RESEARCH INSIGHTS

# Do Children Benefit from Personal Laptops in the Long Run?

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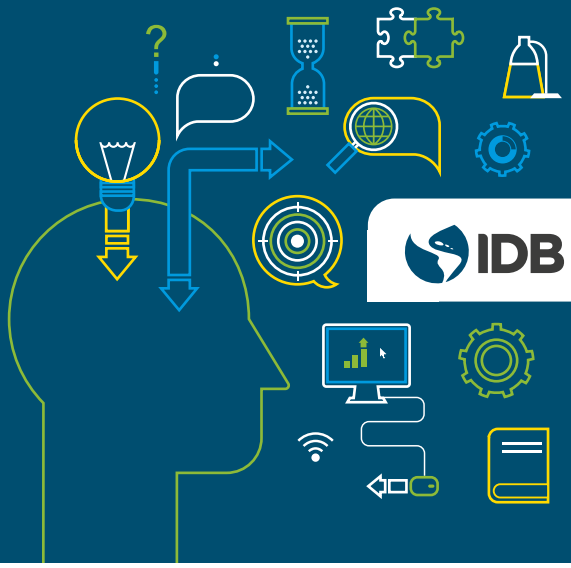


- **Results among primary students in rural Peru indicate that the One Laptop Per Child (OLPC) program resulted in no improvement in academic achievement or overall educational attainment.**
- **However, small negative effects were observed in on-time primary and secondary school completion.**
- **The program increased students' digital skills, but it did not affect teachers' digital skills.**

## CONTEXT

**The OLPC program, designed by a team at the MIT Media Lab, aimed to improve educational outcomes among low-income primary students around the world by providing affordable personal laptops.** The government of Peru launched its national OLPC program in 2009, targeting the nation's most impoverished regions. Improving learning outcomes was a critical goal, considering that only 14% of second grade primary students met the national mathematics standard and only 23% did so for reading in 2009. While similar initiatives were implemented worldwide, their long-term impacts remain underexplored.

## PROJECT

**The Peruvian government distributed OLPC laptops (called XOs) to students in 296 randomly selected treatment schools, achieving a 1-to-1 laptop-to-student ratio.** In contrast, the 235 control schools received almost no XO laptops through 2010. Starting in 2011, control schools did begin receiving some XO laptops, eventually reaching a ratio of over 0.3 laptops per student by 2016. We examine the effects of the program by comparing treatment and control groups in academic performance (using standardized national exams) and educational attainment (using administrative data tracking student enrollment and progression over time).

Key Concept

### DIGITAL SKILLS

Proficiency in using computers and digital tools effectively for various tasks, including academic and non-academic purposes.

## RESULTS

**When evaluating effects for schools over time by following successive cohorts in treatment and control schools, we find no discernible effects on either second-grade mathematics or reading performance** (Figure 1). Nonetheless, we find negative effects on grade progression (defined as the fraction of primary students who advanced to the next grade each year) of 1 percentage point (Figure 1). These results suggest that schools were not able to leverage technology to improve test scores in the early primary grades. In turn, the negative estimated impacts on grade progression over time suggest that the program may have triggered increases in grade repetition that affected students' trajectories as they progressed through the education system.

**A second set of results focuses on the trajectories of student achievement and educational attainment by following students as they progress from primary school to university.** This analysis reveals no significant impacts on either mathematics or reading performance in national standardized examinations taken during second, fourth and eighth grades. However, on-time primary school completion decreased by 2.2 percentage points, and on-time secondary completion fell by 3.1 percentage points, though overall completion rates remained unaffected.

Finally, survey data exploring some mechanisms show limited use of laptops for academic purposes, with teachers lacking sufficient digital skills. Students' digital skills improved, but their cognitive skills and academic achievement remained unchanged.

## POLICY IMPLICATIONS

**These results suggest that the provision of personal technology without appropriate pedagogical integration and guidance is both costly and insufficient to improve educational outcomes.** Nonetheless, while not sufficient by itself, appropriate use of technology could enable tangible improvements in the educational experience toward the development of critical skills.

