Rate, Total (% of relevant age group) - Egypt, Arab Rep." 2018. Accessed January 30, 2020, <https://data.worldbank.org/indicator/SE.PRM.NENR?locations=EG>.
- <sup>4</sup> UNESCO Institute for Statistics. "School Enrollment, Secondary (% net) - Egypt, Arab Rep." 2018. Accessed January 30, 2020, <https://data.worldbank.org/indicator/SE.SEC.NENR?locations=EG>.
- <sup>5</sup> World Bank. "Education in the Middle East and North Africa." 2014. Accessed January 30, 2020, <http://www.worldbank.org/en/region/mena/brief/education-in-mena>.
- <sup>6</sup> World Bank. *Expectations and Aspirations: A New Framework for Education in the Middle East and North Africa*. Washington, DC: World Bank, 2019. Accessed January 30, 2020.
- <sup>7</sup> TIMSS, or the Trends in International Mathematics and Science Study, is a series of international assessments in mathematics and science for grades 4 and 8 students. The first assessment was conducted in 1995 and has been administered every four years thereafter.
- <sup>8</sup> PIRLS, or Progress in International Reading Literacy Study, is an international comparative reading assessment for grade 4 students. The first assessment was conducted in 2001 and has been administered every five years thereafter.
- <sup>9</sup> Clarke, Marguerite. "Nine Takeaways from the 2015 Trends in International Math and Science Study Results." *World Bank Blogs*, November 30, 2016. <http://blogs.worldbank.org/education/nine-takeaways-2015-trends-international-math-and-science-study-results>.
- <sup>10</sup> USAID. "Meeting EFA: Egypt Community." n.d. Accessed February 4, 2020, <https://www.epdc.org/sites/default/files/documents/Egypt%20Community%20Schools.pdf>.
- <sup>11</sup> Reliefweb. "Access to Education an Added Challenge for Refugees in Egypt." *Reliefweb*, April 8, 2014. <https://reliefweb.int/report/egypt/access-education-added-challenge-refugees-egypt>.
- UNICEF. "Better Access to Education and Protection for Refugees in Egypt." UNICEF, press release, July 17, 2018. <https://www.unicef.org/egypt/press-releases/better-access-education-and-protection-refugees-egypt>.
- UNICEF. "Child Protection" n.d. Accessed February 4, 2020, <https://www.unicef.org/egypt/child-protection>.
- UNICEF. "Education." n.d. Accessed February 4, 2020, <https://www.unicef.org/egypt/education>.
- <sup>12</sup> Mohamed, Ramage Y., Makala Skinner, and Stefan Trines. "Education in Egypt." *World Education News + Reviews*, February 1, 2019. <https://wenr.wes.org/2019/02/education-in-egypt-2>.
- <sup>13</sup> Fahmy, Amina, Djavad Salehi-Isfahani, and Navtej Dhillon. "Egypt's Education System: Parents and Students Emerge as a New Force for Reform." *The Brookings Institution*, October 1, 2008. <https://www.brookings.edu/opinions/egypts-education-system-parents-and-students-emerge-as-a-new-force-for-reform/>.
- Keddie, Patrick. "Inside Egypt's Dismal Primary Schools." *Al Jazeera*, December 19, 2013. <https://www.aljazeera.com/indepth/features/2013/12/inside-egypt-dismal-primary-schools-201312157919225472.html>.
- Loveluck, Louisa. *Education in Egypt: Key Challenges*. London: Chatham House, 2012. Accessed January 30, 2020. [https://www.chathamhouse.org/sites/default/files/public/Research/Middle%20East/0312egyptedu\\_background.pdf](https://www.chathamhouse.org/sites/default/files/public/Research/Middle%20East/0312egyptedu_background.pdf).
- <sup>14</sup> Fahmy, Amina, Djavad Salehi-Isfahani, and Navtej Dhillon. "Egypt's Education System: Parents and Students Emerge as a New Force for Reform." *The Brookings Institution*, October 1, 2008. <https://www.brookings.edu/opinions/egypts-education-system-parents-and-students-emerge-as-a-new-force-for-reform/>.
- <sup>15</sup> Egypt Ministry of Education. "Education 2.0." n.d. Accessed February 14, 2020, [https://moenewsegyp.com/en/education\\_systems/5](https://moenewsegyp.com/en/education_systems/5).
- <sup>16</sup> The Abdul Latif Jameel Poverty Action Lab. "Increasing Enrollment and Attendance by Making Education Benefits Salient and Changing Perceptions." *Policy Insights*. Accessed January 30, 2020. <https://www.povertyactionlab.org/policy-insight/increasing-enrollment-and-attendance-making-education-benefits-salient-and-changing>.
