

Targeted Learning Without Deep Remediation

Experimental Evidence from India

Emily Cupito¹ · Alex Eble² · Guthrie Gray-Lobe¹ · Saloni Gupta³ · Michael Kremer¹ · Sabareesh Ramachandran⁴ · Wendy Wong⁵

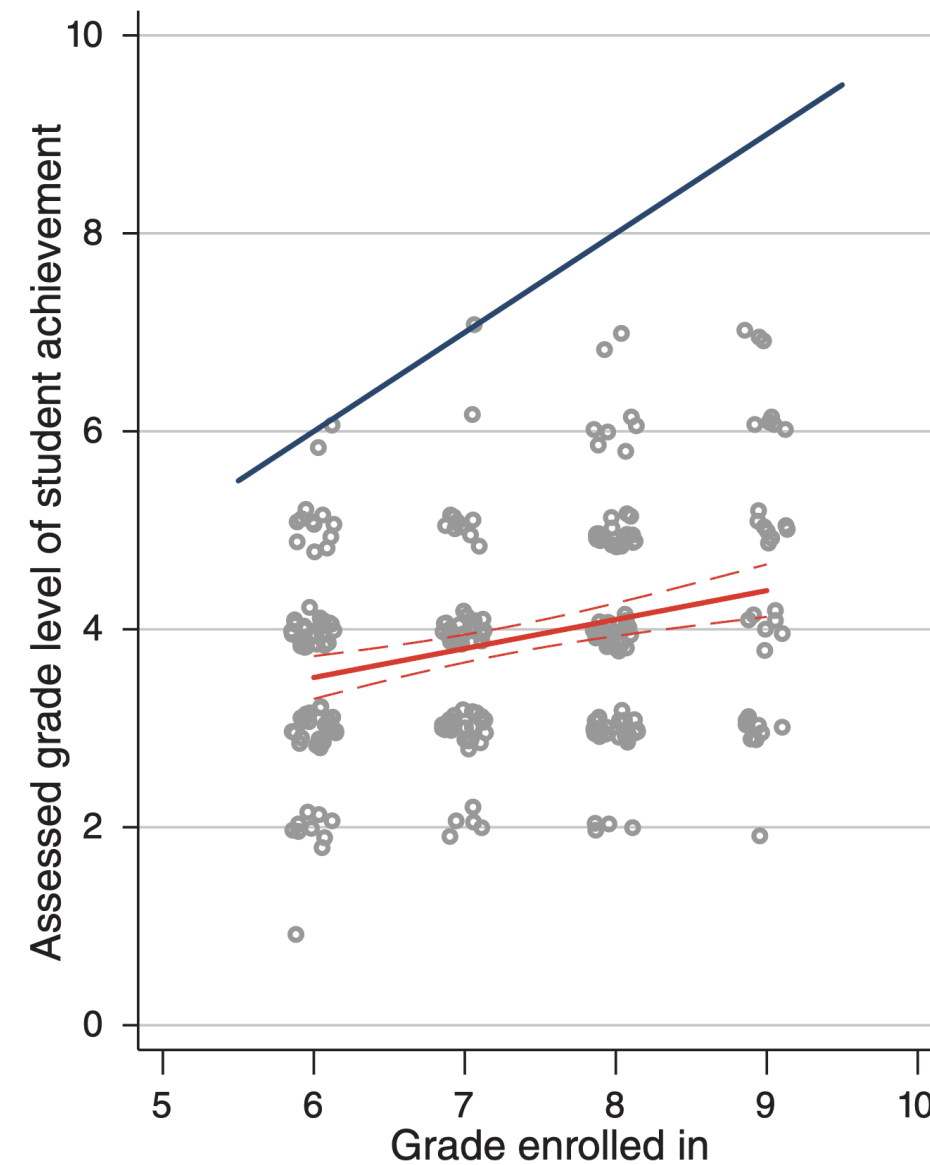
¹ Development Innovation Lab, University of Chicago ² Teachers College, Columbia University ³ Brown University ⁴ Indian School of Business, Hyderabad ⁵ CRI Foundation