Key Concept

### PEDAGOGICAL INTEGRATION

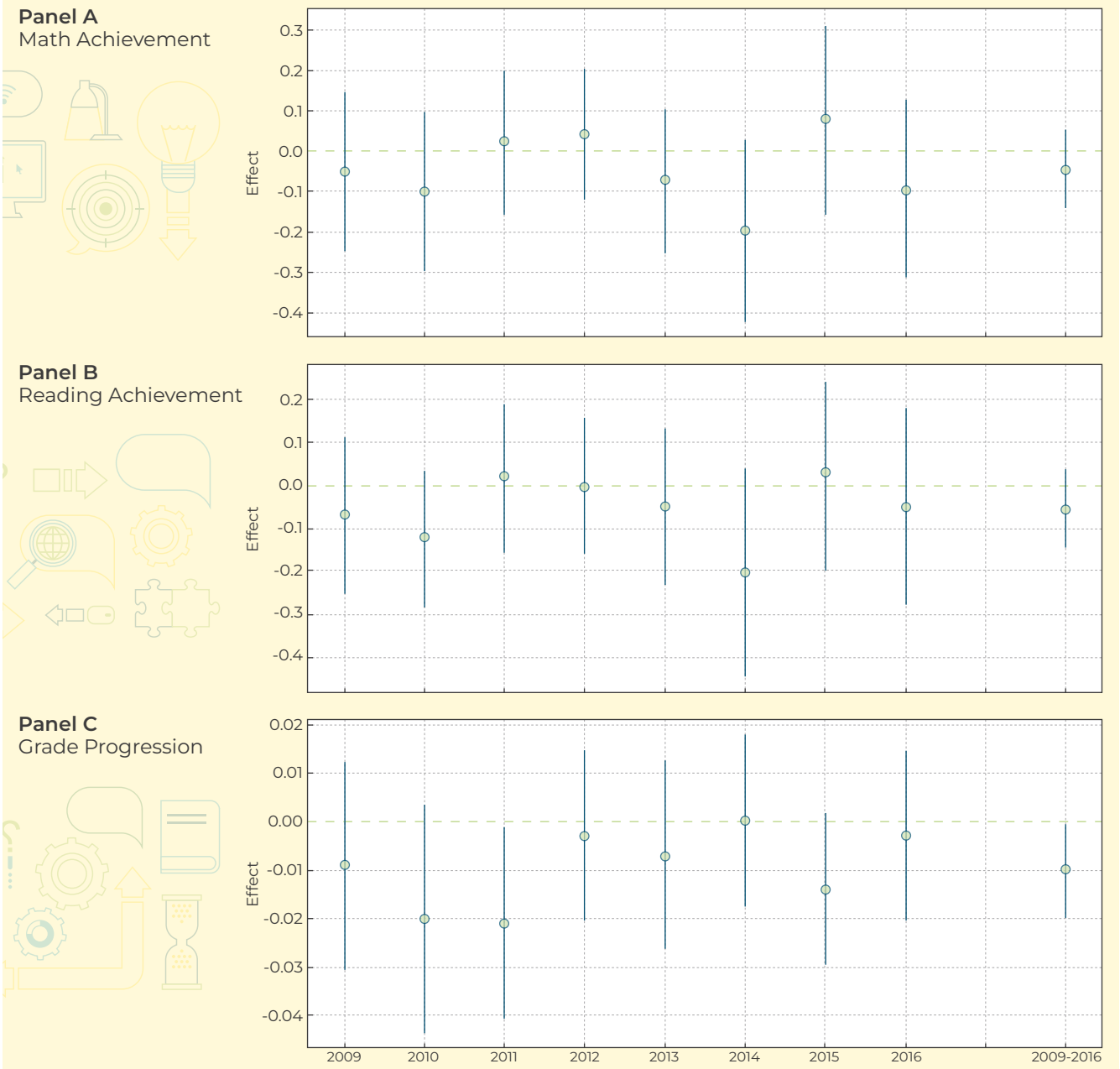
Incorporating technology into teaching practices to enhance learning outcomes.

**This highlights the importance of developing specialized adaptative software aligned with the curricula in key areas such as reading and mathematics.** This has the potential to personalize instruction to each student's level of ability and could be implemented within computer lab settings without necessarily investing in personal devices. Nonetheless, this would also demand addressing contextual barriers such as limited internet access and insufficient teacher preparation.

Our results also stress the need for comprehensive pedagogical support, including robust teacher training and integration of technology into the curriculum. Future initiatives should also evaluate the effectiveness of promotional activities and strategies to enhance technology adoption by teachers in the classrooms, ensuring alignment with educational goals. Likewise, it would be important to evaluate potential synergies between technology and complementary interventions such as tutoring or extended school time in impacting learning outcomes.

