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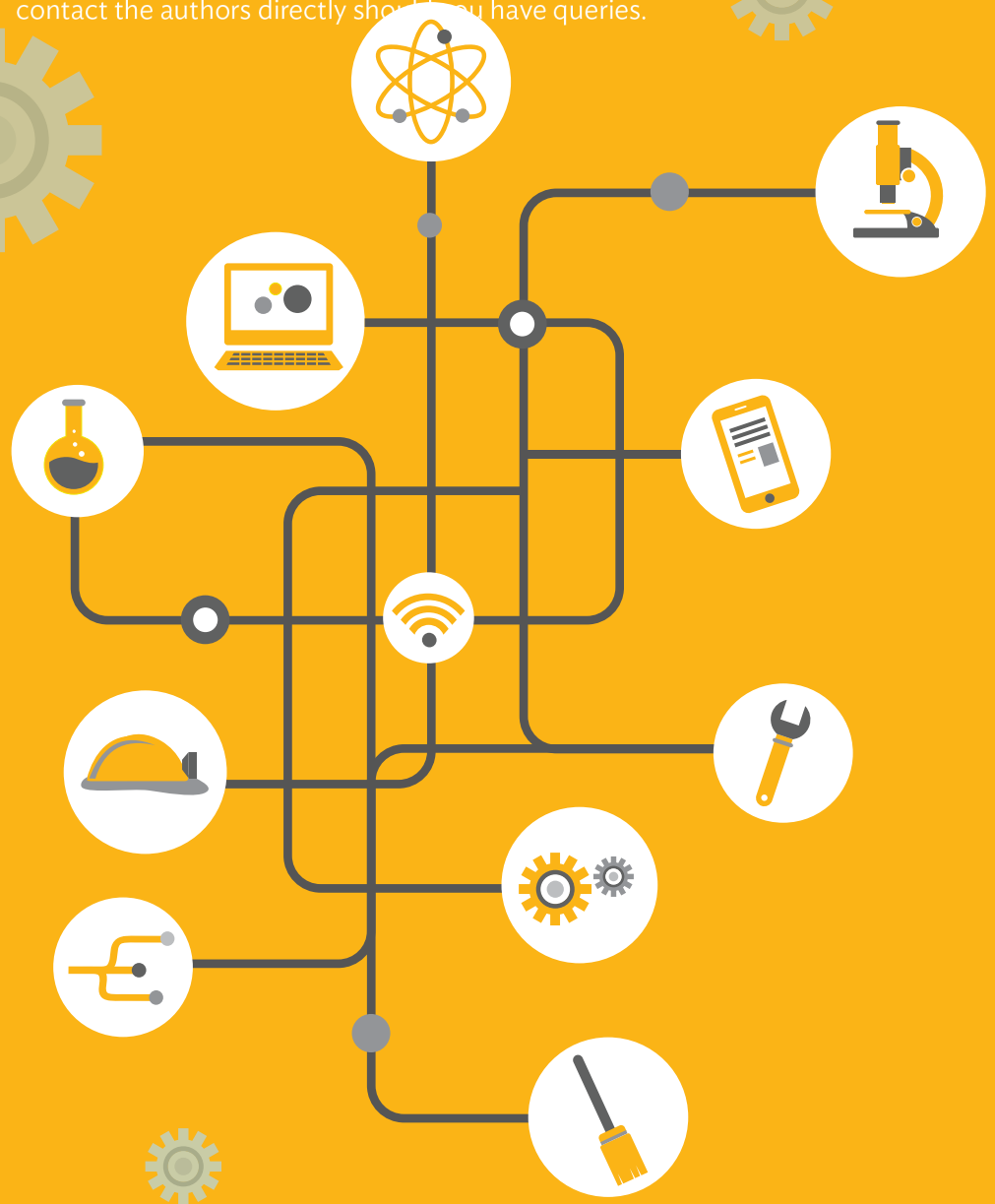

Evidence-Driven Ed-Tech

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9th International Skills Forum
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The Promise of Ed-Tech