WWHGE Conference · 2026-09-15

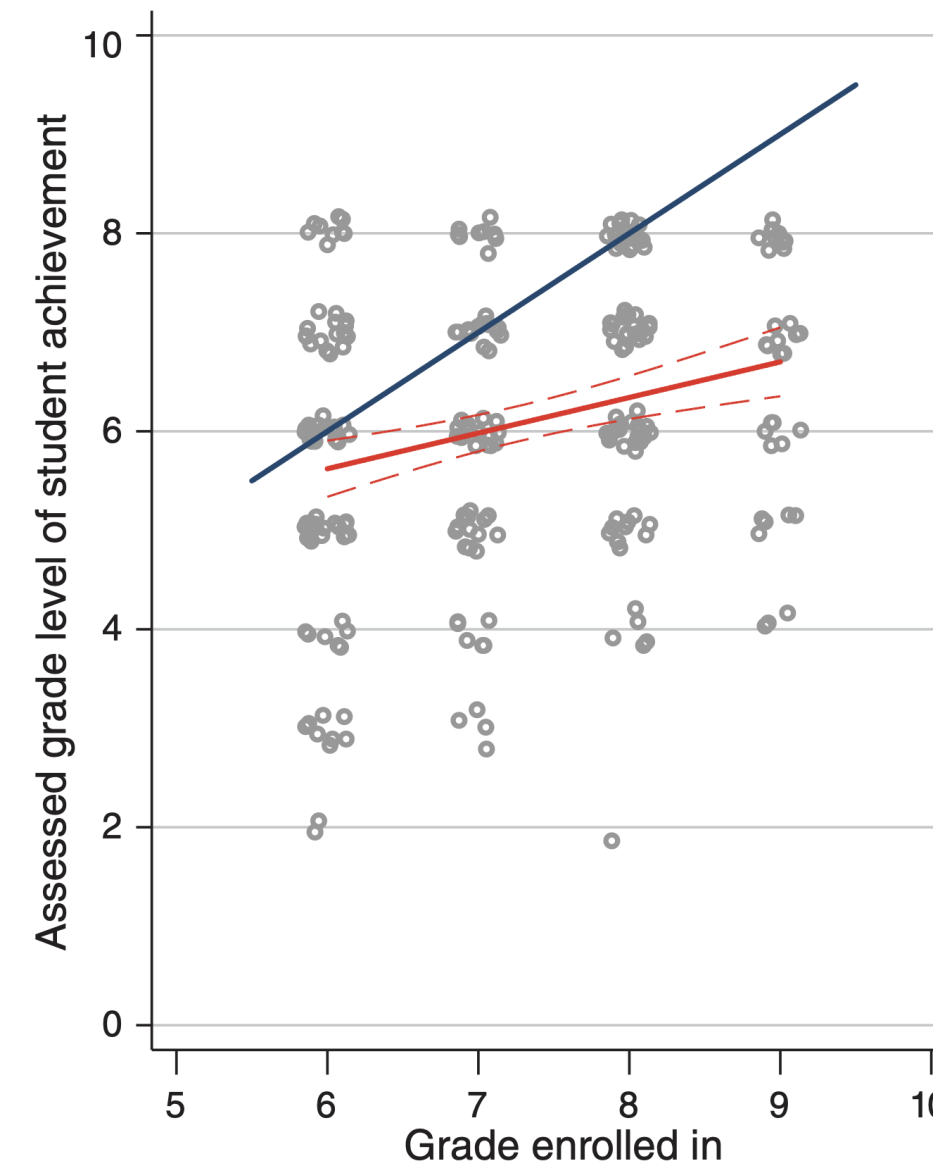
The promises and challenges of targeted learning

- **Problem:** wide **variability** in **learning levels** within classrooms

Panel A. Math



Panel B. Hindi



— Linear fit — Line of equality

The promises and challenges of targeted learning

- **Problem:** wide **variability in learning levels** within classrooms
- The **promise of targeted learning / targeted instruction:** meet students where they are
 - **Tracking students** Duflo et al. 2011
 - **Teaching at the right level** Banerjee et al. 2016
 - **Personalized adaptive learning** Muralidharan, Singh, and Ganimian 2019
- **Challenges**
 - Instruction **progresses according to curriculum**
 - **Teachers, students are measured, rewarded** according to that progression

This paper targets the following opening

- **The problem:** despite large impacts, PAL rollout is **far from universal**
- **The tension**
 - Politically and logistically, PAL **with less remediation more feasible**
 - Average learning of eighth graders in Indian public schools **suggests deep remediation is needed**
- **The opening:** how much learning could we expect from a program with shallow remediation?
 - **Prior:** not much, given current learning levels, theory of change
 - **Counter:** If any found, however, it would be **high return**

