From Hype to Reality: The Promise and Challenges of Educational Technology in Practice

Insights from Targeted Instruction Program (TIP) in KP

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FCDO

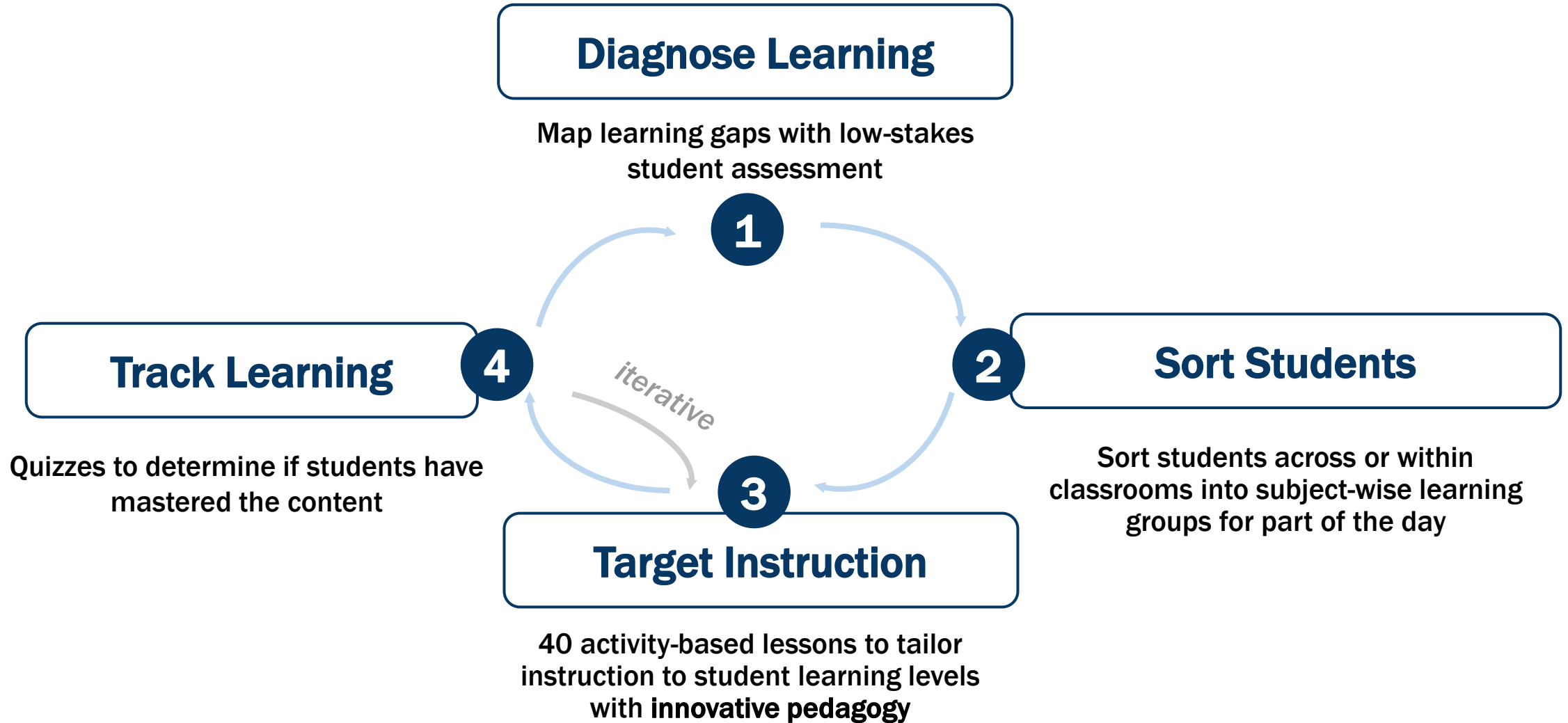# A Way Forward: Targeted Instruction in Pakistan

We, at CERP, designed a **contextualized, system-aligned foundational program**
to *fill in gaps in students' foundational skills*.

Targeted Instruction in Pakistan (TIP)

A foundational learning program to <u>support existing teachers</u>, through a low-cost technology software, in helping primary students (grades 1-5).

- **Direct COVID education response** to mitigate learning losses
- **Integrate closely with government priorities** around curriculum, teacher training, and learning
- **Build students' foundational skills** to make regular classes more productive
- **Minimize costs** by leveraging existing technology devices (personal smartphones and tablets) to support administration

# TIP Intervention: 40 days of *targeting* and *tracking* students

Diagnose Learning

Map learning gaps with low-stakes student assessment

1

Track Learning

4

iterative

2

Sort Students

Quizzes to determine if students have mastered the content

Sort students across or within classrooms into subject-wise learning groups for part of the day

3

Target Instruction

40 activity-based lessons to tailor instruction to student learning levels with **innovative pedagogy**

Minimize costs by leveraging existing technology devices to **support teachers** through a software

TIP Research Sample

	Study 1	Study 2
Location	2 districts in KP	ICT
Schools	**1250** public primary schools	**560** public primary schools
Teachers	**~7000** teachers and head teachers	**2500** teachers and head teachers
Students	**~250,000** from classes 1-5	**~90,000** from classes 1-5
Household actors	NA	**10,000**

TIP Tech Tool: MIS, LMS and Fast Grading Tool

Through an iterative process, we developed a *teacher-support Tech Tool* with a toolkit consisting of an adapted curriculum and related instructional materials, a grading tool, and asynchronous training resources.
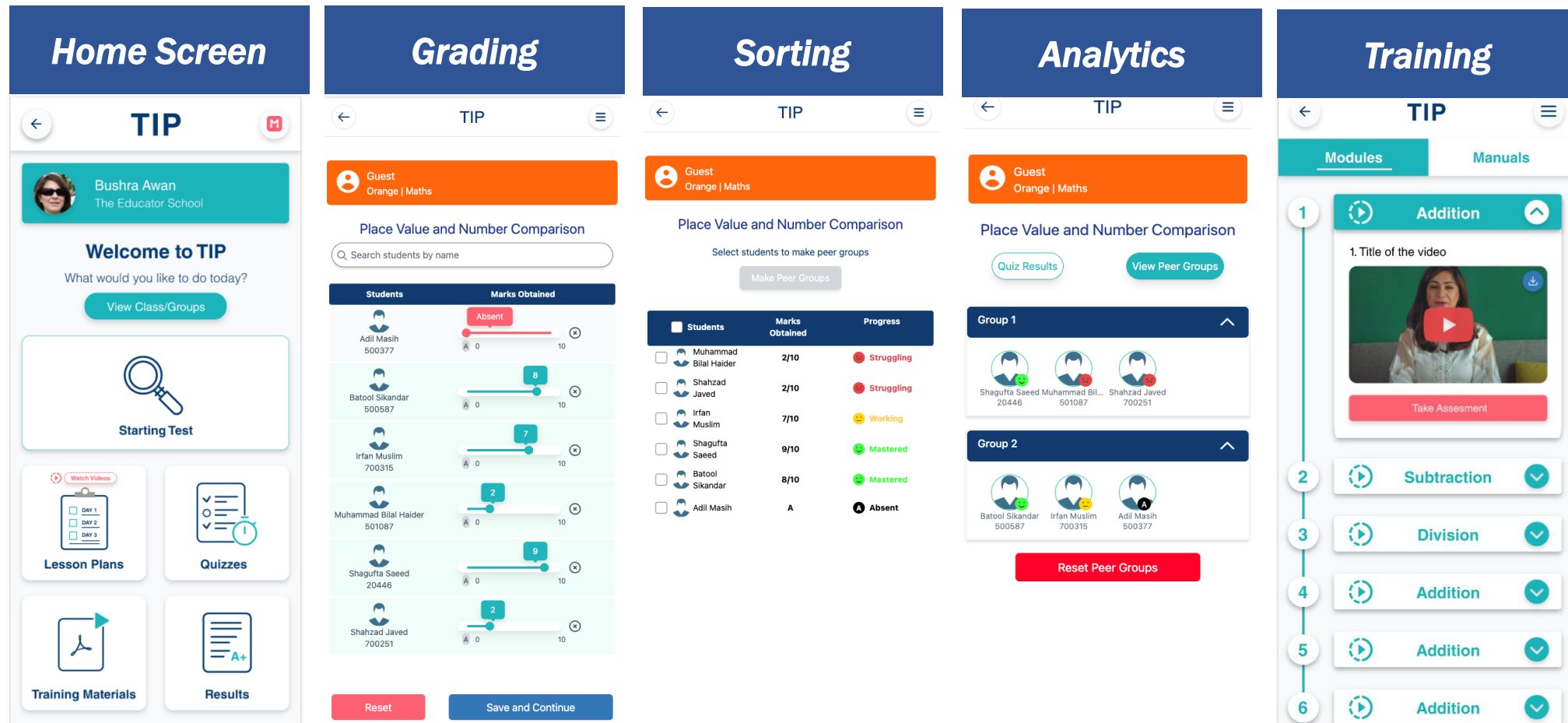
TIP Tech Tool: MIS, LMS and Fast Grading Tool