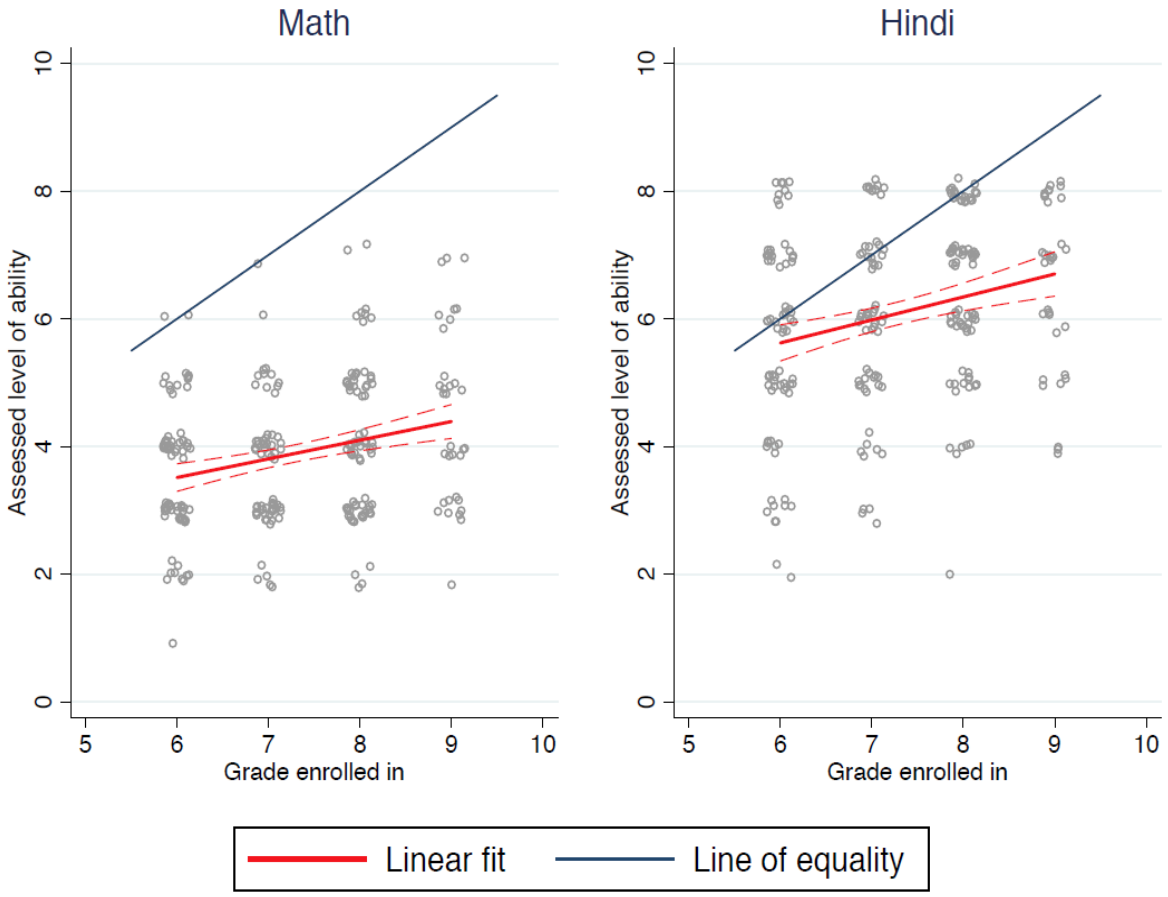
- Has enormous potential. Mechanisms of potential impact include
  - Scalable access to high-quality instruction
  - Supplemental instruction, practice, reinforcement at home
  - Customizing learning paths for students (and inducing greater engagement)
  - Shortening feedback loop for students
  - Gamification & rewards to boost student motivation
  - Supporting teacher training and skill upgrading
  - Engaging with parents (SMS, WhatsApp); and parent groups

- But the overall evidence is quite mixed, and quite disappointing
  - High-quality studies find effects that are positive, zero, and negative (!)

- What is going on?
  - Design details REALLY matter a lot.
  - The binding constraints for education in LMICs are governance & pedagogy
  - Tech can help alleviate both, but requires careful design & monitoring

Actual vs. expected learning levels

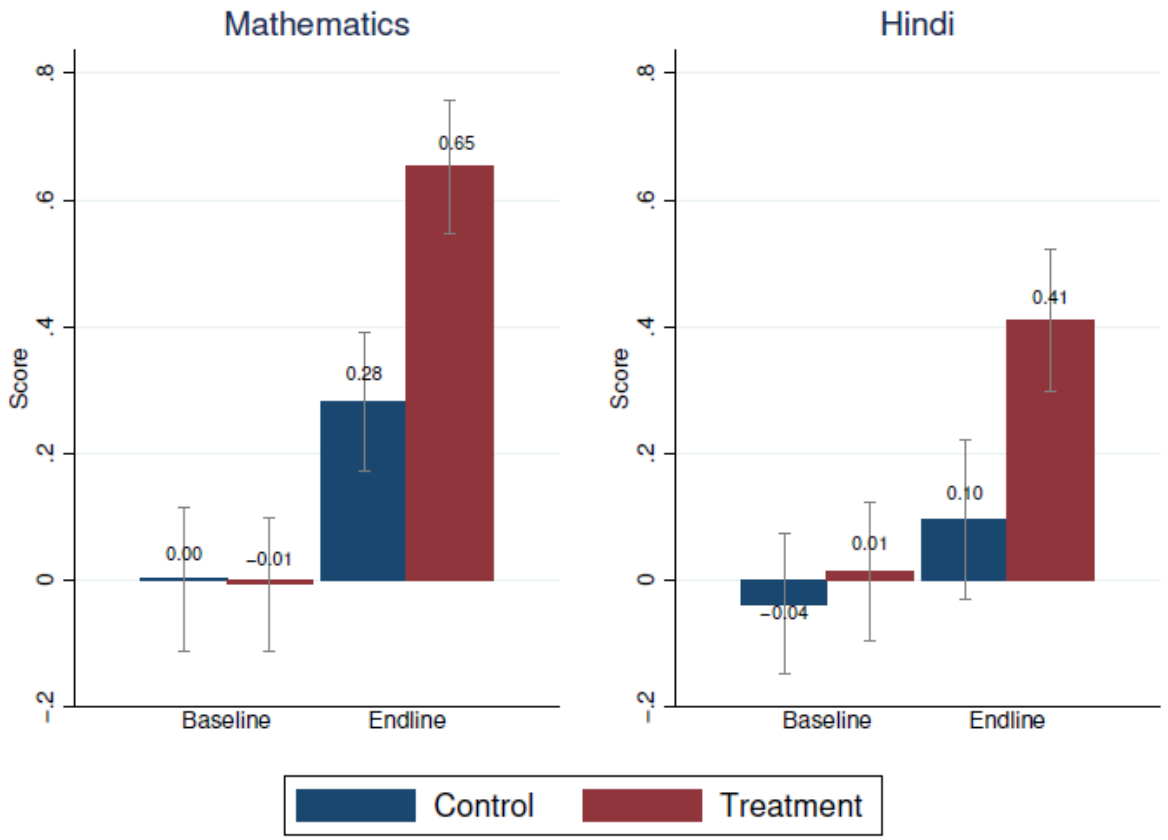
In the treatment group at start of intervention



This figure shows, for treatment group, the actual ability level (determined by the Mindspark CAL program) plotted against the grade they are enrolled in.