We report two evaluations of a targeted learning intervention

- **Study 1:** large RCT of an adaptive learning program implemented in government schools
 - **Shallow remediation:** at most 2 grades
Only 30% of items below grade level (most recent study: 97%)
 - **Run by government** with light-touch external supervision
One supervisor per 12 classrooms; 1:1 in other studies
- **Study 2:** smaller RCT evaluating intensity of remediation
 - **Arm 1:** shallow remediation → at most two years below current grade
As in study 1
 - **Arm 2:** deep remediation → at most five years below current grade
Adds two hours of instruction (i.e., no substitution)

Setting, background

- **Setting:** Indian state of Andhra Pradesh (AP)
 - **Large gap** between curricular expectations and actual learning
 - Learning levels are **middle of the pack** vis-a-vis other Indian states
 - **Open to experimentation**
- We work in **government schools** in AP
 - Large **private school** sector → **selection out** of government schools
 - Remaining student body predominantly **low-income, low performing**
- **Goal of partnership:** evaluate PAL program developed in partnership between govt. of AP and edtech firm Convegenius

Design of intervention

- The intervention focused on math instruction
 - Replaced two math periods per week
 - Delivered **via tablets**
 - Designed to be **engaging and interactive**, with videos, animations, and sound
 - **Shallow remediation: max. two grades** back; 70% of content **at grade level**
- Implementation and supervision
 - Each school received 30 tablets
 - **Supervision and tech support** came from field management staff (“FMS”)
Light touch: one FMS staff member per 12 schools