Minimize costs by leveraging existing technology devices to **support teachers**
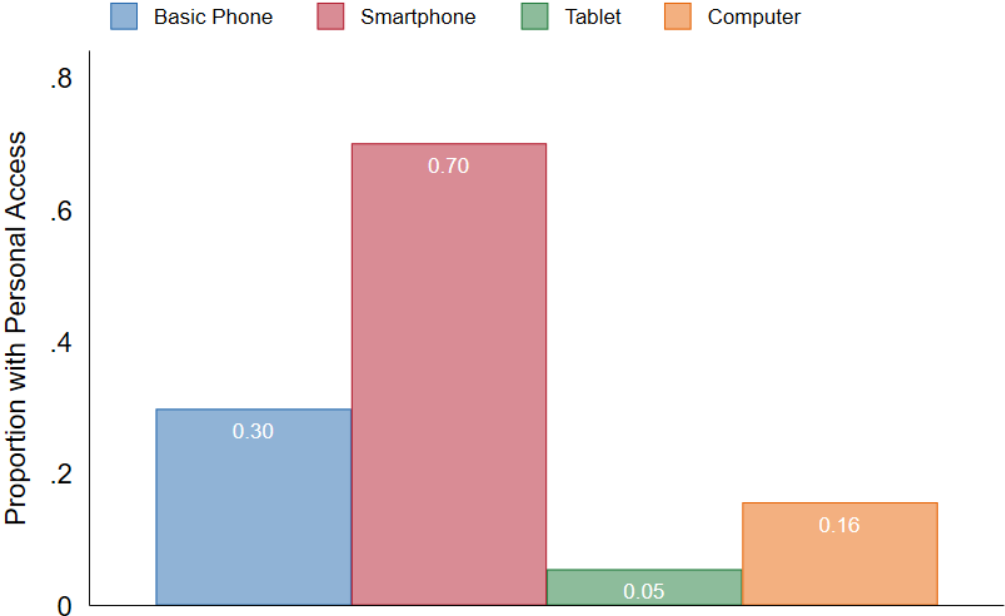
Features of the TIP Tech Tool

- Assists teachers in efficiently grading students

- Generates child-, class- and skill-wise student results

- Sorts students into learning and peer groups to target instruction to individual students

- Cues readily available, downloadable lesson plans and related TLMs for targeted instruction

- Offers training videos, focused on pedagogy and content, in downloadable and online formats

- Systematically organizes school, teacher and student level data

Alleviating teachers' constraints in tech adoption

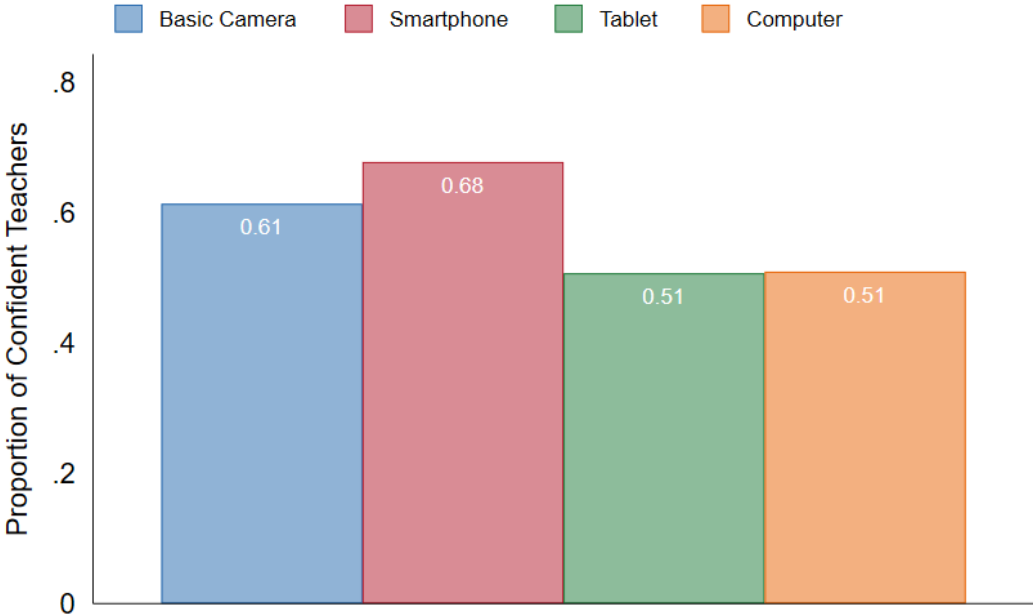TIP is designed as a scalable and sustainable solution for budget-constrained settings.

➔ A low-cost technology software, built using WhatsApp UI/UX interface, that can be used offline once downloaded on *existing smart devices.*

➔ *Smartphones as the instrument of choice*, given its high prevalence and comfort among teachers as a personal digital device.

Teachers' Access to Digital Devices

Legend: Basic Phone | Smartphone | Tablet | Computer

Proportion with Personal Access:
- Basic Phone: 0.30
- Smartphone: 0.70
- Tablet: 0.05
- Computer: 0.16

Note: Data collected as of May, 2022. Sample includes 2,151 females and 2,892 males.

Teachers' Confidence in Digital Devices

Legend: Basic Camera | Smartphone | Tablet | Computer

Proportion of Confident Teachers:
- Basic Camera: 0.61
- Smartphone: 0.68
- Tablet: 0.51
- Computer: 0.51

Note: Data collected as of May, 2022. Sample includes 2,151 females and 2,892 males. Confidence is a binary variable taken from a 5-pt Likert scale.

Source: TIP Teacher Baseline Survey (2022)

TIP KP: Research Design

**Treatment Groups Allow Us to Test…**

Targeted Instruction

1. No technology (paper-based)

2. Mandatory technology

3. Optional technology

4. Mandatory, then optional tech (grace period)

No Targeted Instruction

5. No targeted instruction (pure control)

Tech vs. paper-based TIP (**T1 vs. T2-T4**) _to examine how teacher tech adoption impacts TIP implementation and student learning._

Is tech an _experience good_? Varying exposure and mandated usage policy.

TIP as a whole (**T1-T4 vs. T5**) to test the efficacy of our targeted instruction program as a whole.

TIP KP: Research Design

Targeted Instruction	1. No technology (paper-based)
	2. Mandatory technology
	3. Optional technology
	4. Mandatory, then optional tech (grace period)
No Targeted Instruction	5. No targeted instruction (pure control)

We focus on teachers' choices in T3 and T4.

T3 allows people to self select into the technology tool.