The core result

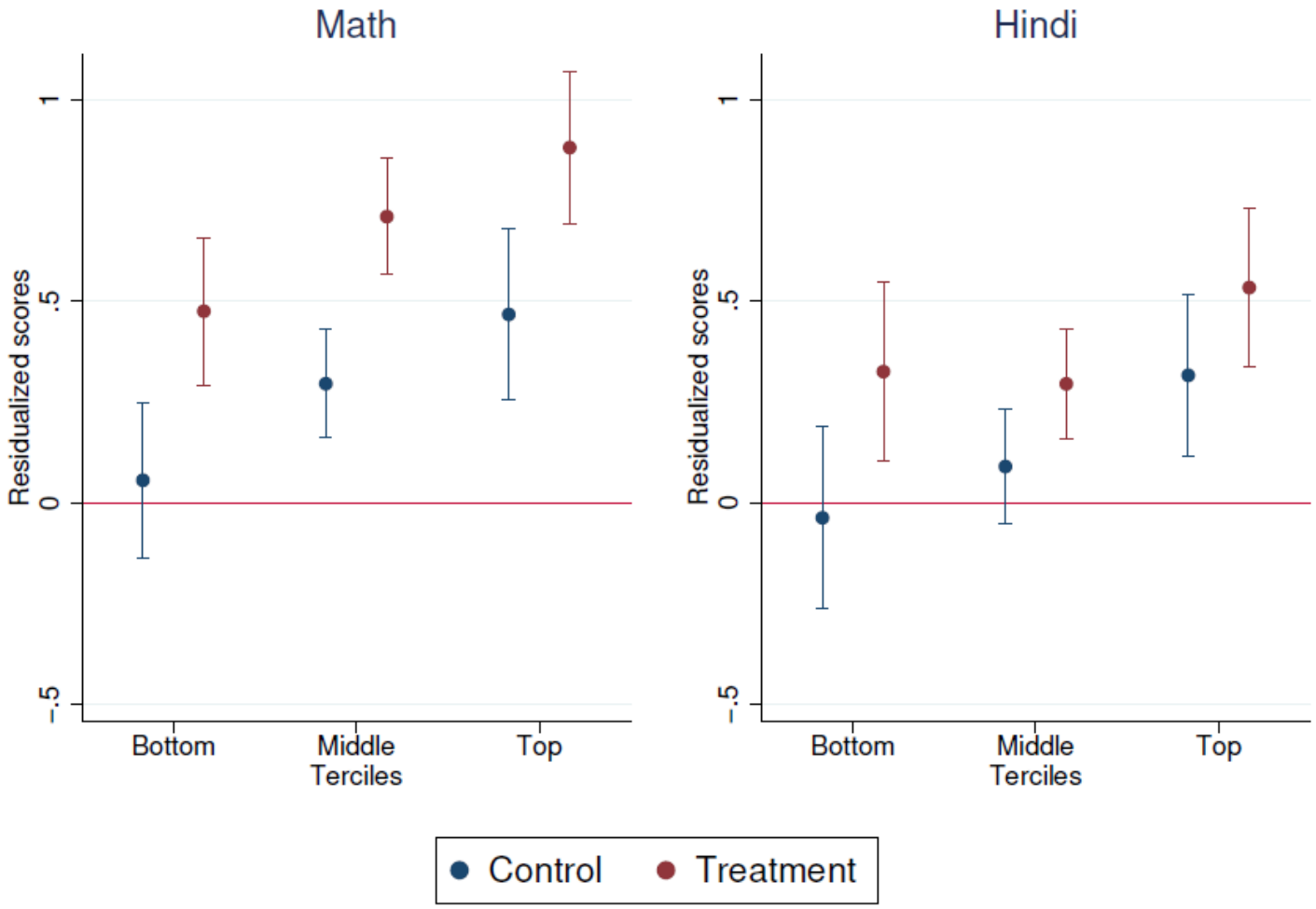
Mean differences in achievement



This figure shows mean of test scores, normalized with reference to baseline, across treatment and control groups in the two rounds of testing. Tests are generated using IRT and linked across grades and rounds within-subject.