Design of study

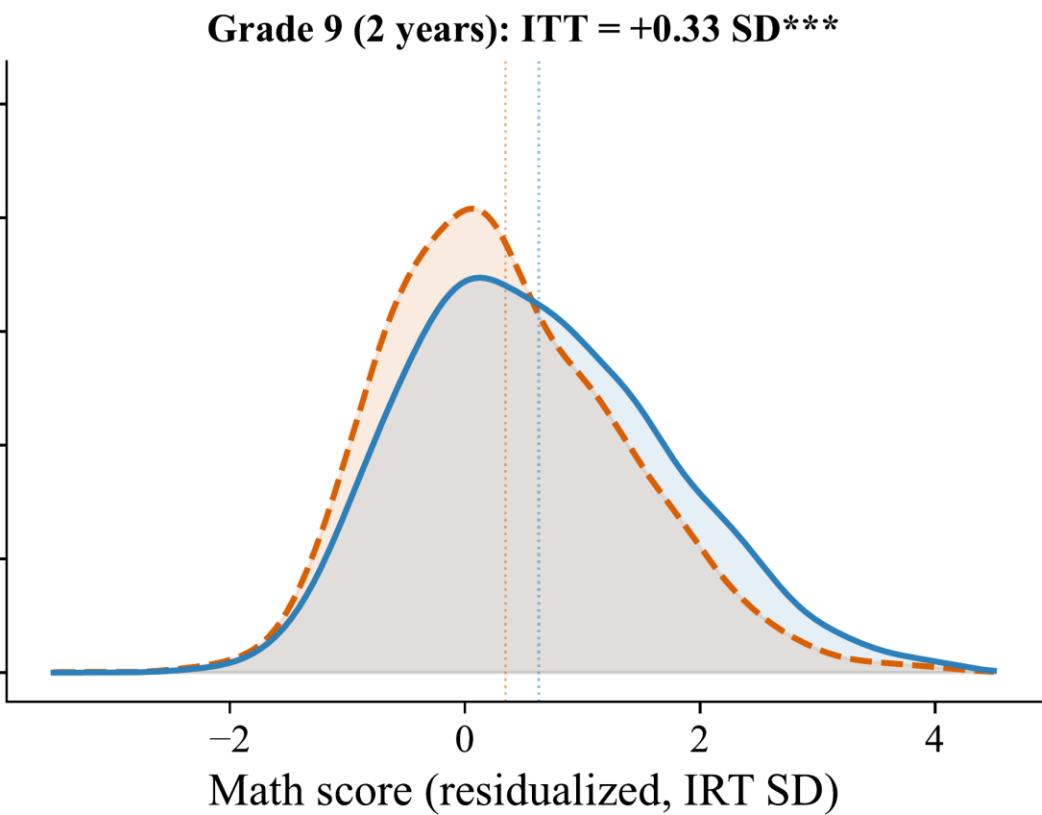
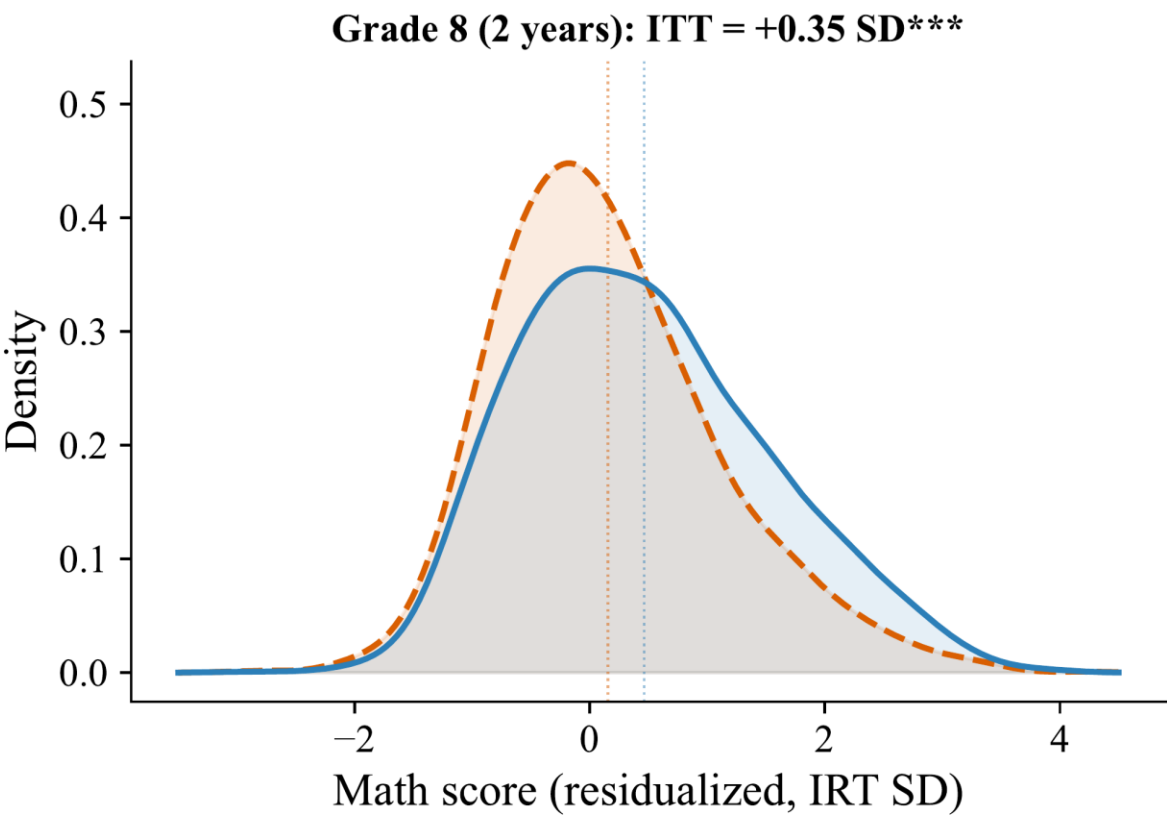
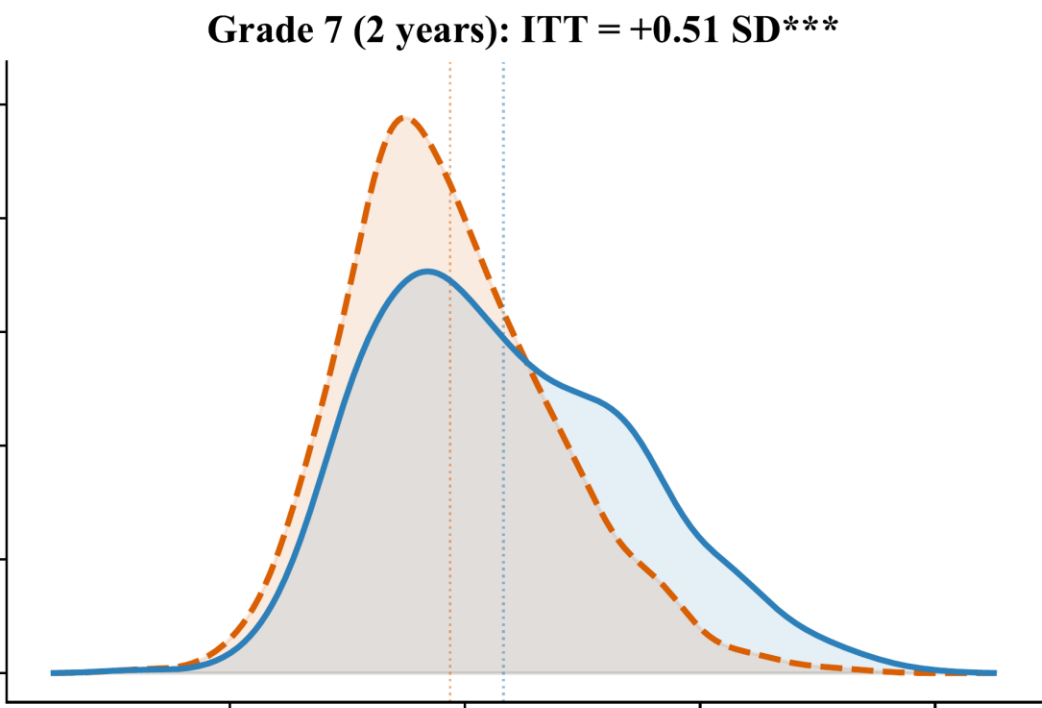
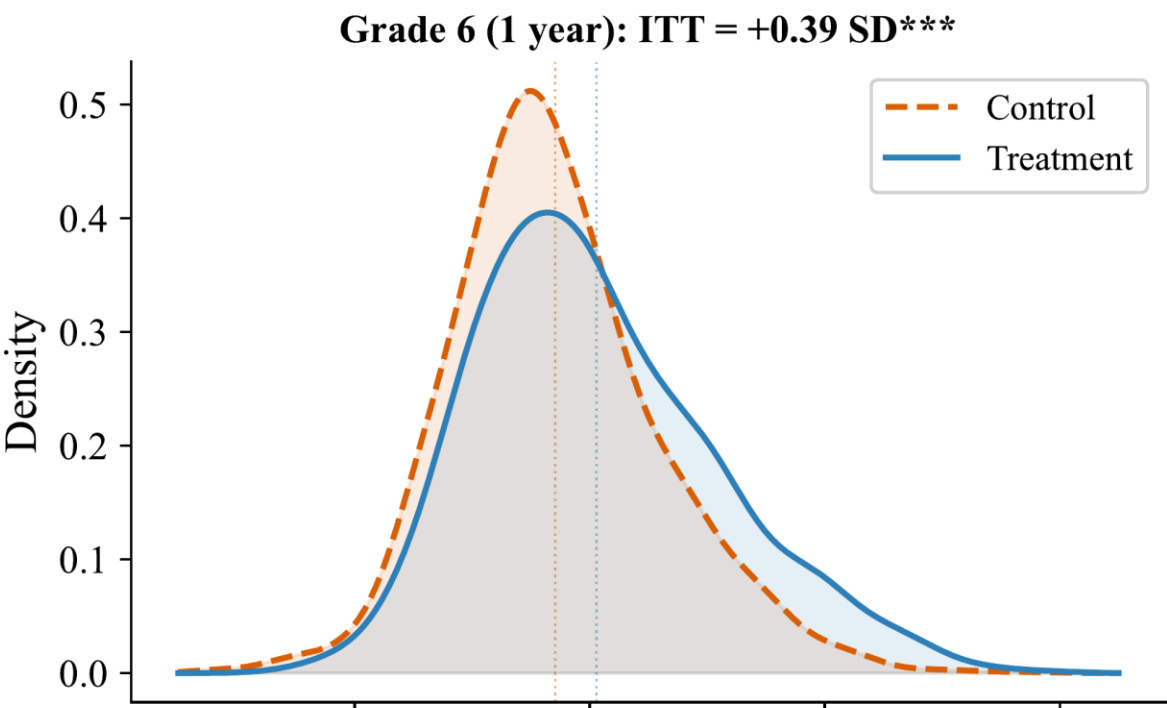
- Study 1 evaluates **the intervention's impact** on math skill acquisition
 - Cluster-RCT in government-run middle schools
 - **Sample size:** 120 schools, ~ 14,200 students
 - Compares to **business as usual**
- Study 2 **compares the effects of deep versus shallow** remediation
 - RCT, randomized at child level, in government-run middle schools
 - **Sample size:** 20 schools, ~ 3,800 students
 - Compares the intervention **as in study 1** with a version that **goes up to five grades back**, and adds additional time