We know women have less confidence in technology. In T4, we first mandate exposure to the tech tool for 2 weeks, then we allow them to opt out / keep and see whether they differ vs. optional treatment arm.
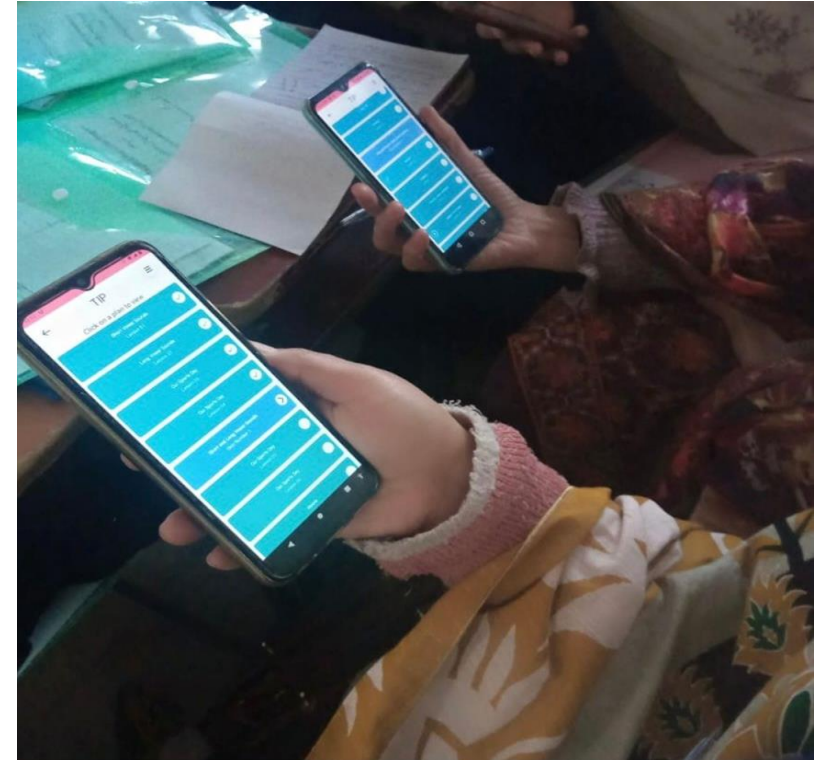
Heterogeneity in Teachers' Access and Confidence in Technology

Dataset: Teacher Baseline Survey

- Teacher Baseline Survey
- Date(s) collected: May 2022
- Unit of observation: teacher-level
- N=6,833 public primary teachers across all treatments

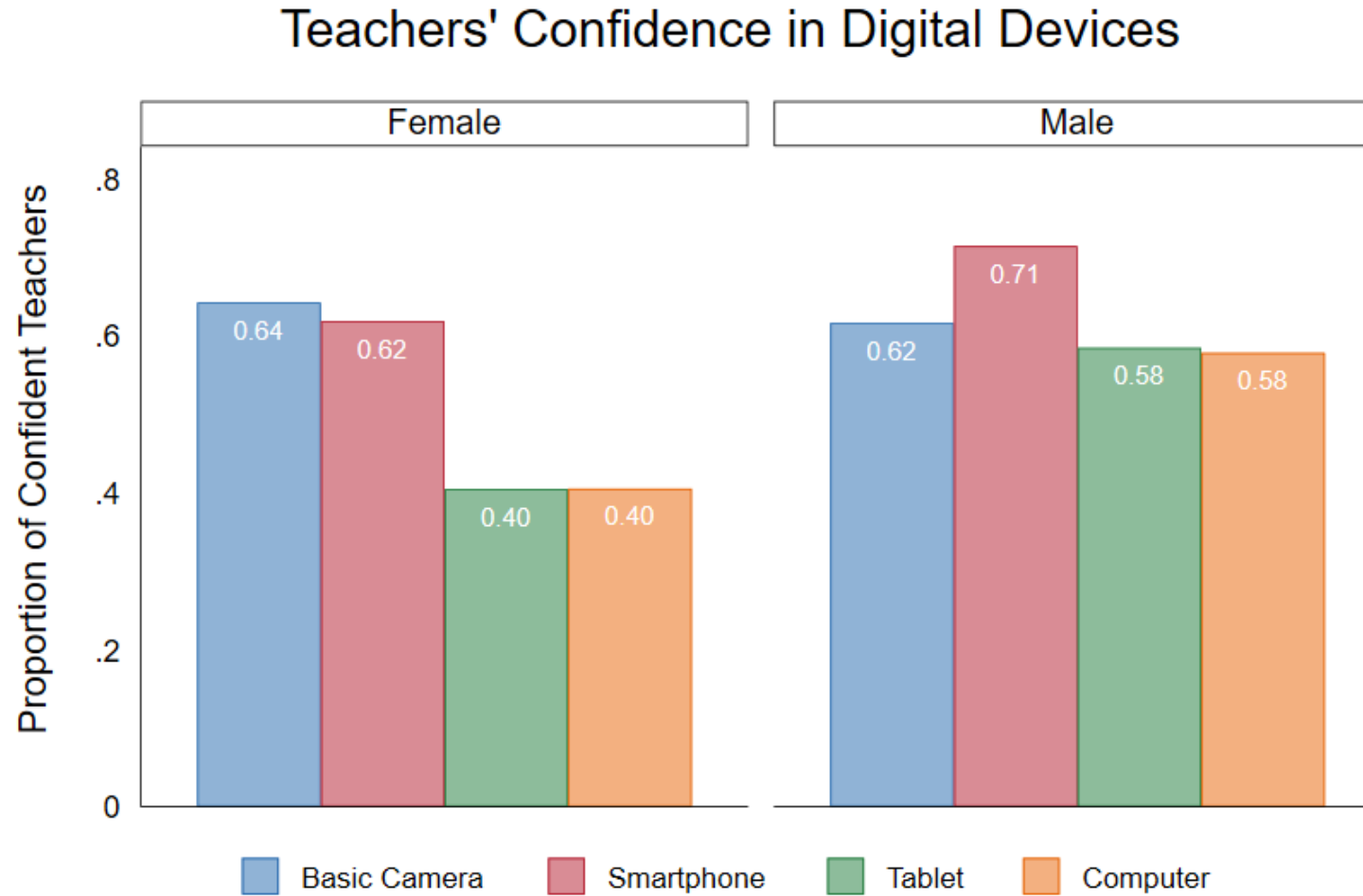| Sections |
| --- |
| Section 1 \| Teaching experience, training, commute, personality
Section 2 \| Technology confidence and usage
Section 3 \| Time allocation in-class vs. outside-class, pedagogy styles
Section 4 \| Beliefs about pedagogy styles and TIP's effectiveness |