- <sup>17</sup> World Bank. 2018. *World Development Report 2018: Learning to Realize Education's Promise*. Washington, DC: World Bank.
- <sup>18</sup> Barrera-Osorio, Felipe, David S. Blakeslee, Matthew Hoover, Leigh L. Linden, Dhushyanth Raju, and Stephen P. Ryan. "Delivering Education to the Underserved Through a Public-Private Partnership Program in Pakistan." NBER Working Paper No. 23870, 2017.
- Burde, Dana, and Leigh L. Linden. 2013. "Bringing Education to Afghan Girls: A Randomized Controlled Trial of Village-Based Schools." *American Economic Journal: Applied Economics* 5 (3): 27-40.
- Duflo, Esther. 2001. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment." *American Economic Review* 91(4): 795-813.
- Ingwersen, Nicholas, Harounan Kazianga, Leigh L. Linden, Arif Mamun, Ali Protik, and Matthew Sloan. "The Long-Term Impacts of Girl-Friendly Schools: Evidence from the BRIGHT School Construction Program in Burkina Faso." *Development Working Papers* 452, 2019.
- Kazianga, Harounan, Dan Levy, Leigh L. Linden, and Matthew Sloan. 2013. "The Effects of 'Girl-Friendly' Schools: Evidence from the BRIGHT School Construction Program in Burkina Faso." *American Economic Journal: Applied Economics* 5(3): 41-62.
- Kazianga, Harounan, Leigh L. Linden, Ali Protik, and Matthew Sloan. "The Medium-Term Impacts of Girl-Friendly Schools: Seven-Year Evidence from School Construction in Burkina Faso." NBER Working Paper No. 26006, 2019.
- Muralidharan, Karthik, and Nishith Prakash. "Cycling to School: Increasing Secondary School Enrollment for Girls in India." Working Paper, 2016.
- <sup>19</sup> Burde, Dana, and Leigh L. Linden. 2013. "Bringing Education to Afghan Girls: A Randomized Controlled Trial of Village-Based Schools." *American Economic Journal: Applied Economics* 5 (3): 27-40.
- <sup>20</sup> Barrera-Osorio, Felipe, David S. Blakeslee, Matthew Hoover, Leigh L. Linden, Dhushyanth Raju, and Stephen P. Ryan. "Delivering Education to the Underserved Through a Public-Private Partnership Program in Pakistan." NBER Working Paper No. 23870, 2017.
- <sup>21</sup> Duflo, Esther. 2001. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment." *American Economic Review* 91(4): 795-813.
- Kazianga, Harounan, Dan Levy, Leigh L. Linden, and Matt Sloan. 2013. "The Effects of 'Girl-Friendly' Schools: Evidence from the BRIGHT School Construction Program in Burkina Faso." *American Economic Journal: Applied Economics* 5(3): 41-62.
- Muralidharan, Karthik, and Nishith Prakash. "Cycling to School: Increasing Secondary School Enrollment for Girls in India." Working Paper, 2016.
- <sup>22</sup> Abeberese, Ama Baafr, Todd J. Kumler, and Leigh Linden. 2013. "Improving Reading Skills by Encouraging Children to Read in School: A Randomized Evaluation of the Sa Aklat Sisikat Reading Program in the Philippines." Working Paper. 2013.
- Bando, Rosangela, Francisco Gallego, Paul Gertler, and Dario Romero Fonseca. 2017. "Books or Laptops? The Effect of Shifting from Printed to Digital Delivery of Educational Content on Learning." *Economics of Education Review* 61.
- Banerjee, Abhijit, Shawn Cole, Esther Duflo, and Leigh Linden. 2007. "Remedying Education: Evidence From Randomized Experiments in India." *The Quarterly Journal of Economics* 122 (3): 1235-1264.
- Barrera-Osorio, Felipe, and Leigh L. Linden. "The Use and Misuse of Computers in Education: Evidence from a Randomized Experiment in Colombia." World Bank Policy Research Working Paper 4836. 2009.
- Bassi, Marina, Costas Meghir, and Ana Reynoso. "Education Quality and Teaching Practices." NBER Working Paper No. 22719. 2019.
- Beg, Sabrin, Adrienne M. Lucas, Waqas Halim, and Umer Saif. "Beyond the Basics: Improving Post-Primary Content Delivery through Classroom Technology." Working Paper. 2019.
- Beuermann, Diether W., Julian Cristia, Santiago Cueto, Ofer Malamud, and Yannu Cruz-Aguayo. 2015. "One Laptop per Child at Home: Short-Term Impacts from a Randomized Experiment in Peru." *American Journal of Economics: Applied Economics* 7 (2): 53-80.
