Topic 10: Education

Image created by ChatGPT

Main things to learn

1. **Access to education**: infrastructure, materials, food, access to health remedies and teacher presence are important for students' enrollment and attendance, but not necessarily enough to guarantee learning takes place.

2. Access to learning – **the learning crisis**:
- Frequent mismatch between needs and resource use.
- Tailoring incentives, teaching methods and the use of available resources to existing needs as a requisite for learning.
- Keep cost effectiveness in mind!

3. **Soft but important factors for learning**: Language, socioemotional skills, aspirations, peer effects and role models.
- A variety of important social and psychological factors matter for effective learning.

10.1. Access to Education

Many barriers preventing access to education

- Providing **universal access to primary education**, core goal of the MDE (2000-2015) – important progress (83% to 91%).

- **Main barriers**: lack of schools (+ distance), lack of teachers, lack of furniture and materials, lack of transport, lack of food, poor health…
  - For example, we have seen that improvements in health can result in important increases in school attendance (Miguel and Kremer 2004).

- **Solving these barriers** is frequently associated **with increased school attendance** (school canteens – Aurino et al, 2020) but this is **not always associated with improved learning**.
  - From increasing enrolment and attendance to the learning crisis.

Infrastructure – Duflo (AER, 2001) - 1

- Exploits a dramatic **change in policy** to evaluate the **effect of building schools on education and earnings in Indonesia**.
- Between 1973-74 and 1978- 79 more than 61,000 primary schools (**2 per 1,000 children aged 5-14** in 1971) were **built**.
- **Enrolment rates** among children 7-12 **increased from 69% to 84%** (males) and 82% (females) in 1978.
- Identification strategy: exposure to the school construction programme varied by region and date of birth.
- Diff-in-diff: **education should be higher for younger vs. older cohorts for all regions, but the difference should be larger in those regions that received more schools**.

Infrastructure – Duflo (AER, 2001) - 1

Results

- The estimates suggest that the construction of primary schools led to an increase in education and earnings.
- Children aged 2-6 in 1974 received 0.12 to 0.19 more years of education for each school constructed per 1,000 children in their region of birth.