Treatment vs. "business-as-usual" progress

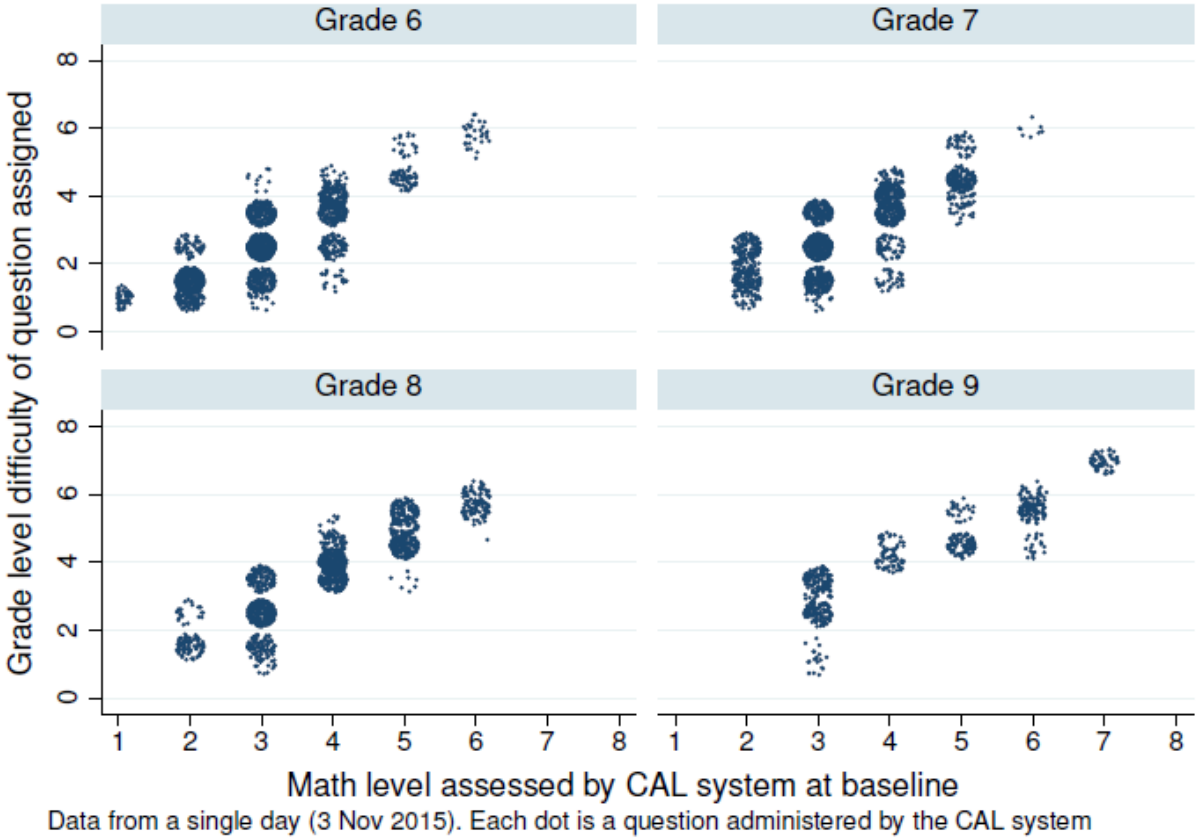
Children in the lowest terciles make *zero progress* in control