- Beuermann, Diether W., Julian P. Cristia, Yannu Cruz-Aguayo, Santiago Cueto, and Ofer Malamud. "Home Computers and Child Outcomes: Short-Term Impacts from a Randomized Experiment in Peru." NBER Working Paper No. 18818. 2013.

- Blimpo, Moussa, and David Evans. 2013. "School-Based Management and Educational Outcomes: Lessons from a Randomized Field Experiment." *nGender Impact: the World Bank's Gender Impact Evaluation Database*. Washington, DC: World Bank.
- Borkum, Evan, Fang He, and Leigh L. Linden. "The Effects of School Libraries on Language Skills: Evidence from a Randomized Controlled Trial in India." NBER Working Paper 18183, 2012.
- Cristia, Julián P., Pablo Ibararán, Santiago Cueto, Ana Santiago, and Eugenio Severín. "Technology and Child Development: Evidence from the One Laptop Per Child Program." IDB Working Paper Series No. IDPWP-304, 2012.
- Das, Jishnu, Stefan Dercon, James Habyarimana, Pramila Krishnan, Karthik Muralidharan, and Venkatesh Sundararaman. 2013. "School Inputs, Household Substitution, and Test Scores." *American Economic Journal: Applied Economics* 5 (2): 29-57.
- Duflo, Esther. 2001. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment." *American Economic Review* 91(4): 795-813.
- Fafchamps, Marcel, and Di Mo. "Peer Effects in Computer Assisted Learning: Evidence from a Randomized Experiment." NBER Working Paper No. 23195, 2017.
- Fairlie, Robert W., and Jonathan Robinson. "Experimental Evidence on the Effects of Home Computers on Academic Achievement among Schoolchildren." NBER Working Paper No. 19060, 2013.
- Ferman, Bruno, Lucas Finamor, and Lycia Lima. "Are Public Schools Ready to Integrate Math Classes with Khan Academy?" MPRA Paper No. 94736, 2019.
- Gallego, Francisco, Emma Naslund-Hadley, and Mariana Alfonso. "Tailoring Instruction to Improve Mathematics Skills in Preschools: A Randomized Evaluation." IDB Working Paper, 905, 2018.
- Glewwe, Paul, Michael Kremer, Sylvie Moulin, and Eric Zitzewitz. "Retrospective vs. Prospective Analyses of School Inputs: The Case of Flip Charts in Kenya." NBER Working Paper 8018, 2000.
- Glewwe, Paul, Michael Kremer, and Sylvie Moulin. 2009. "Many children left behind? Textbooks and test scores in Kenya." *American Economic Journal: Applied Economics* 1 (1), 112–135.
- Krueger, Alan B., and Diane M. Whitmore. 2001. "The Effect of Attending a Small Class in the Early Grades on College-Test Taking and Middle School Test Results: Evidence from Project STAR." *The Economic Journal* 111 (468): 1-28.
- Leigh, Linden. "Complement or Substitute? The Effect of Technology on Student Achievement in India." Working Paper, 2008.
- Lucas, Adrienne M., Patrick J. McEwan, Moses Ngware, and Moses Oketch. 2014. "Improving Early-Grade Literacy in East Africa: Experimental Evidence from Kenya and Uganda." *Journal of Policy Analysis and Management* 33 (4): 950-976.
- Malamud, Ofer, Santiago Cueto, Julian Cristia, and Diether W. Buermann. "Do Children Benefit from Internet Access? Experimental Evidence from Peru." NBER Working Paper No. 25313, 2018.
- Mbiti, Isaac, Karthik Muralidharan, Mauricio Romero, Youdi Schipper, Constantine Manda, and Rakesh Rajani. 2019. "Inputs, Incentives, and Complementarities in Education: Experimental Evidence from Tanzania." *The Quarterly Journal of Economics* 134 (3): 1627-1673.
- Piper, Benjamin, Stephanie Simmons Zuilkowski, Dunston Kwayumba, and Carmen Strigel. 2016. "Does Technology Improve Reading Outcomes? Comparing the Effectiveness and Cost-Effectiveness of ICT Interventions for Early Grade Reading in Kenya." *International Journal of Educational Development* 49: 204-214.
- Pradhan, Menno, Daniel Suryadarma, Amanda Beatty, Maisy Wong, Arya Gaduh, Armida Alisjabbana, and Rima Prama Artha. 2014. "Improving Educational Quality through Enhancing Community Participation: Results from a Randomized Field Experiment in Indonesia." *American Economic Journal: Applied Economics* 6 (2): 105-126.