Outcomes

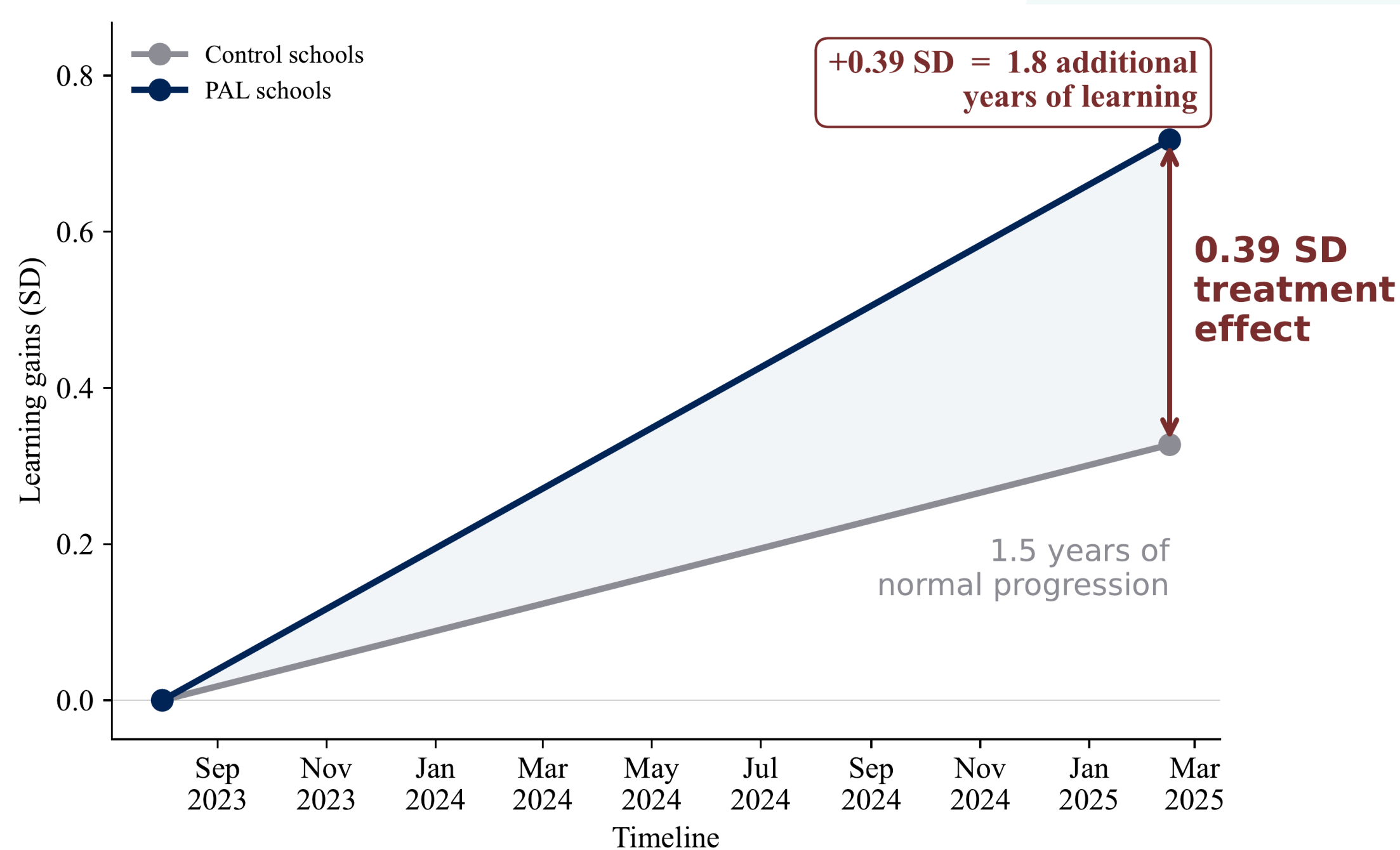
- **Endline tests** administered by tablet
 - Eight questions from grade 2 up to current grade
 - Piloted, honed in other AP government schools
 - **Use IRT** to develop unidimensional endline test score
 - Smaller study showing **no effect of treatment on performance by test modality** (paper vs. tablet)
- **Usage data** from tablets
- Performance on **government exams** (not today)