Plotted against own quantiles

No single teacher can individualize instruction so finely

CAL caters to wide range of ability in a single session

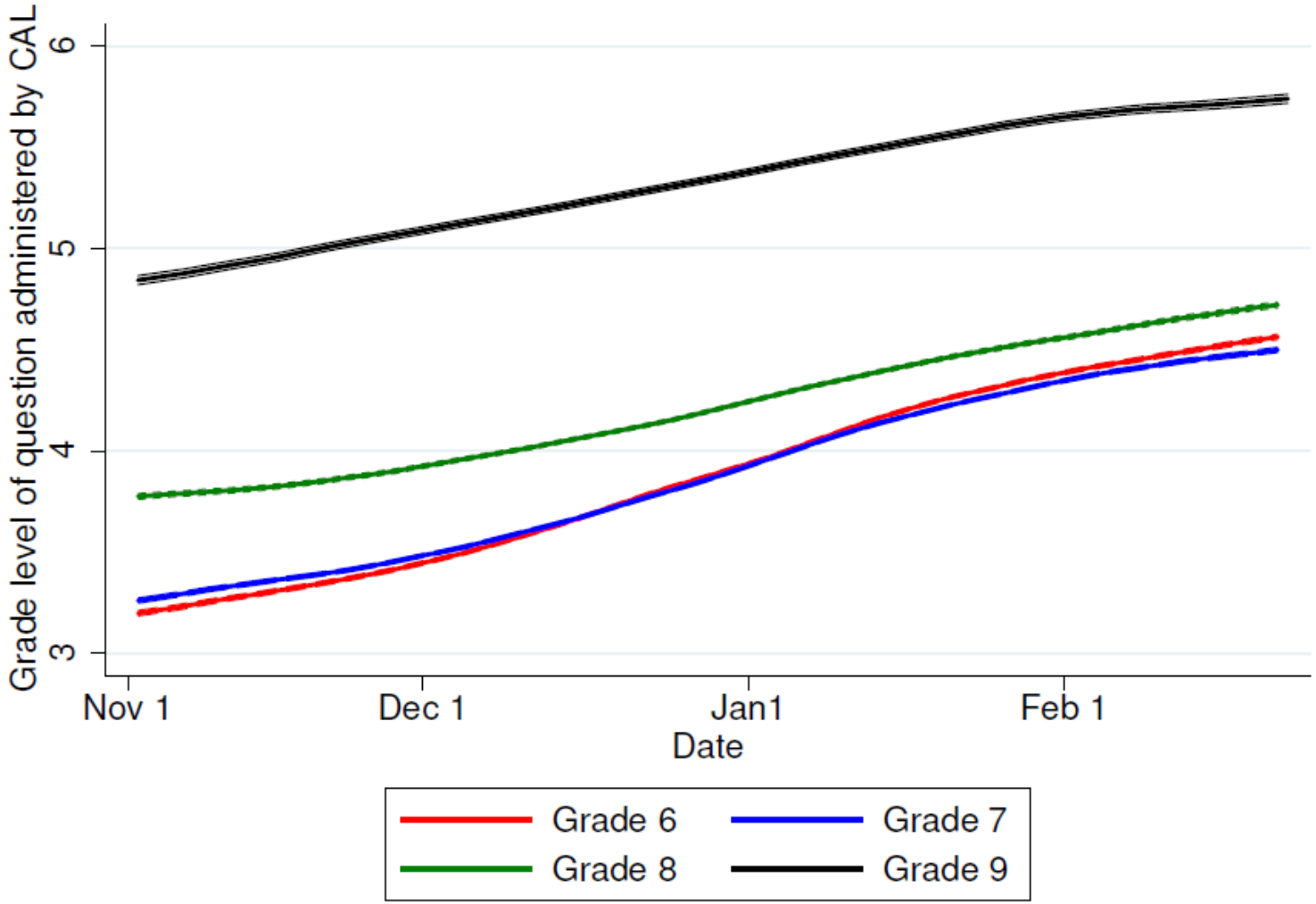


Data from a single day (3 Nov 2015). Each dot is a question administered by the CAL system

This figure shows, for treatment group, the grade level of questions administered by the computer adaptive system to students **in a single day** (3 Nov 2015). The CAL system (a) allows for precise targeting to individual ability levels; (b) can cope with wide variation in ability levels within and across grade levels; (c) can adapt quickly to changes in ability.

Students in all grades learn over the study period

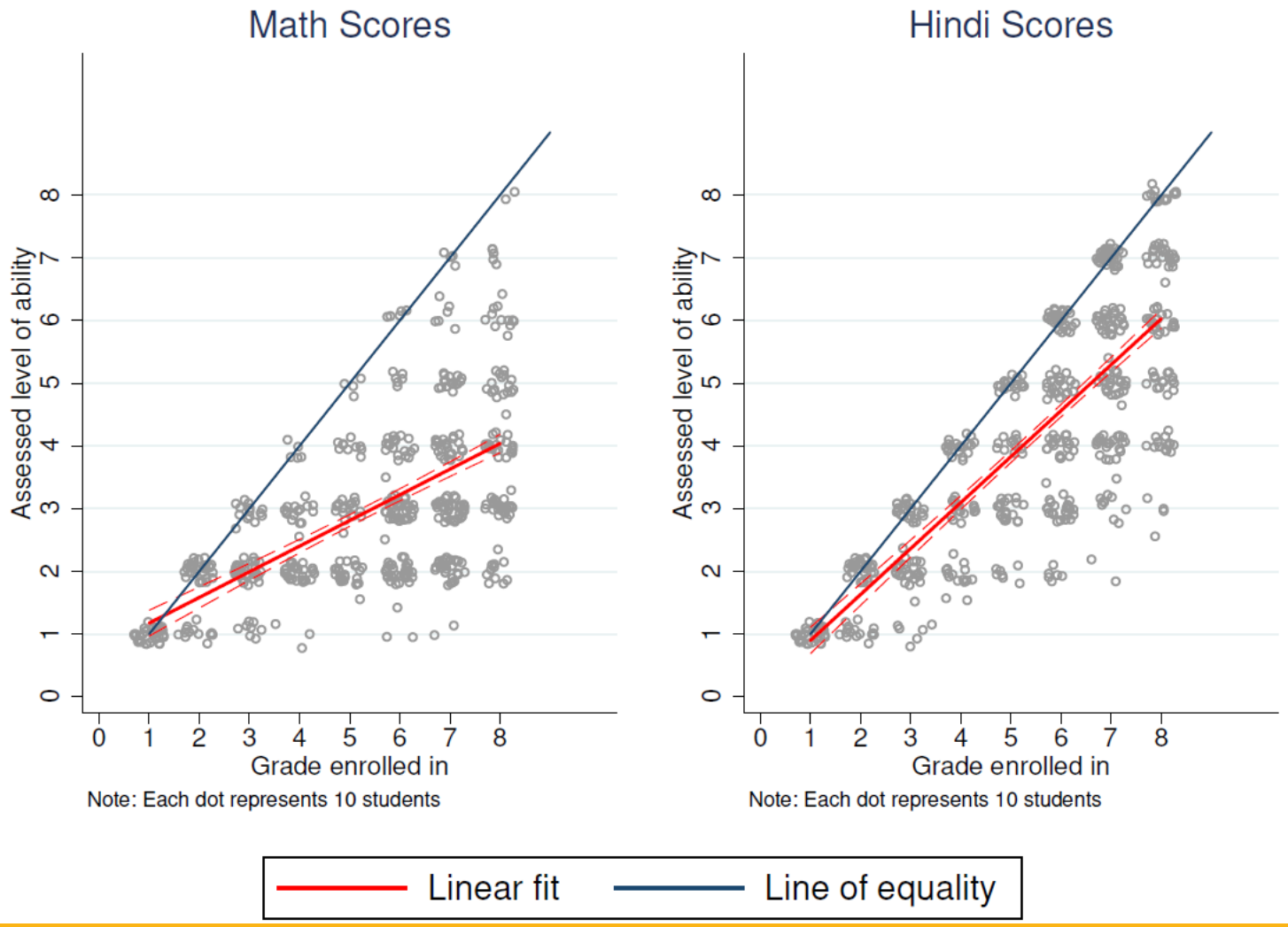
The increase in learning is continuous *and continuously adapted to at individual level*