Female and male teachers have **similar access** to smartphones.
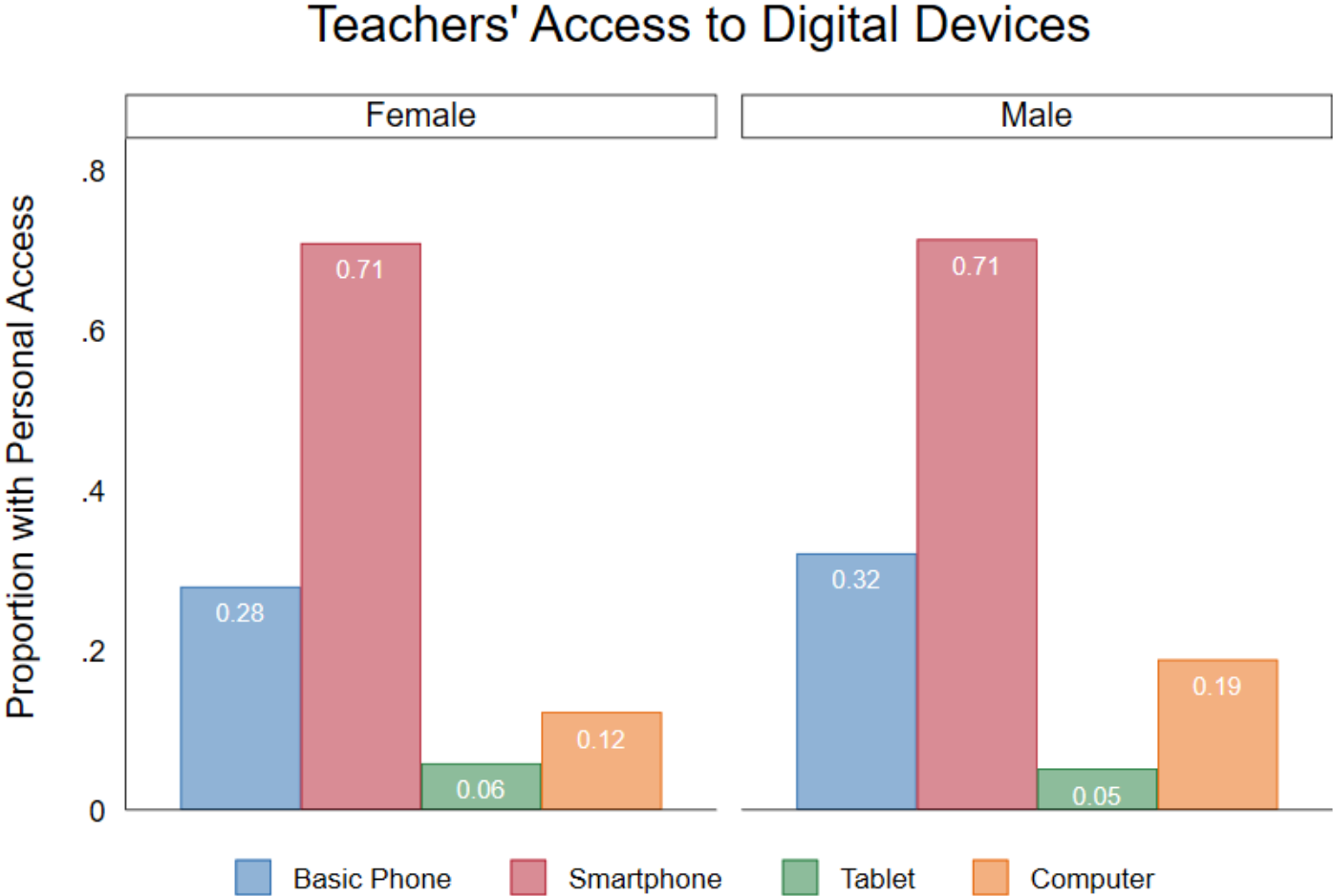
Teachers' Access to Digital Devices

However, men are significantly more confident in all devices except basic camera.

Teachers' Confidence in Digital Devices

	Female	Male
Basic Camera	0.64	0.62
Smartphone	0.62	0.71
Tablet	0.40	0.58
Computer	0.40	0.58

Note: Data collected as of May, 2022. Sample includes 2,151 females and 2,892 males. Confidence is a binary variable taken from a 5-pt Likert scale.
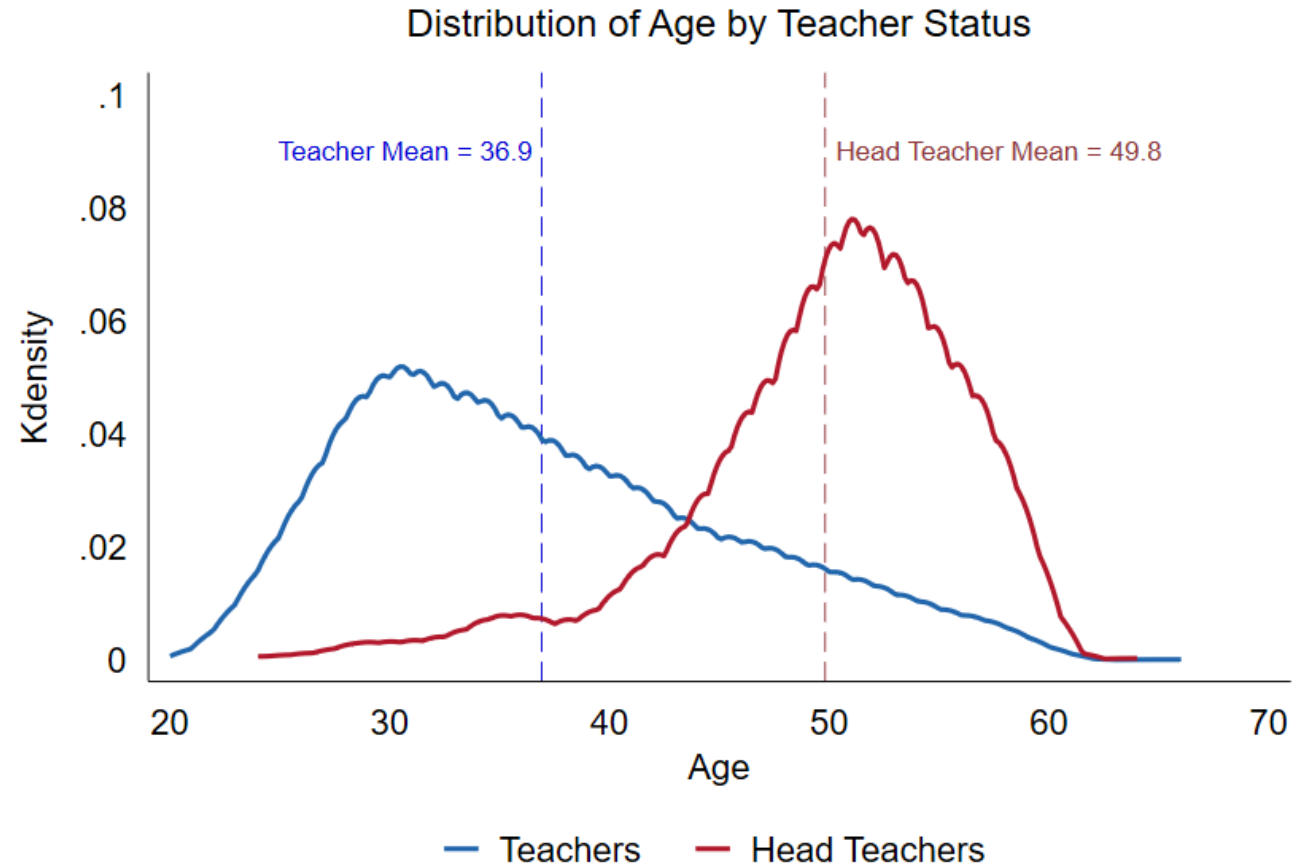
Across ages, men are mostly **more confident** in digital devices than women are.
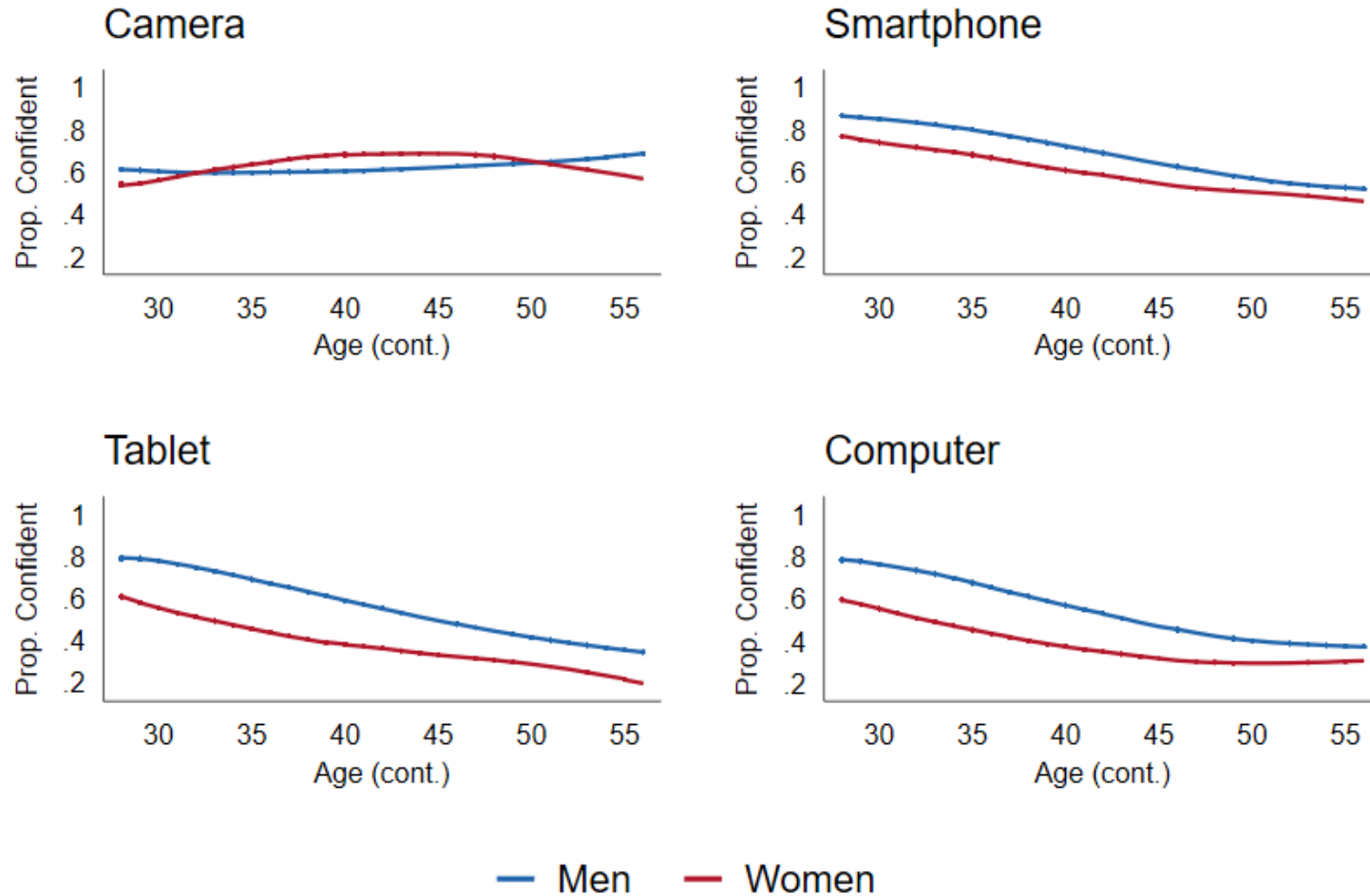
Head teachers are *older* ...