Study one main findings part I - impact



This translates into nearly two years of learning

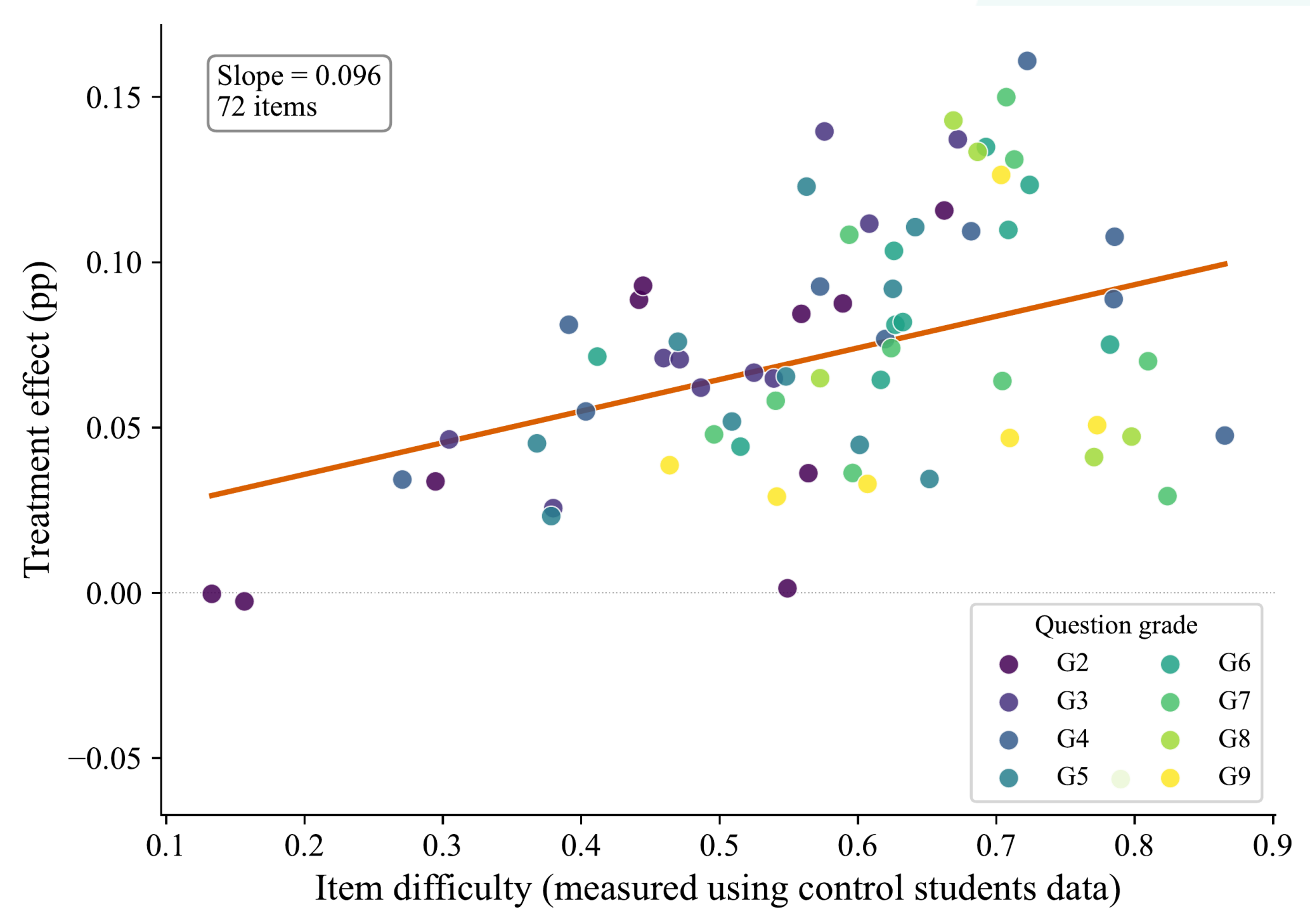


ITT: 0.39 SD (school-clustered SE, adjusted for covariates)

One grade ~ 0.22 SD in control → **treatment effect ~ 1.8 additional years of learning**



We see large gains across the spectrum of item difficulty



Effects slightly larger on harder items (slope = 0.096).