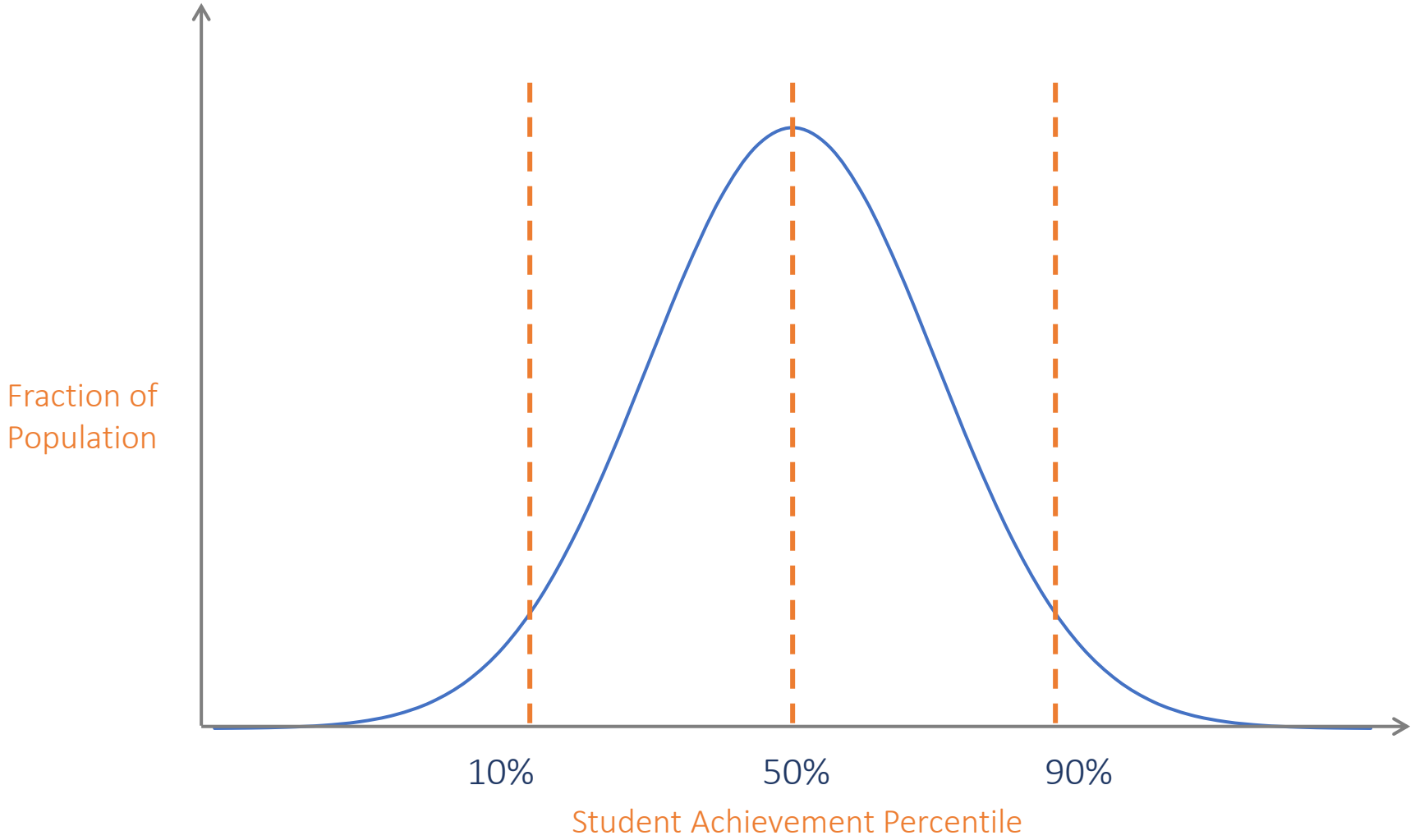
Plotted separately by actual grade enrolled in