Looking forward, **we expect future research to explore how recent advances in artificial intelligence may introduce opportunities to leverage technology** in innovative ways to improve the delivery of educational services at low cost and large scale.

## FIGURE 1. Effects for Schools over Time




*Note:* The dots represent the OLPC estimated effects on second-grade mathematics and reading performance as well as on the fraction of students (within each primary school) who progressed to the next grade. The lines represent the 95% confidence intervals of the estimated effects (meaning that if the line crosses the zero value, the estimated effect is not significant or cannot be distinguished from zero). Effects are presented for each year between 2009 and 2016, as well as pooling all data (years 2009-2016) together.

## FULL STUDY

**Cueto, Santiago, Diether Beuermann, Julian P. Cristia, Ofer Malamud, and Francisco Pardo. 2024. "Laptops in the Long-Run: Evidence from the One Laptop per Child Program in Rural Peru." IDB Working Paper Series No. 1614. Washington, DC: Inter-American Development Bank. https://doi.org/10.18235/0013192.**

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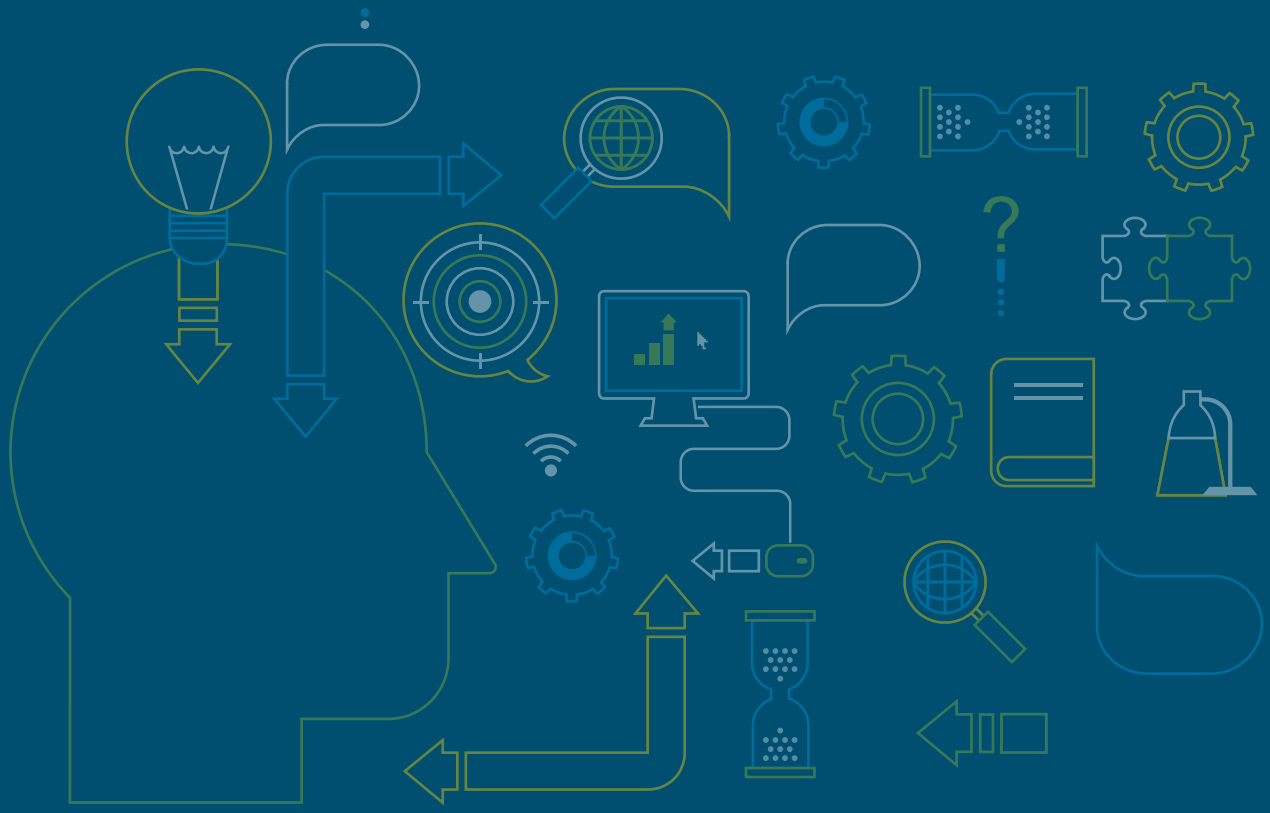




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