Infrastructure – Duflo (AER, 2001) - 3

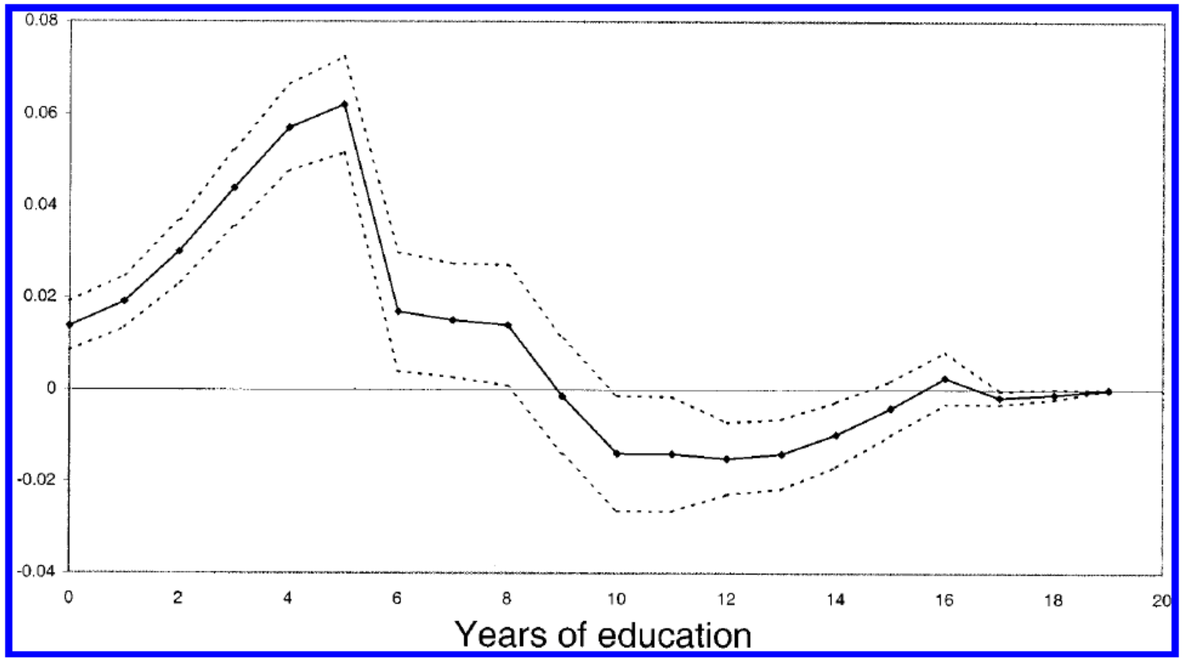


FIGURE 2. DIFFERENCE IN DIFFERENCES IN CDF (ESTIMATED FROM LINEAR PROBABILITY MODEL) WITH 95-PERCENT CONFIDENCE INTERVAL

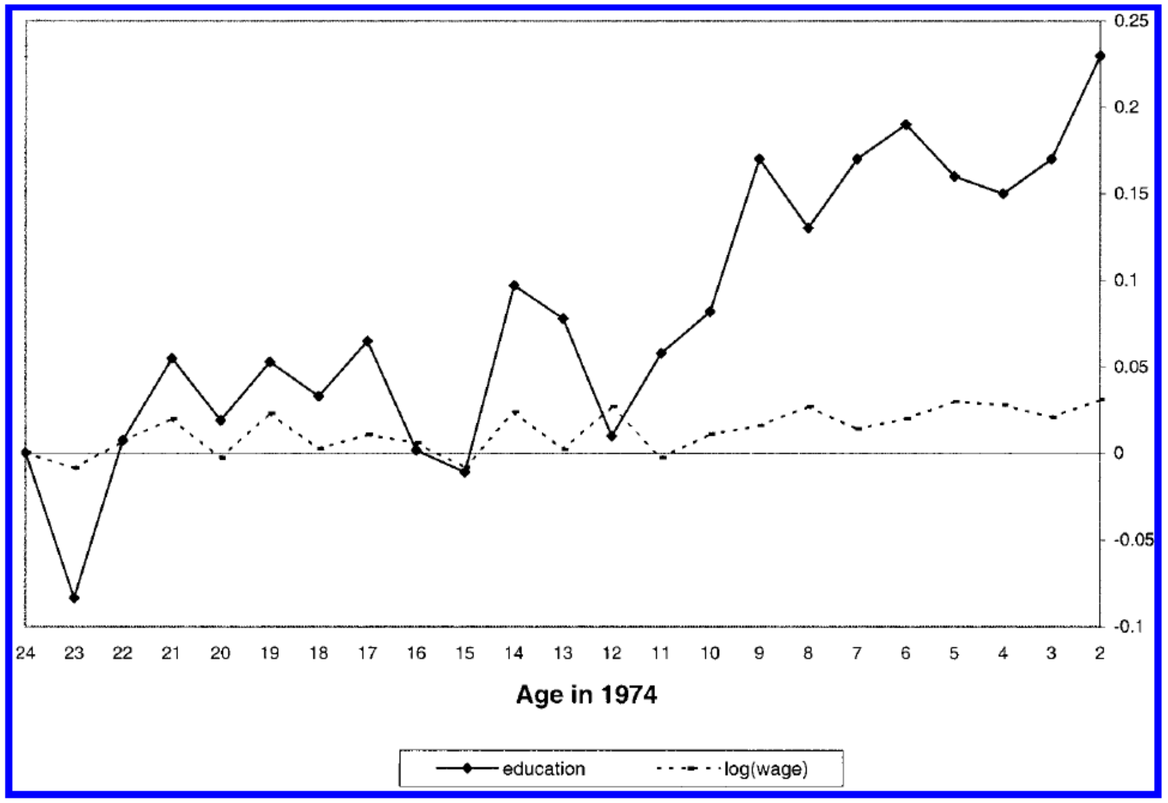


FIGURE 3. COEFFICIENTS OF THE INTERACTIONS AGE IN 1974* PROGRAM INTENSITY IN THE REGION OF BIRTH IN THE WAGE AND EDUCATION EQUATIONS

Teacher attendance – Duflo, Hanna, and Ryan (2012, AER) - 1

> "…in India, a nationwide survey found that 65 percent of children enrolled in grades 2 through 5 in government primary schools could not read a simple paragraph (Pratham 2006)"

- *Motivation: 25% of teachers were absent during school hours, in India, and only 50% were teaching – Kremer et al. 2005.*
- RCT used to test whether the **direct monitoring of the attendance of para-teachers**, coupled with **high-powered financial incentives based on their attendance**, improves teacher attendance and school quality.