Mismatch between grade levels and actual achievement

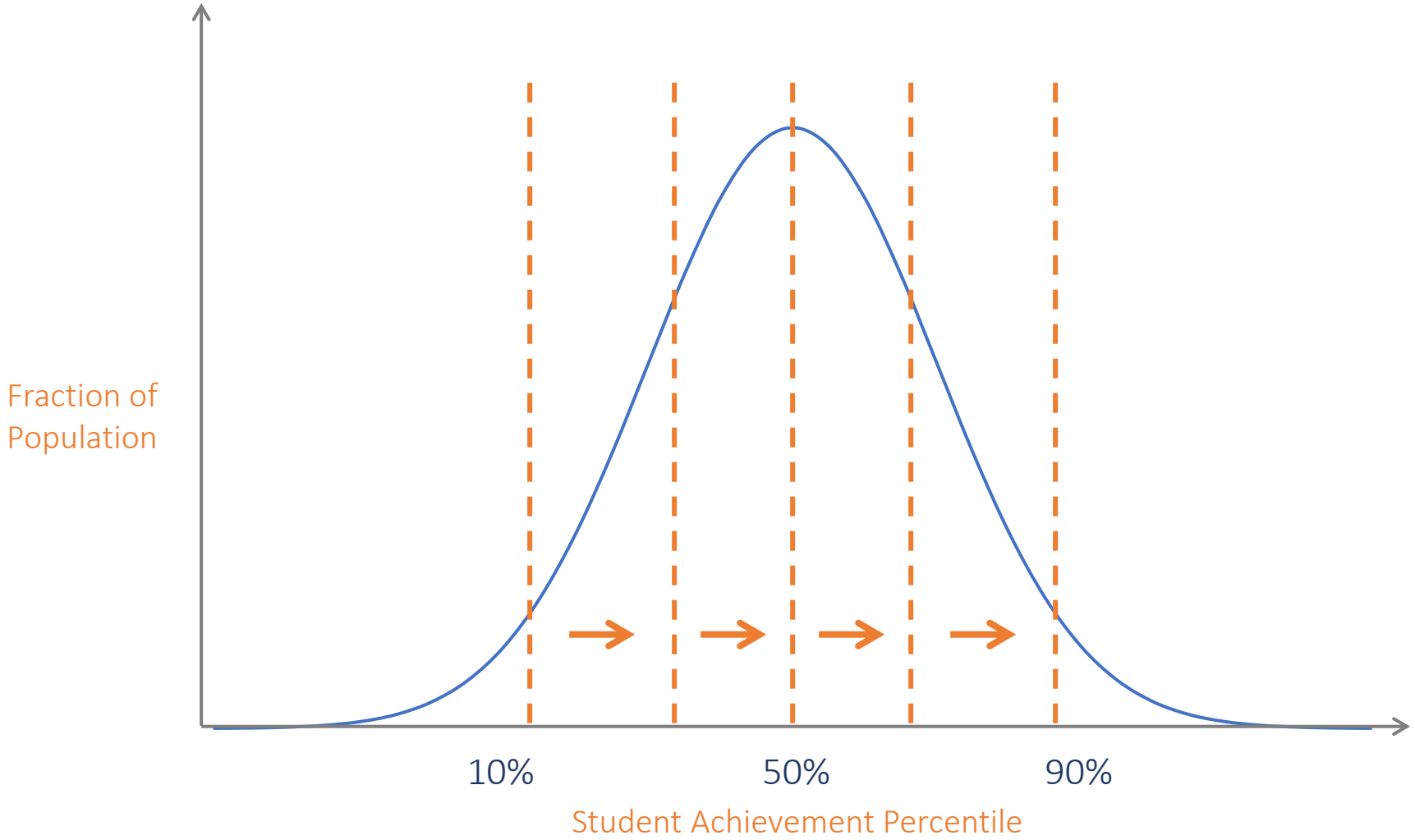
Learning deficits and within-grade dispersion in achievement



Selection Versus Developmental Paradigm in Education

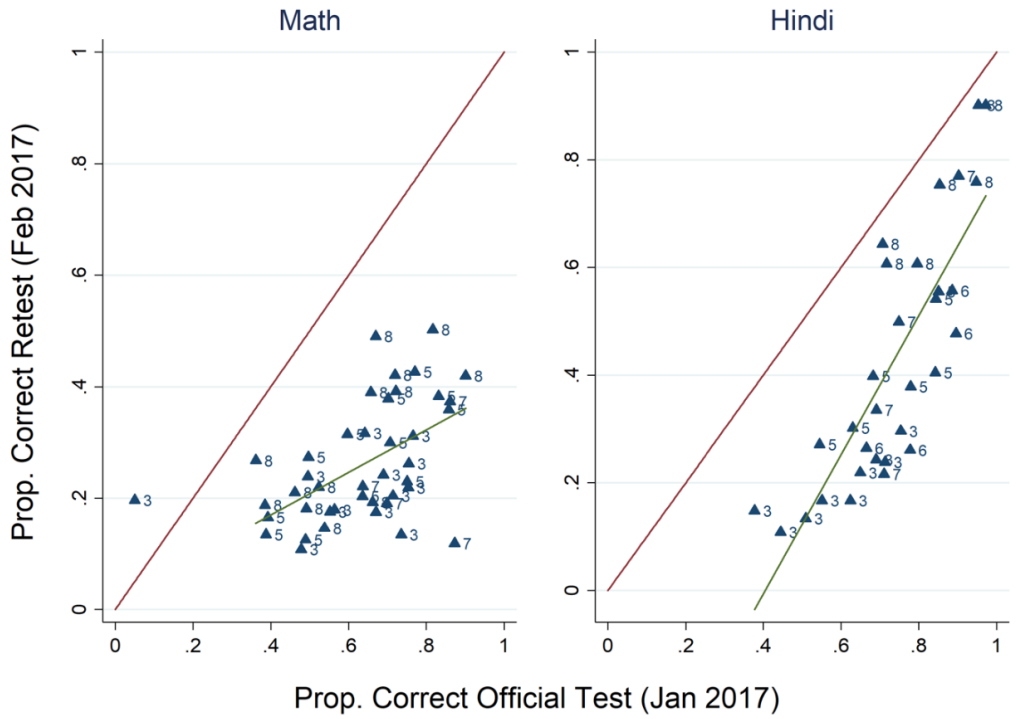


Moving from Selection to Human Capital at all Parts of the Distribution



The Challenge of Data Integrity (Singh 2021)