- Head teachers are much older than teachers (+ 13 years)

- These *older h*ead teachers display different technology preferences and beliefs

Distribution of Age by Teacher Status

Teacher Mean = 36.9

Head Teacher Mean = 49.8

Kdensity

Age

— Teachers   — Head Teachers

Note: Latest collected as of January, 2023. Sample includes 5,608 teachers and 1,232 head teachers.

... and *less comfortable with technology*

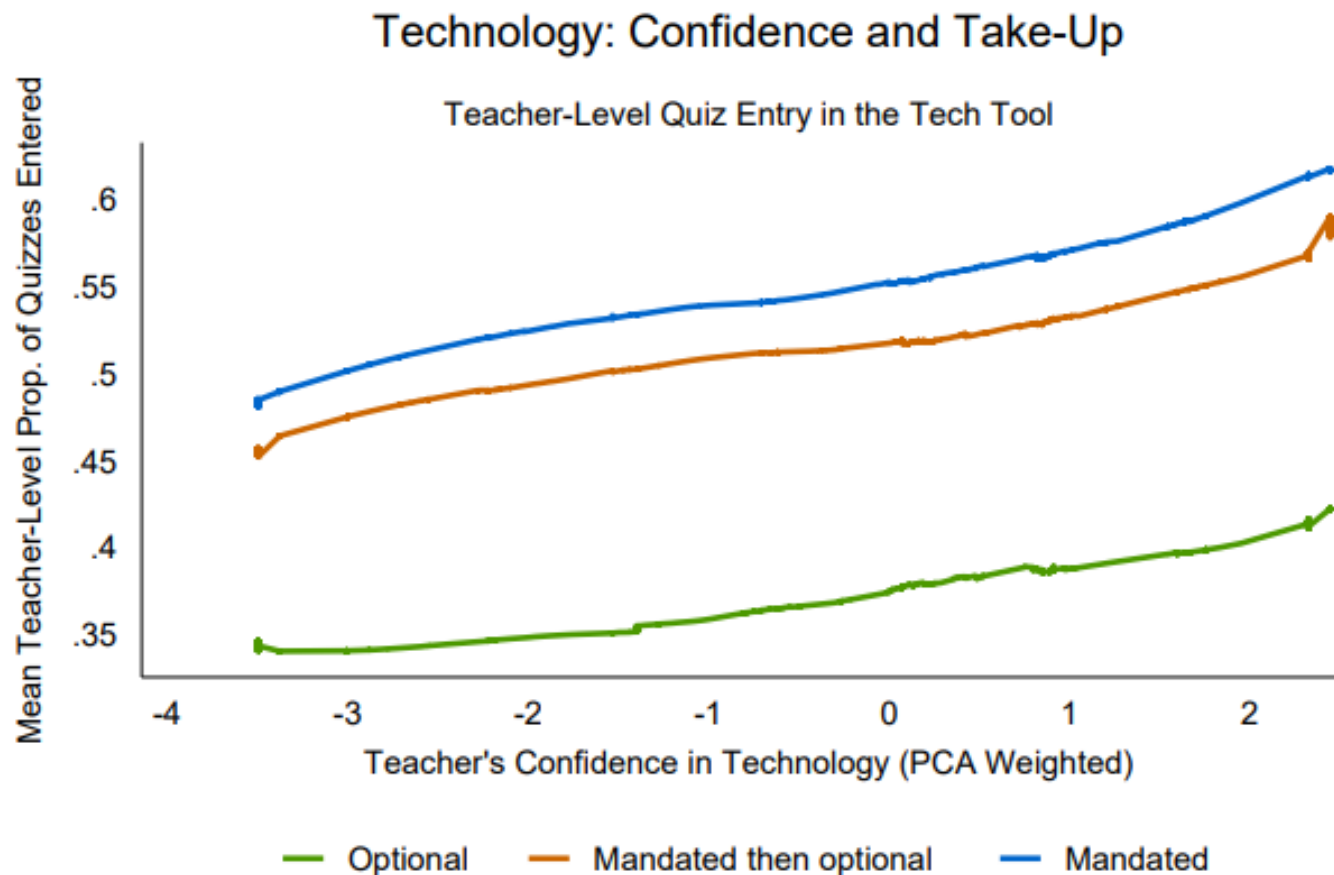## Teachers' Confidence in Digital Devices
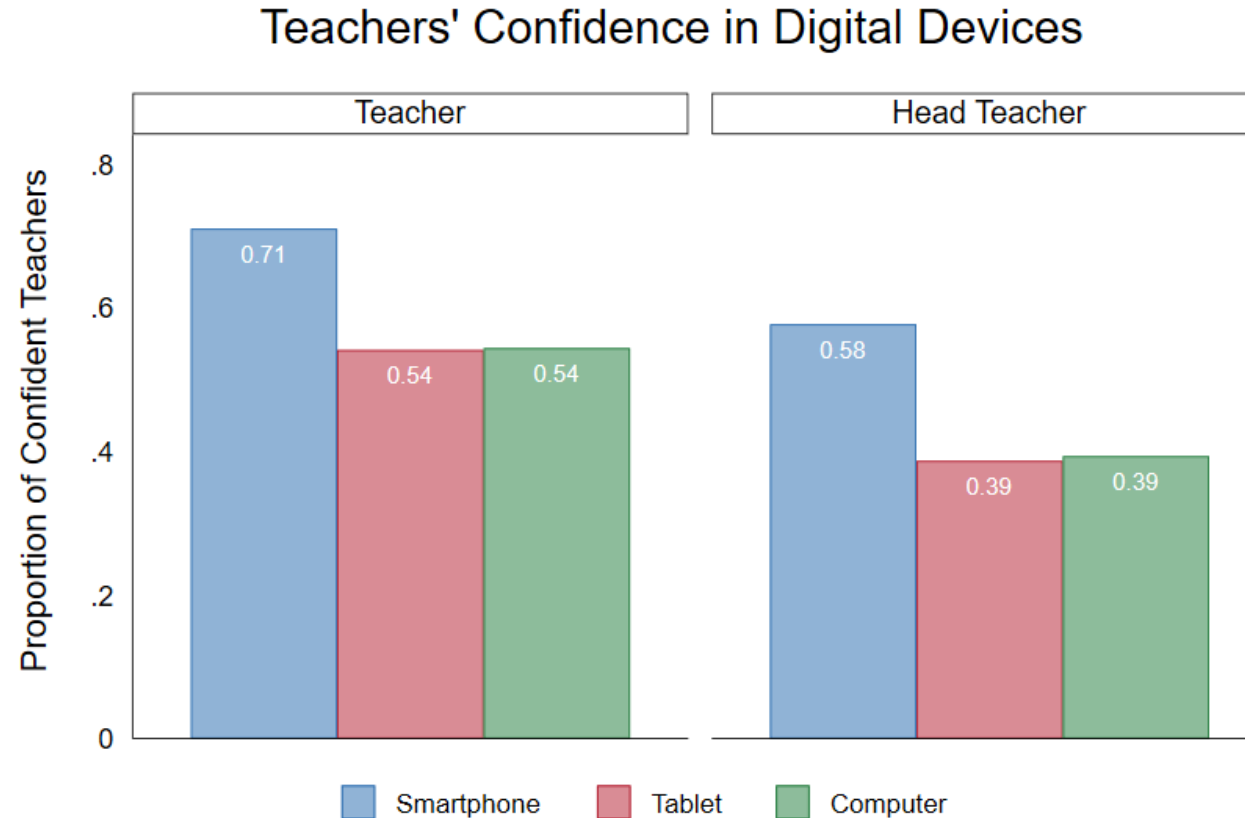
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TIP leverages *Tech Captains*, a chosen/self-volunteered teacher in the school, to reinforce tech take-up of the tech tool by teachers, especially older ones.