"Para-teachers are teachers that are hired on short, flexible contracts to work in primary schools and in non-formal education centers that are run by NGOs and local governments. Unlike government teachers, it may be feasible to implement greater oversight and incentives for para-teachers since they do not form an entrenched constituency, they are already subject to yearly renewal of their contract, and there is a long queue of qualified job applicants".

Teacher attendance – Duflo, Hanna, and Ryan (2012, AER) - 2

In theory: unclear whether incentives will work:

- They might not be powerful enough to bring teachers to class,
- They might crowd-out intrinsic motivation,
- They might support in bringing teachers to class, but they might not teach.

Teacher attendance – Duflo, Hanna, and Ryan (2012, AER) - 3

- In September of 2003, Seva Mandir (the NGO running the program) gave **teachers in 57 randomly selected program schools a camera**, along with instructions to have one of the students take a picture of the teacher and the other students at the start and close of each school day.

- The cameras had **tamper-proof date and time functions**, allowing for the collection of precise data on teacher attendance that could be used to calculate teachers' salaries.

- **Each teacher was then paid according to a nonlinear function of the number of valid school days for which they were actually present**, where a valid day was defined as one for which the opening and closing photographs were separated by at least five hours and both photographs showed at least eight children.

- In the **56 comparison schools**, teachers were paid a **fixed rate** for the month and were reminded (as usual) that regular presence was a requirement of their job, and that they could in principle be dismissed for repeated, unexcused absences.

Teacher attendance – Duflo, Hanna, and Ryan (2012, AER) - 4

- The program resulted in an **immediate and long-lasting improvement in teacher attendance rates in treatment schools**, as measured through monthly unannounced visits in both treatment and comparison schools.
- Over the 30 months in which attendance was tracked, **teachers at program schools had an absence rate of 21 percent, compared to 44 percent baseline and the 42 percent in the comparison schools**.
- Children's **test scores increased by 0.17 standard deviations**.