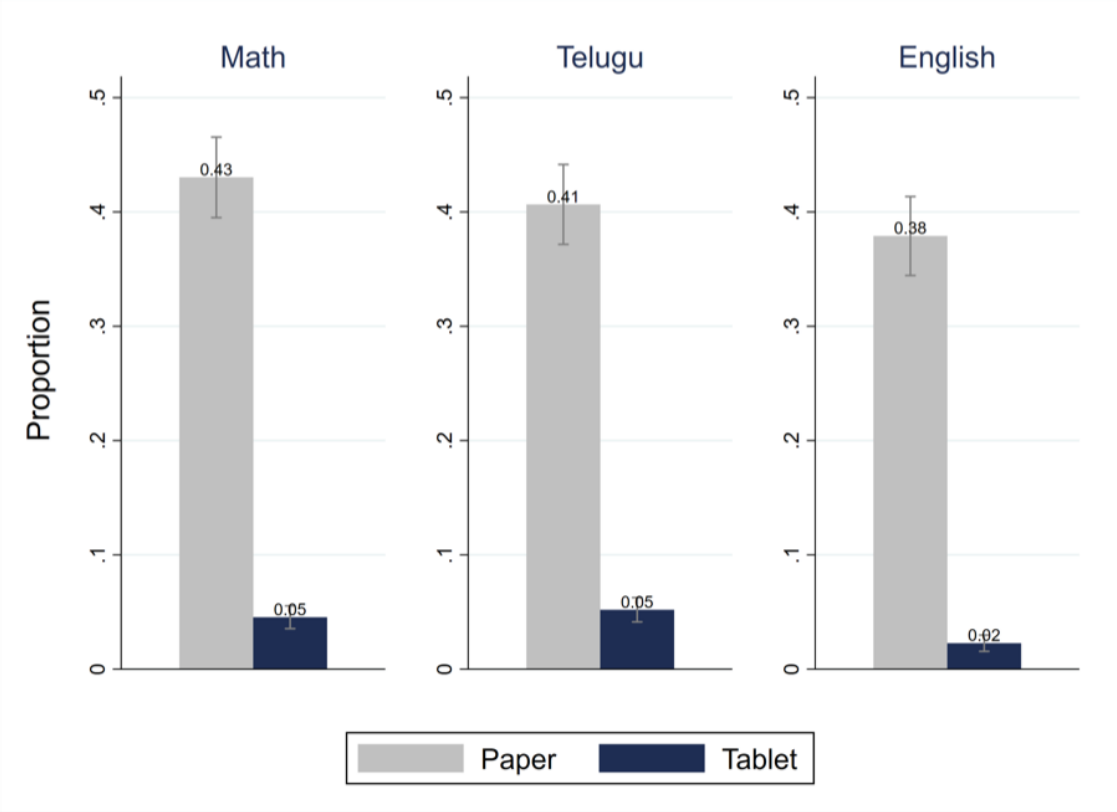
Figure 1: Comparing item-level data from official tests and retest audit



Note: Each dot in this figure is an individual multiple-choice test question and compares the proportion of students who are reported to have correctly answered in the Pratibha Parv assessment (Jan 2017) with the percentage correctly answered in the audit (Feb 2017). There are 69 such test questions across the two subjects. The marker label indicates the grade in which the question was administered.

The Promise of Technology for Measurement

Figure 5: Proportion of schools flagged as potentially cheating



Note: This figure shows the proportion of schools in the paper and tablet testing arms which are flagged as having potentially cheated based on the procedure in Angrist et al. (2017). This procedure identifies, at the classroom level, anomalous response patterns using item level data; please see Appendix C for details. Whereas between 38-43% of classrooms with paper-based testing are flagged, this figure is only around 2-5% in tablet based tests.

But policy is still “input focused” for the most part

- Ed-tech policy in many countries:
  - Main focus is on hardware and procurement and sanctioning budget for computer labs in schools or laptops for students (and maybe connectivity)
  - “Software” is an after-thought (cobble together free resources)
  - But it is the integration of pedagogy and technology (including careful content curation, scaffolding, and monitoring of progress) that will yield results
  - Simply not enough attention being paid to these issues right now

- Key issues include:
  - Hardware specs to run high-quality learning software
  - Dynamic procurement based on revealed & evolving quality of vendors over time
  - PMU to monitor implementation and drive performance (monitoring actual usage and student learning gains will be key)
  - Continuous measurement of impact (Smartboard example)
  - Alignment of goals and monitoring down the chain based on learning outcomes (example of computer lab in RJ)

Summary

- Huge potential for ed-tech to improve both governance & pedagogy – as well as parent, teacher, student engagement
  - But requires considerable attention to details
  - Political incentives point towards inputs – but this is only a starting point

- There is also a real risk of growing inequality due to ed-tech
  - Market rewards innovations for whose who can pay
  - COVID-19 school shutdowns have almost certainly increased inequality

- Essential for policy/philanthropy to focus on effectively accelerating access to innovations to those who cannot pay
  - But again, it is not enough to just focus on devices or inputs
  - But huge potential to use technology to alleviate the binding constraints of measurement, pedagogy, and governance (as well as student motivation and shifting to a focus on absolute vs. relative learning)