Preliminary Results: Teacher Take-Up of Technology

Technology take-up is correlated with *ex ante confidence in technology*

Technology: Confidence and Take-Up
Teacher-Level Quiz Entry in the Tech Tool

Legend: Optional · Mandated then optional · Mandated

X-axis: Teacher's Confidence in Technology (PCA Weighted)
Y-axis: Mean Teacher-Level Prop. of Quizzes Entered

Notes: Lines show the local estimates of OLS regressions of tech take-up on PCA-weighted technology confidence.
Technology confidence is a PCA-weigthed teacher-level average of dummies measuring confidence in smartphone, camera, computer, etc.
Tech take-up is measured by teacher-level means of total graded quizzes across subjects on the tech tool.
Sample includes teachers N=863 in optional, N=787 in mandated then optional, and N=805 in mandated tech treatment arms.
Sample excludes teachers or students who transferred away or into sample schools during TIP administration.
In the mandated then optional tech treatment arm, the opt-out announcement was made to schools 4 weeks
after the start of TIP classes. Optional tech schools were told to use the tech tool at their discretion
from the start of TIP classes. Mandated tech schools were required to use the tech tool throughout TIP classes.

TIP KP: Research Design

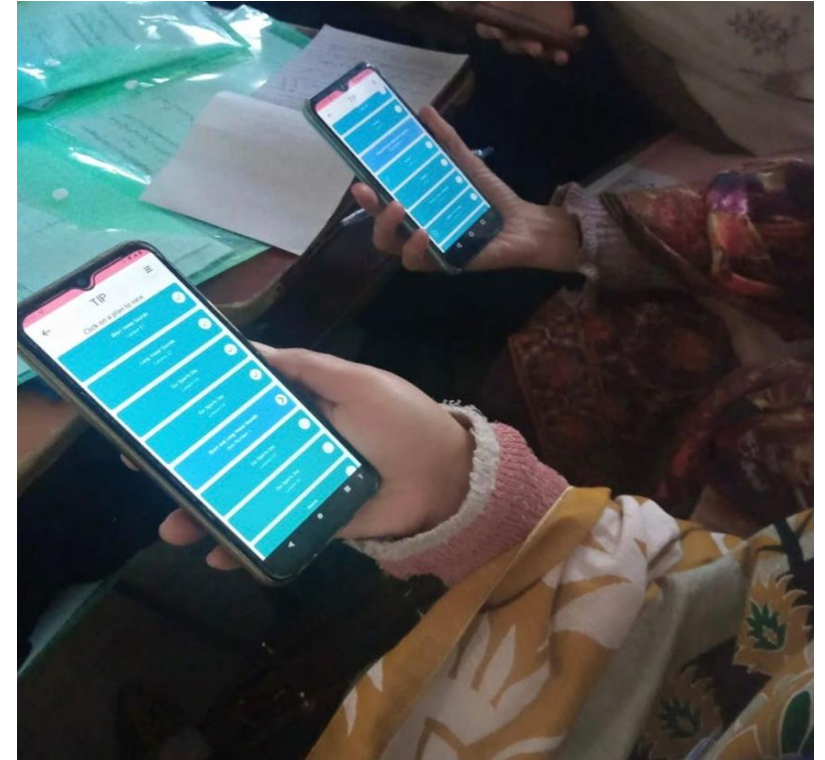|	
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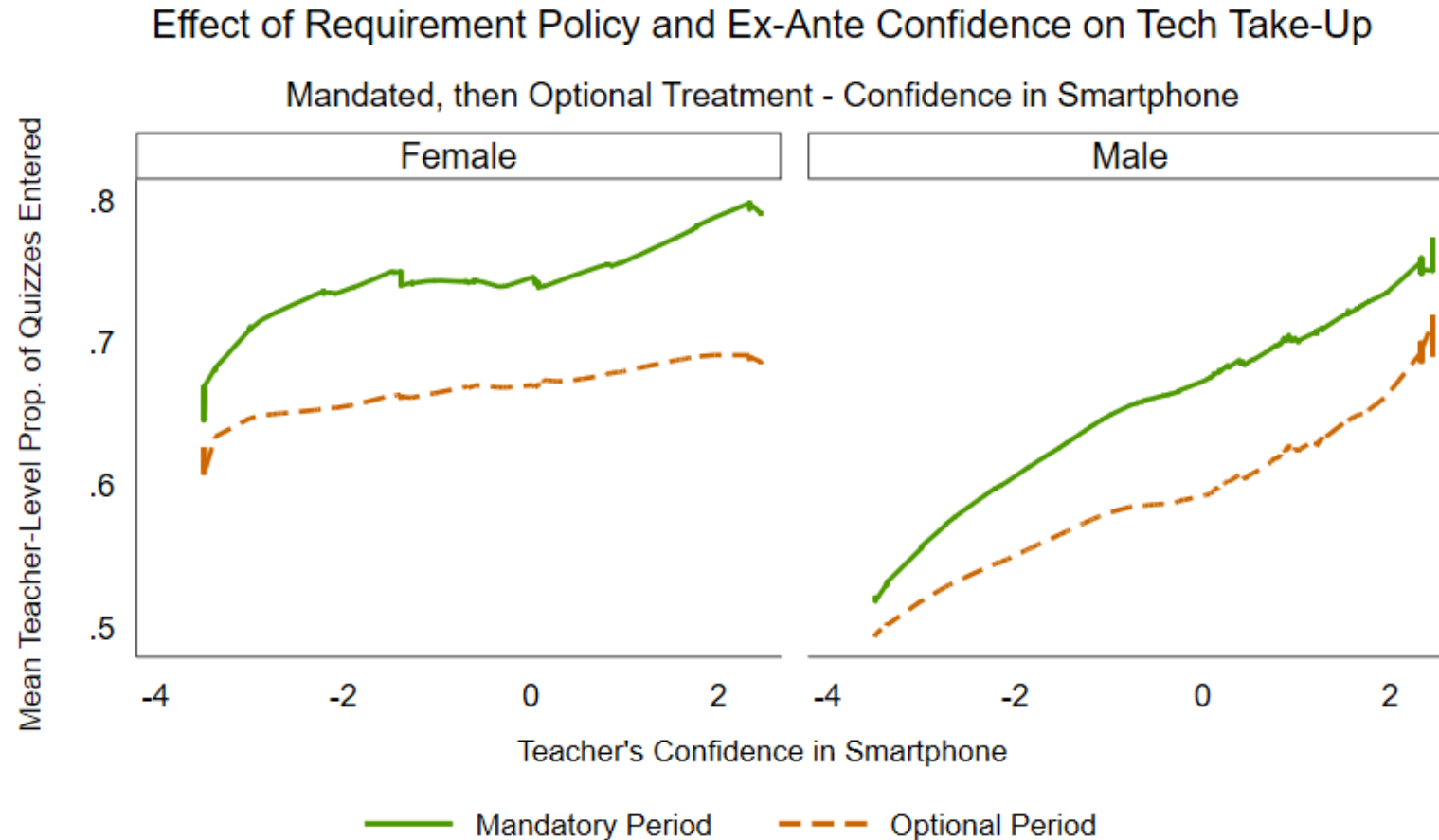
Getting over the confidence gap:
women are *more likely to use the technology tool* after being mandated to do so