Teacher attendance – Duflo, Hanna, and Ryan (2012, AER) - 5

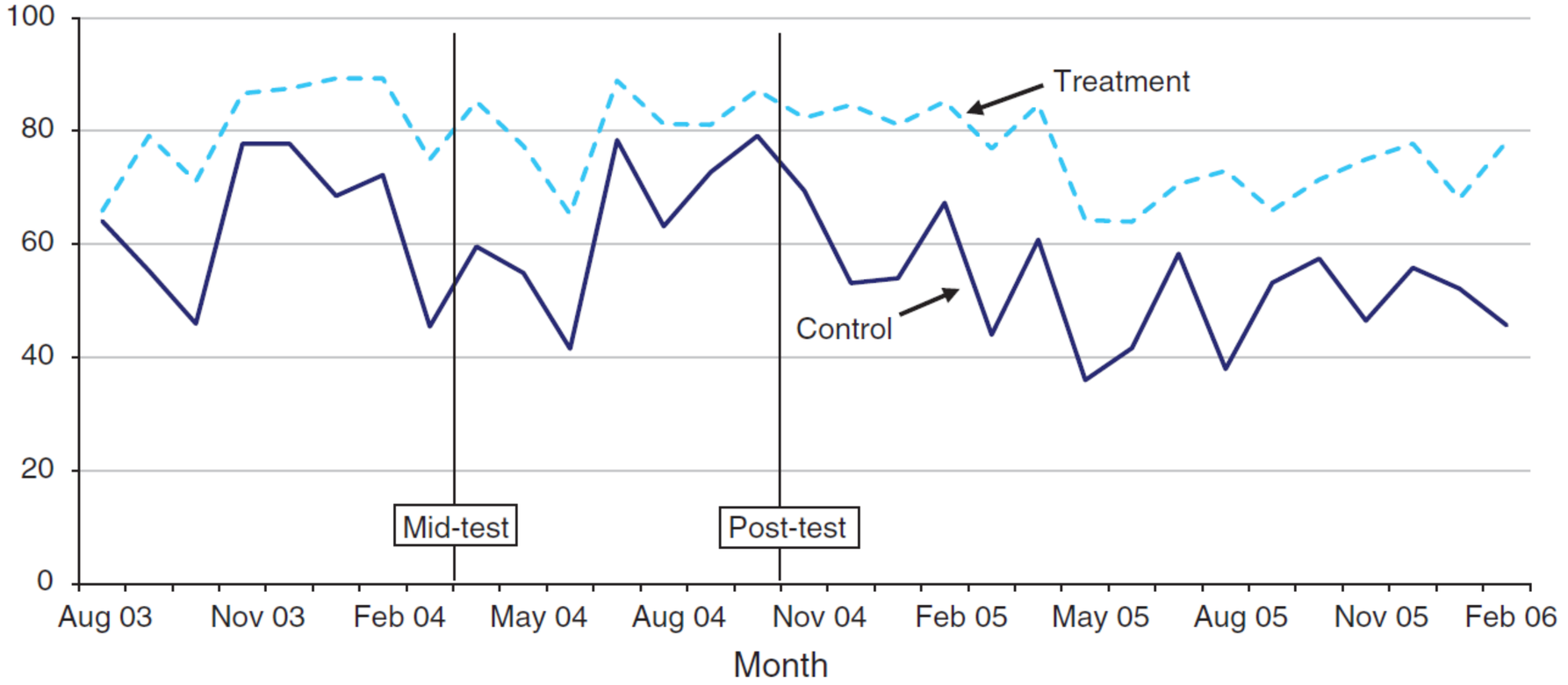


FIGURE 1. PERCENTAGE OF SCHOOLS OPEN DURING RANDOM CHECKS

Teacher attendance – Duflo, Hanna, and Ryan (2011, AER) - 6

TABLE 2—TEACHER ATTENDANCE

September 2003–February 2006			Difference between treatment and control schools		
Treatment (1)	Control (2)	Diff (3)	Until mid-test (4)	Mid- to post-test (5)	After post-test (6)
Panel A. All teachers					
0.79	0.58	0.21	0.20	0.17	0.23
		(0.03)	(0.04)	(0.04)	(0.04)
1,575	1,496	3,071	882	660	1,529
Panel B. Teachers with above median test scores					
0.78	0.63	0.15	0.15	0.15	0.14
		(0.04)	(0.05)	(0.05)	(0.06)
843	702	1,545	423	327	795
Panel C. Teachers with below median test scores					
0.78	0.53	0.24	0.21	0.14	0.32
		(0.04)	(0.05)	(0.06)	(0.06)
625	757	1,382	412	300	670

Notes: Child learning levels were assessed in a mid-test (April 2004) and a post-test (November 2004). After the post-test, the "official" evaluation period was ended. Random checks continued in both the treatment and control schools. Standard errors are clustered by school. Panels B and C only include the 109 schools where teacher tests were available.

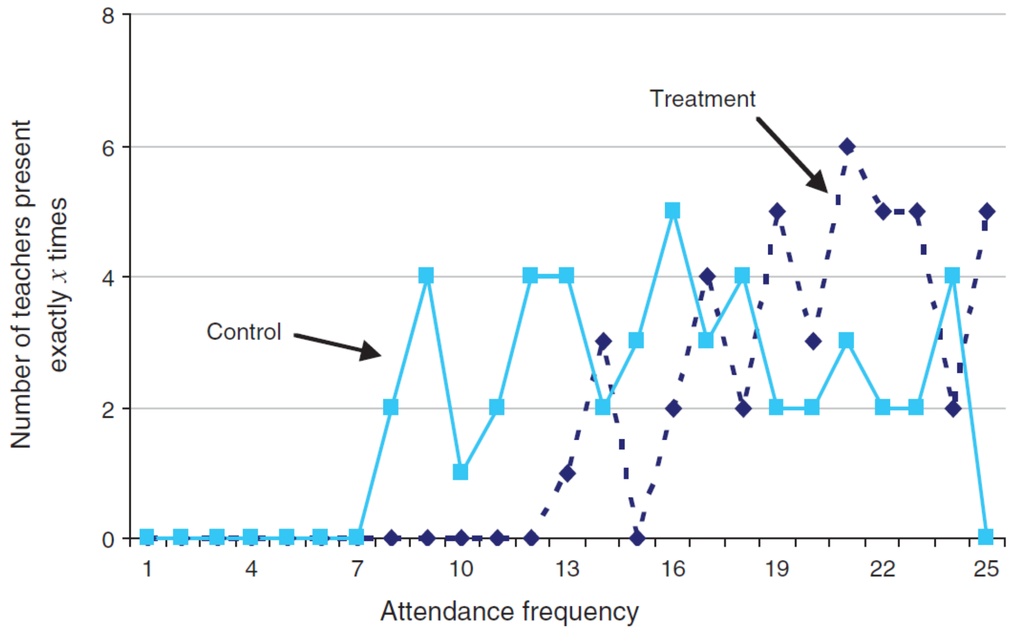


FIGURE 2. IMPACT OF THE CAMERAS
(*Out of at least 25 visits*)