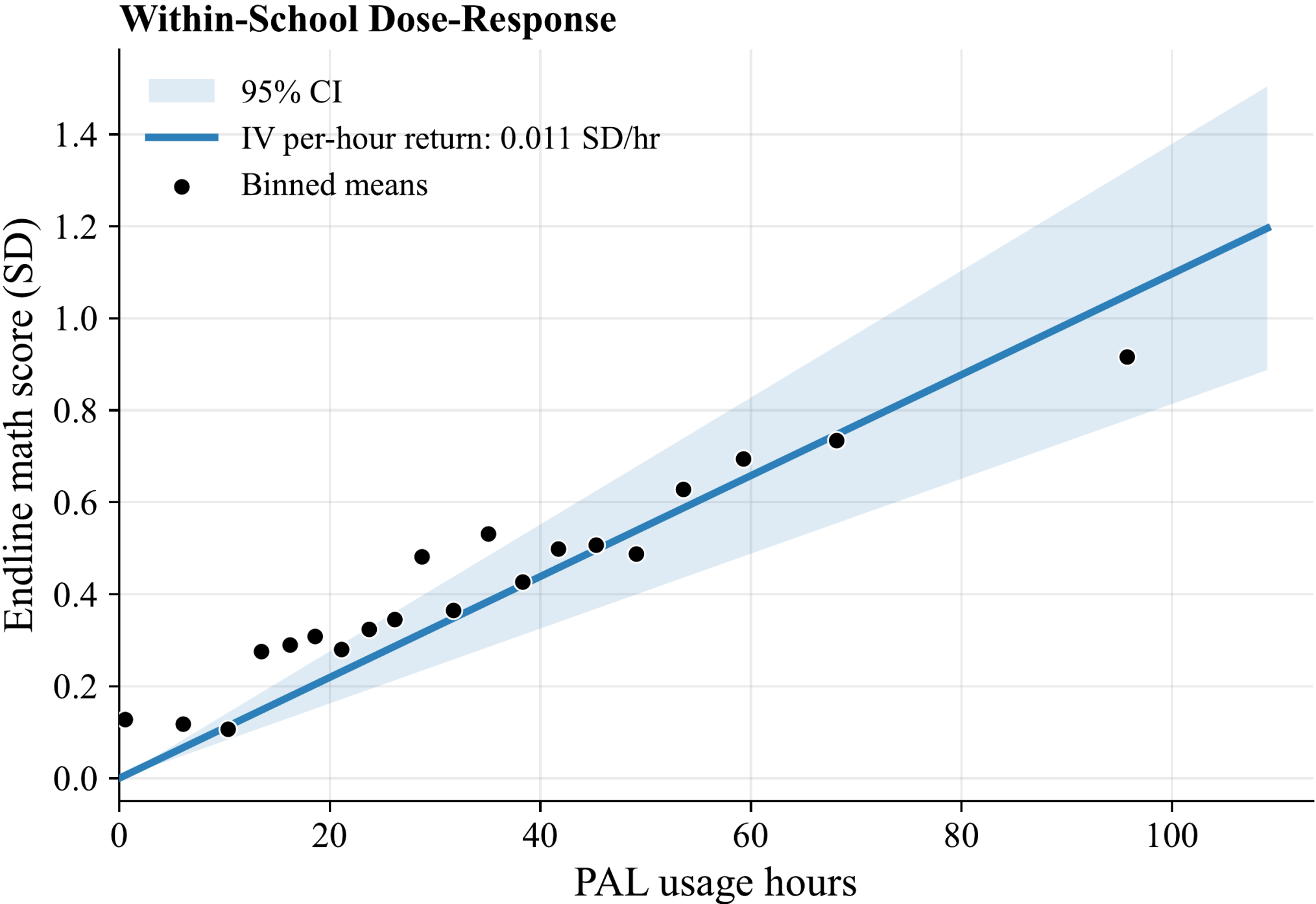


Study one main findings part II - heterogeneity

- **Gender:** significantly larger effects for girls than boys
 - Girls **gain 0.464 SD**; use tablets more
 - Boys **gain 0.329 SD**
- **Socioeconomic status:** no detectable differences
- **Usage:** Larger gains with greater
 - Usage quantity (as measured by hours on task)
 - Usage quality (within-lesson persistence)
- **Section size:** larger effects for smaller sections → **instrument for usage**



Study one main findings part III - per-hour learning gains



Using cohort size as an instrument for usage → **~ 0.011 SD per hour of use**



Study two - comparing shallow vs. deep remediation



	All grades (1)	Grqde 6 (2)	Grqde 7 (3)	Grqde 8 (4)	Grqde 9 (5)
Deep remediation effect	+0.053** (0.022)	+0.113* (0.063)	+0.059 (0.057)	+0.016 (0.050)	+0.031 (0.066)
Shallow remediation mean	+0.000	-0.310	+0.040	+0.049	+0.181
Observations	3,755	832	883	984	1,056
R ²	0.231	0.249	0.263	0.227	0.172

If we deflate the estimate by the two extra hours of instruction → **deep remediation yields ~ 0.02 SD** in additional learning (not significant)



What we learn

- We can reap **large gains without deep remediation**
 - Important for **political economy** of targeted learning
- **Newer models, tech** may increase the impact of this tool
- **Open questions**
 - How do these gains, and this program **persist into the future?**
 - What is the **optimal level** of remediation?
 - What **other features** lead to large learning gains?