Quiz Entry in the Teacher Tech Tool (After Opt-Out Announcement)
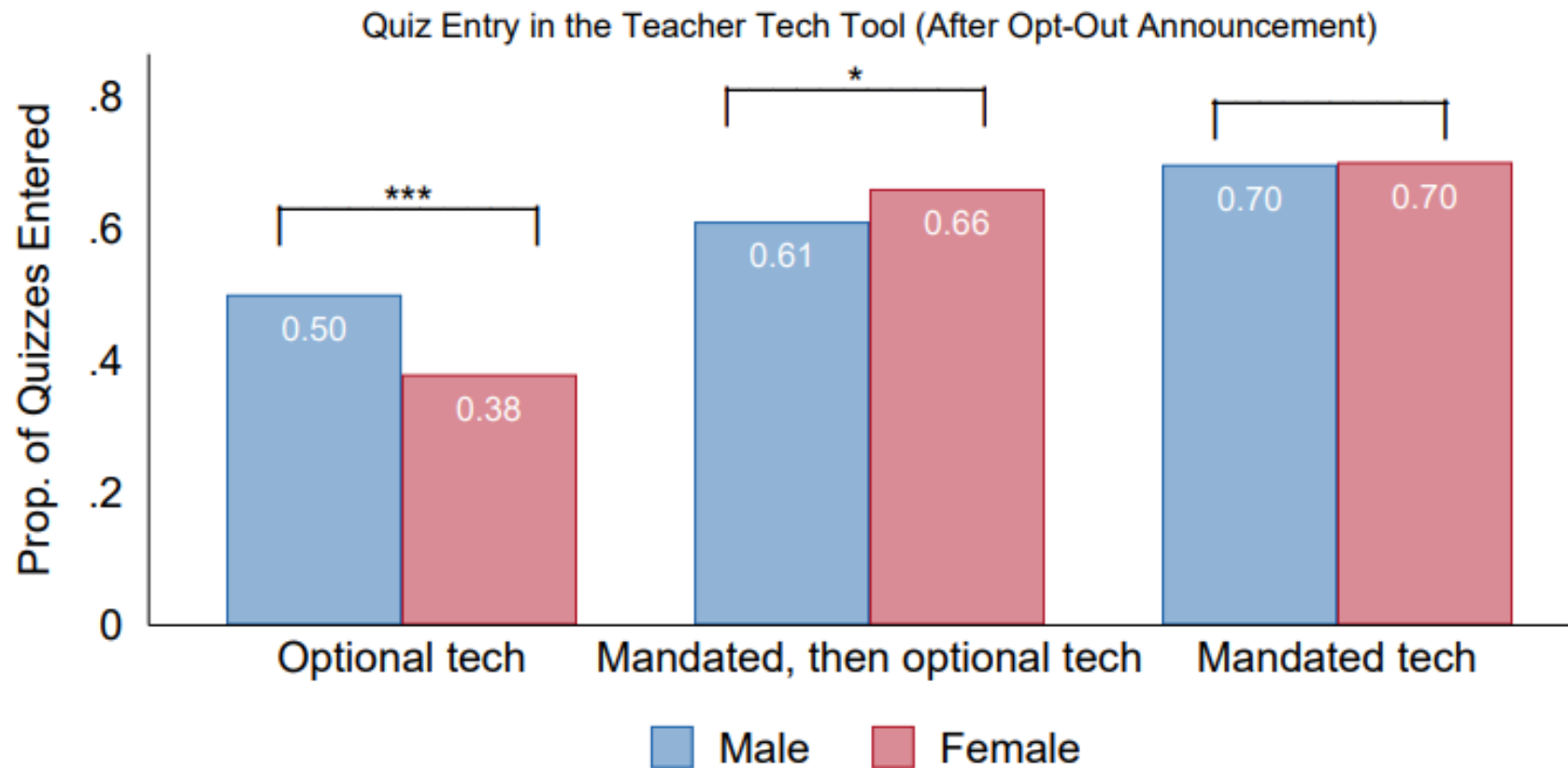
Note: Stars indicate significance in the difference in gender means at the 5% **, 1% **, and 0.1% *** levels.
Bars show treatment means (by gender) of teacher-level means of total graded quizzes across subjects on the tech tool.
Sample includes teachers N=1,019 in optional, N=931 in mandated then optional, and N=964 in mandated tech treatment arms.
Sample excludes teachers or students who transfered away or into sample schools during TIP administration.
Overall treatment means after the opt-out announcement are 0.45 in optional, 0.63 in switch, and 0.70 in mandated schools.
Proportion of men is ~60% and is not significantly different across treatments.
In the mandated then optional tech treatment arm, the opt-out announcement was made to schools after 2 quizzes
(or 4 weeks after the start of TIP classes). Optional tech schools were told to use the tech tool at their discretion
from the start of TIP classes. Mandated tech schools were required to use the tech tool throughout TIP classes.

Getting over the confidence gap:
women are *more likely to use the technology tool* after being mandated to do so