Students in treated schools attend class more (take more tests) and perform better: learning!

10.2. Access to Learning

Access to learning – brief summary

- Access to books and technology (tablets or computers) and learning – mixed effects.
- The importance of effective teaching interventions:
  - Targeted interventions: remedial education, educational games… See in next slides.
  - Full-package interventions, completely changing the management of schools – works well but is expensive!
    - Romer et al (2020 AER) – Liberia.
    - Fazzio et al (2021 JPubE) – Guinea-Bissau.

Textbooks and inequality: Glewwe, Kremer and Moulin (AEJ: Applied – 2009)

- Idea: Supplying textbooks in resource-poor schools should raise test scores, especially where book access is scarce.
- Intervention: Randomized distribution of official government textbooks to primary schools in rural Kenya (grades 3–8).
- Findings:
  - No impact on average test scores.
  - Positive effects only for top-performing students.
  - Likely cause: textbooks written in English (students' third language) and aligned with a curriculum geared toward the elite. (Language!).
  - Illustrates broader curriculum mismatch in centralized systems with diverse student preparation.

Targeted interventions – Banerjee et al (QJE – 2007) - 1

First intervention:

- Idea: Target low-performing students with focused, basic skills instruction.
- Intervention: Local women (“balsakhis”) taught lagging Grade 3–4 students for 2 hours/day.
- Findings:
    - Improved test scores by 0.14 SD (Year 1) and 0.28 SD (Year 2).
    - Largest gains for bottom third of students.
    - No spillover effect on other students (class-size reduction alone was ineffective).

Targeted interventions – Banerjee et al (QJE – 2007) - 1

Second intervention:

- Idea: Use existing computers to enhance math skills via educational games.
- Intervention: Grade 4 students received 2 hours/week of supervised math game time..
- Findings:
    - Math scores increased by 0.35 SD (Year 1) and 0.47 SD (Year 2).
    - Benefits were broad-based across ability levels.
    - Less cost-effective than remedial education, but scalable via unused infrastructure.

Technology – Cardim, Molina-Millán and Vicente (JDE – 2023) - 1

- Analyze the impact of a **pedagogical package based on technology –** Computer-assisted Learning (CAL)

- ProFuturo, an innovative CAL program present in 38 countries of
- three continents, which has already reached more than 450,000 teachers and 12 million children.

- ProFuturo program enables **tailoring contents to individual student needs**. Two innovations:
- - Teachers at the center of the program's experience;
  - Promotes student interaction with teachers and peers, namely through group work.

- Apart from the learning software, ProFuturo includes an **equipment set composed by individual tablets for all students in a classroom**.

- Field experiment in 42 Angolan schools – Luanda.

Figure A2: ProFuturo suitcase.

Technology – Cardim, Molina-Millán and Vicente (JDE – 2023) - 2

- Approximately a year after the program was introduced, they find that ProFuturo:
  - **Increases technology usage** for both teachers and students.
  - **Teachers' motivation improves**; specifically, the program led to a reduction in teachers' absenteeism. Students also become more motivated, namely towards Mathematics.
  - Teachers **improve the quality of their class preparation and engage more often in active teaching in the classroom**. Finally, they observe higher standards of teacher knowledge.
  - **Students devote more time to reading**, and to shared time with their guardians using technology, **as well as to pro-social interaction**.
  - These effects of ProFuturo translate into **improved students' test scores in Science**, which was the subject most frequently selected to be taught under ProFuturo.