- Saavedra, Juan, Emma Naslund-Hadley, and Mariana Alfonso. "Targeted Remedial Education: Experimental Evidence from Peru." NBER Working Paper No. 23050, 2017.
- Sabarwal, Shwetlena, David K. Evans, and Anastasia Marshak. "The Permanent Input Hypothesis: The Case of Textbooks and (No) Student Learning in Sierra Leone." World Bank Policy Research Working Paper No. 7021, 2014.
- <sup>23</sup> Abeberese, Ama Baafra, Todd J. Kumler, and Leigh Linden. 2013. "Improving Reading Skills by Encouraging Children to Read in School: A Randomized Evaluation of the Sa Aklat Sisikat Reading Program in the Philippines." Working Paper, 2013.
- Banerjee, Abhijit, Shawn Cole, Esther Duflo, and Leigh Linden. 2007. "Remedying Education: Evidence From Randomized Experiments in India." *The Quarterly Journal of Economics* 122 (3): 1235-1264.
- Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukerji, Marc Shotland, and Michael Walton. 2017. "From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application." *Journal of Economic Perspectives* 31 (4): 73-102.
- <sup>24</sup> Cabezas, Veronica, Jose I. Cuesta, and Francisco A. Gallego. "Effects of Short-Term Tutoring on Cognitive and Non-Cognitive Skills: Evidence from a Randomized Evaluation in Chile." Working Paper, 2011.
- Cook, Philip J., Kenneth Dodge, George Farkas, Roland G. Fryer, Jr., Jonathan Guryan, Jens Ludwig, Susan Mayer, Harold Pollack, and Laurence Steinberg. "The (Surprising) Efficacy of Academic and Behavioral Intervention with Disadvantaged Youth: Results from a Randomized Experiment in Chicago." NBER Working Paper No. 19862, 2014.
- Cook, Philip J., Kenneth Dodge, George Farkas, Roland G. Fryer, Jr., Jonathan Guryan, Jens Ludwig, Susan Mayer, Harold Pollack, and Laurence Steinberg. "Not Too Late: Improving Academic Outcomes for Disadvantaged Youth." Institute for Policy Research, Northwestern University Working Paper Series, 2015.
- Duflo, Esther, Pascaline Dupas and Michael Kremer. 2011. "Peer Effects, Teacher Incentives, and the Impact of Tracking: Evidence from a Randomized Evaluation in Kenya." *American Economic Review* 101 (5): 1749-1774.
- Duflo, Esther, Pascaline Dupas and Michael Kremer. 2015. "Education, HIV and Early Fertility: Experimental Evidence from Kenya." *American Economic Review* 105 (9): 2757-2797.
- Gallego, Francisco, Emma Naslund-Hadley, and Mariana Alfonso. "Tailoring Instruction to Improve Mathematics Skills in Preschools: A Randomized Evaluation." IDB Working Paper, 905, 2018.
- Lakshminarayana, Rashmi, Alex Eble, Preetha Bhakta, Chris Frost, Peter Boone, Diana Elbourne, and Vera Mann. 2013. "The Support to Rural India's Public Education System (STRIPES) Trial: A Cluster Randomised Controlled Trial of Supplementary Teaching, Learning Material and Material Support." *PLoS ONE* 8 (7).
- Muralidharan, Karthik, Abhijeet Singh, and Alejandro J. Ganimian. 2019. "Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India." *American Economic Review* 109 (4): 1426-1460.
- Saavedra, Juan, Emma Naslund-Hadley, and Mariana Alfonso. "Targeted Remedial Education: Experimental Evidence from Peru." NBER Working Paper No. 23050, 2017.
- <sup>25</sup> Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukerji, Marc Shotland, and Michael Walton. "Mainstreaming an Effective Intervention: Evidence from Randomized Evaluations of 'Teaching at the Right Level' in India." NBER Working Paper No. 22746, 2016.
- Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukerji, Marc Shotland, and Michael Walton. 2017. "From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application." *Journal of Economic Perspectives* 31 (4): 73–102.
- <sup>26</sup> The Abdul Latif Jameel Poverty Action Lab. "Teaching at the Right Level to Improve Learning." *Evidence to Policy*. Accessed January 30, 2020. <https://www.povertyactionlab.org/case-study/teaching-right-level-improve-learning>.
- <sup>27</sup> Muralidharan, Karthik, Abhijeet Singh, and Alejandro J. Ganimian. 2019. "Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India." *American Economic Review* 109 (4): 1426-1460.
- <sup>28</sup> Alan, Sule, Teodora Boneva, and Seda Ertac. 2019. "Ever Failed, Try Again, Succeed Better: Results from a Randomized Educational Intervention on Grit." *The Quarterly Journal of Economics* 134 (3): 1121-1162.