Effect of Requirement Policy and Ex-Ante Confidence on Tech Take-Up

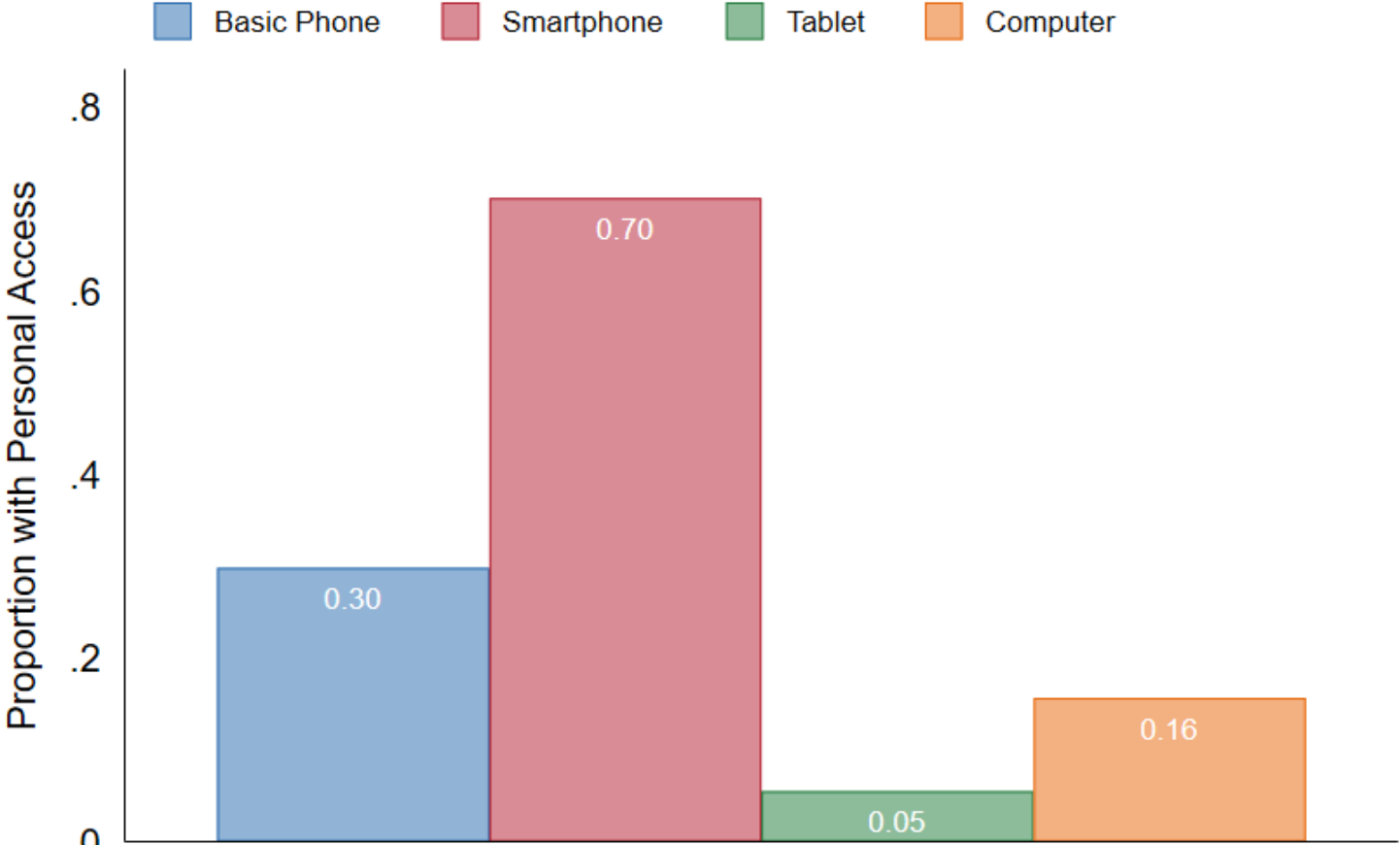Mandated, then Optional Treatment - Confidence in Smartphone

Notes: Lines show the local estimates of regressions of tech take-up on confidence.
Confidence is measured on a 1-5 Likert scale (1-Very confident; 5-Not at all confident.)
Tech take-up is measured by teacher-level means of total graded quizzes across subjects on the tech tool.
Sample includes teachers N=1,019 in optional, N=931 in mandated then optional, and N=964 in mandated tech treatment arms.
Sample excludes teachers or students who transfered away or into sample schools during TIP administration.
Overall treatment means during trial are 0.70 during mandatory period, and 0.63 in optional period.
In the mandated then optional tech treatment arm, the opt-out announcement was made to schools after 2 quizzes
(or 4 weeks) after the start of TIP classes.

End

Appendix

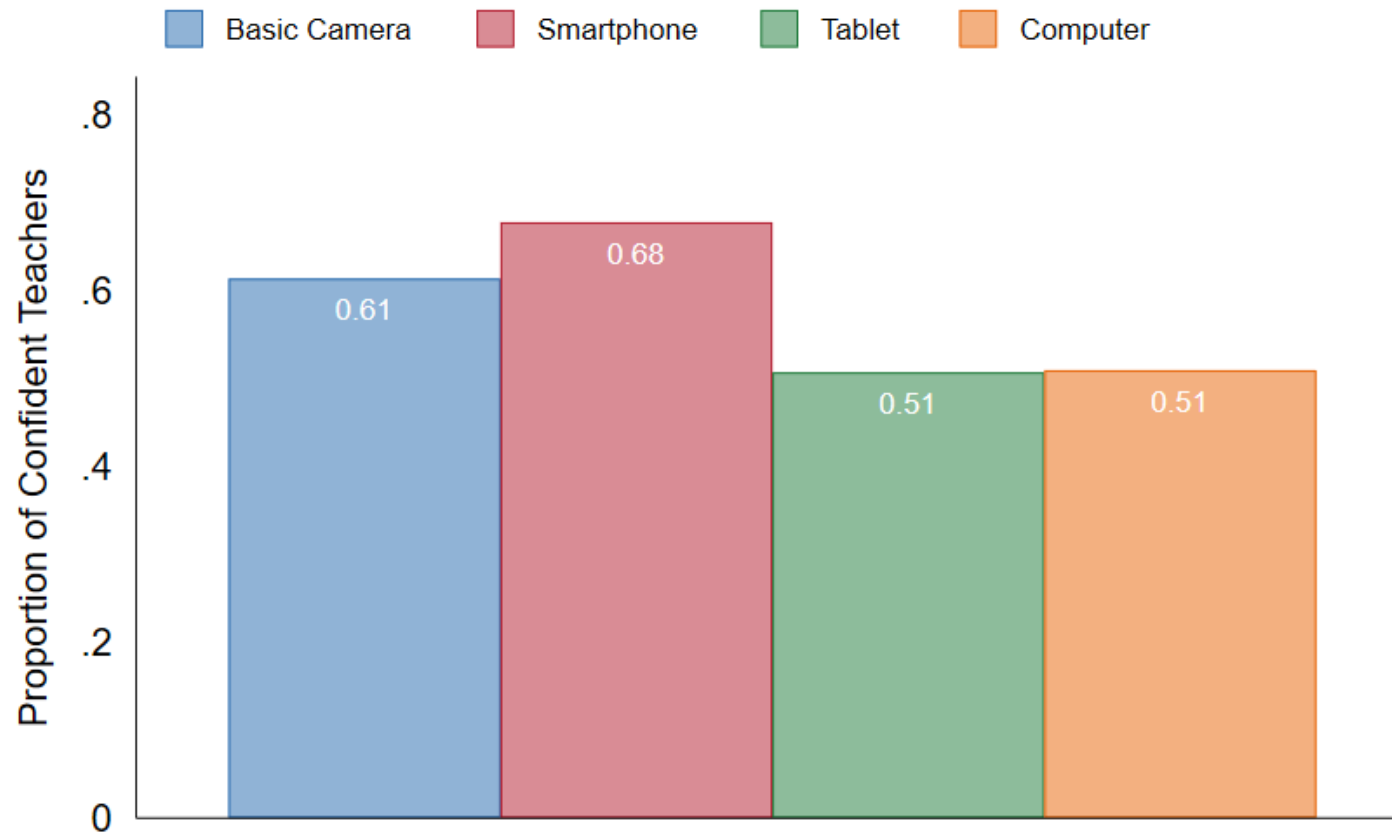# Smartphones is the most prevalent digital device among teachers.

Teachers' Access to Digital Devices

Basic Phone   Smartphone   Tablet   Computer

Basic Phone: 0.30
Smartphone: 0.70
Tablet: 0.05
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Proportion with Personal Access

Note: Data collected as of May, 2022. Sample includes 2,151 females and 2,892 males.

Teachers also have the highest confidence in smartphones.

Teachers' Confidence in Digital Devices

Legend: Basic Camera | Smartphone | Tablet | Computer

- Basic Camera: 0.61
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- Tablet: 0.51
- Computer: 0.51

Y-axis: Proportion of Confident Teachers (0, .2, .4, .6, .8)

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