Technology – Cardim, Molina-Millán and Vicente (JDE – 2023) - 3

Figure 1: Main treatment effects - aggregated outcomes employing z-scores

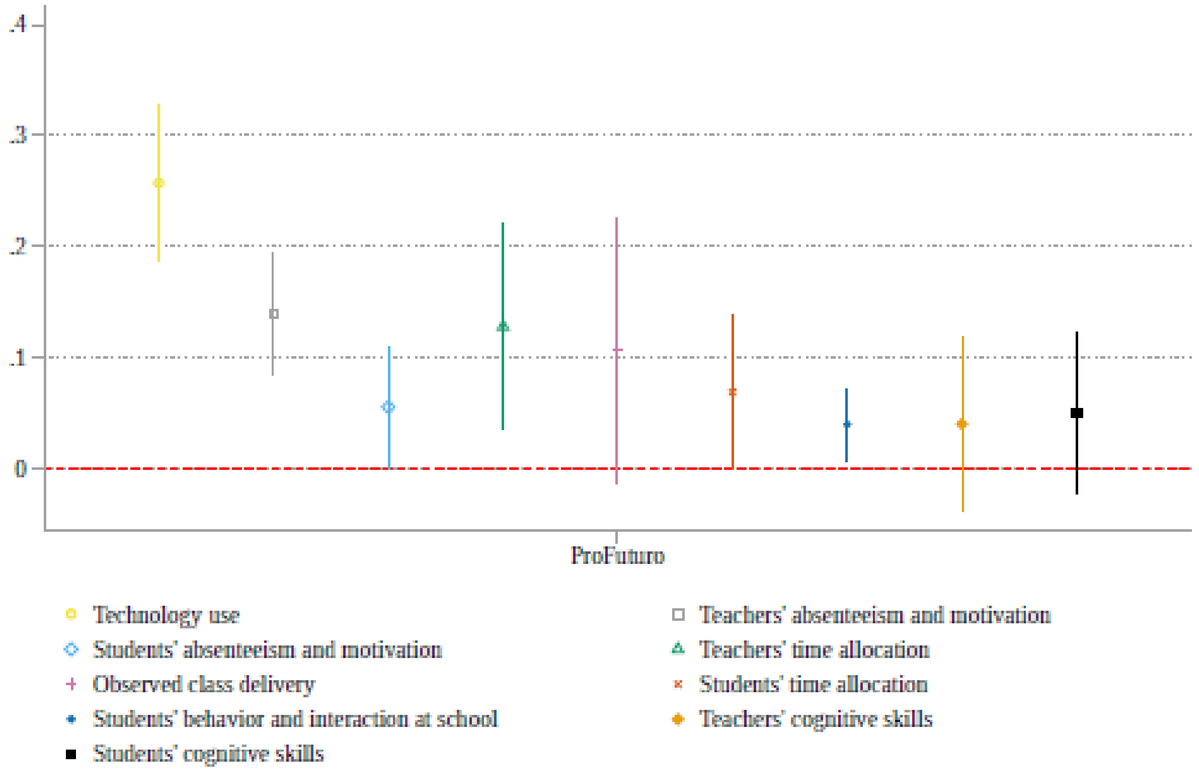


Table 9: Cognitive skills. Students.

	Students' survey			
		Test scores		
	Digit span	Portuguese	Maths	Science
	(1)	(2)	(3)	(4)
ProFuturo	0.041	0.030	-0.004	0.065**
	(0.044)	(0.053)	(0.066)	(0.032)
	[0.583]	[0.943]	[0.868]	[0.089]
Observations	2322	1011	1011	1011
R^2	0.15	0.26	0.39	0.39
Mean (control group)	-0.00	0.00	0.00	-0.01

Note: Estimates based on OLS regressions. All columns present estimates using Equation 1. Estimation sample in columns (1)-(4) consists of students interviewed in the corresponding endline survey. Depending on the column the dependent variables are defined as follows. (1) Digit span: Score of the memory for digit span test. This variable is normalized, i.e., as a z-score. (2) Portuguese: Score of students' Language test. This variable is normalized, i.e., as a z-score. (3) Maths: Score of students' Mathematics test. This variable is normalized, i.e., as a z-score. (4) Science: Score of students' Science test. This variable is normalized, i.e., as a z-score. Columns (1)-(4) include student-level controls. The full list of controls is presented in Section 4. Standard errors, reported in parentheses, are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1. P-values from randomization-inference tests are reported in brackets.

Technology and distraction - filtered vs. unfiltered

- **Filtered technology** (structured, educational software) shows **positive learning impacts** in both high and low-income countries.

- **Unfiltered device use linked to lower academic performance** due to multitasking and off-task behavior.
  - Studies show 41% of classroom screen time spent on non-educational apps when devices aren't restricted (Bold et al., 2021)

- Digital adoption in low/middle-income countries (LMICs) is happening faster than in high-income countries.
  - Smartphone penetration in Sub-Saharan Africa rose from 15% to 43% in just eight years – **vulnerability to digital distractions**.
  - 78% of LMIC schools lack digital pedagogy frameworks and only 22% of teachers receive relevant training in digital tools.

How to teach youth to use technology effectively – self control!?

10.3. Socioemotional skills, aspirations, peer effects and role models

Socioemotional skills, aspirations, peer effects and role models

- Language: teaching in a minority language that students know or in a “major” one that they don’t?
- Socioemotional Skills: Traits like grit and self-control improve education and job outcomes.(Heckman & Kautz, 2012)
- Aspirations: Raising future goals boosts school and health investments.(Ray, 2006)
- Peer Effects: Classmates shape effort, behavior, and performance.(Kremer, Miguel & Thornton, 2009)
- Role Models: Exposure to relatable achievers raises motivation, especially for girls.(Beaman et al., 2012)

Role models - Riley (2024 – ReStat) - 1

Research Context & Method

- Study: Randomized experiment with 1,500 secondary school students in Uganda
- Intervention: Students randomly assigned to watch either:
- Treatment: "Queen of Katwe" (story of Phiona Mutesi, a girl from Kampala slums who succeeds at chess)
- Control: "Miss Peregrine's Home for Peculiar Children" (placebo movie)
- Timing: Lower secondary students viewed film 1 week before national exams; upper secondary students 1 month before.

Role models - Riley (2024 – ReStat) - 2

Why This Matters

- Tests whether exposure to relatable role models can improve educational outcomes
- "Queen of Katwe" features themes of:
  - Perseverance through challenges
  - Education as a pathway to success
  - Growth mindset ("In chess, the small one can become the big one")
- First study showing a movie role model can significantly impact actual exam performance

Role models - Riley (2024 – ReStat) - 3

- Academic Gains: +11 pp in math pass rates; 30% drop in failure risk.
- Biggest Impact: 44% fewer failures among girls; >50% drop for low-ability students.
- Long-Term Effects: Gender gaps in higher ed closed; +15% female university applications.
- Takeaway: Relatable film role models can boost academic and life outcomes for disadvantaged youth.

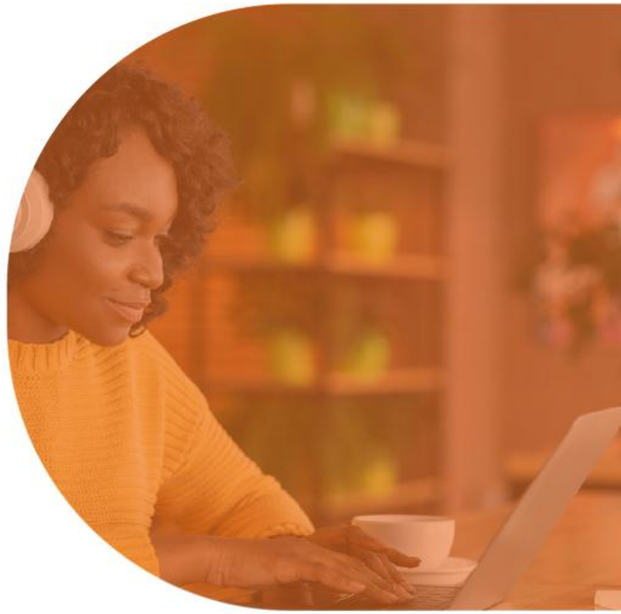
Women empowerment through education – Canonici et al 2025

Education boosts empowerment across life domains. Causal evidence shows that interventions—like school feeding, health programs, and role model exposure—improve girls' attendance, delay marriage, reduce early pregnancies, and raise aspirations.

Structural barriers matter! Success depends on tackling non-tuition costs, mobility restrictions, and entrenched gender norms; mixed results when interventions ignore these contextual constraints

pep partnership for economic policy

Towards Gender Equality: The Impact of Education and Training on Women's Educational Outcomes and Empowerment in Low-Income Contexts :A systematic Review



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Thanks for your attention and contributions!