

## How effective are computer-based teacher training programs? Evidence from a randomized controlled trial in El Salvador

Aymo Brunetti<sup>1</sup>, Konstantin Büchel<sup>1</sup>, Martina Jakob<sup>2</sup>, Ben Jann<sup>2</sup>, Christoph Kühnhanss<sup>2</sup>, Daniel Steffen<sup>1</sup>

<sup>1</sup>Department of Economics, University of Bern

<sup>2</sup>Institute of Sociology, University of Bern

Seminar on «Analytical Sociology: Theory and Empirical Applications», Venice International University, November 18–21, 2019

# OUTLINE

1. Motivation
2. A look back: Results from the CAL-IMPACT project in 2018 (RCT on computer-assisted learning in primary schools in El Salvador)
3. Pilot study on content knowledge of primary-school teachers in El Salvador
4. First results of an RCT on computer-assisted teacher training in 2019

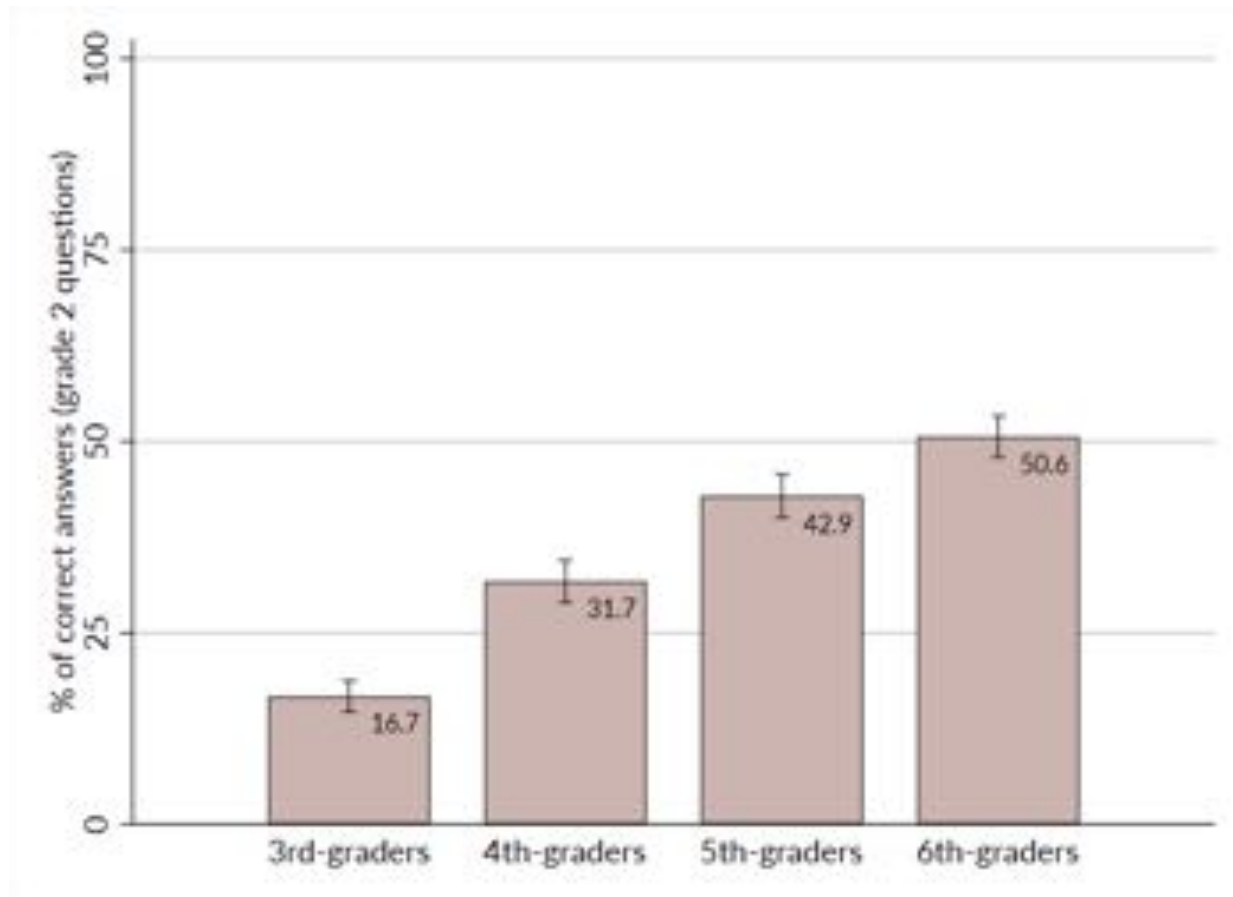
# PART I

## Motivation

# THE PROBLEM: LEARNING CRISIS

- Improved school enrollment rates in developing countries ...
- ... but poor learning outcomes
- „Schooling is not Learning“
- „Learning Crisis“ (World Bank)

# THE PROBLEM: 2<sup>ND</sup> GRADE MATH QUESTIONS



**Figure:** Percent of correct answers on *second grade math questions*, Source: Baseline data collected in February 2018 (N=3,532)

# THE PROBLEM: BASELINE TEST SCORES

Example:  $45 \div 9 = \underline{\hspace{2cm}}$

Correct answers:

3 <sup>rd</sup> gr.	3 %
4 <sup>th</sup> gr.	9 %
5 <sup>th</sup> gr.	28 %
6 <sup>th</sup> gr.	39 %

# THE PROBLEM: BASELINE TEST SCORES

What's 8 : 2?

What time is it?



## PART II CAL-IMPACT 2018

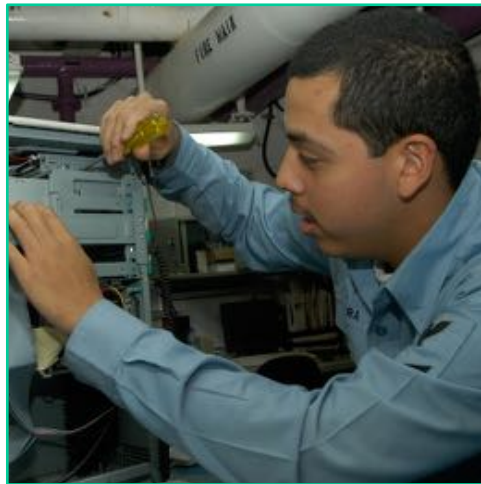




# EL SALVADOR



# CAL-IMPACT: INTERVENTIONS (ADDITIONAL MATH LESSONS)



2 x 90 min./week  
40 classes, ≈ 800 children

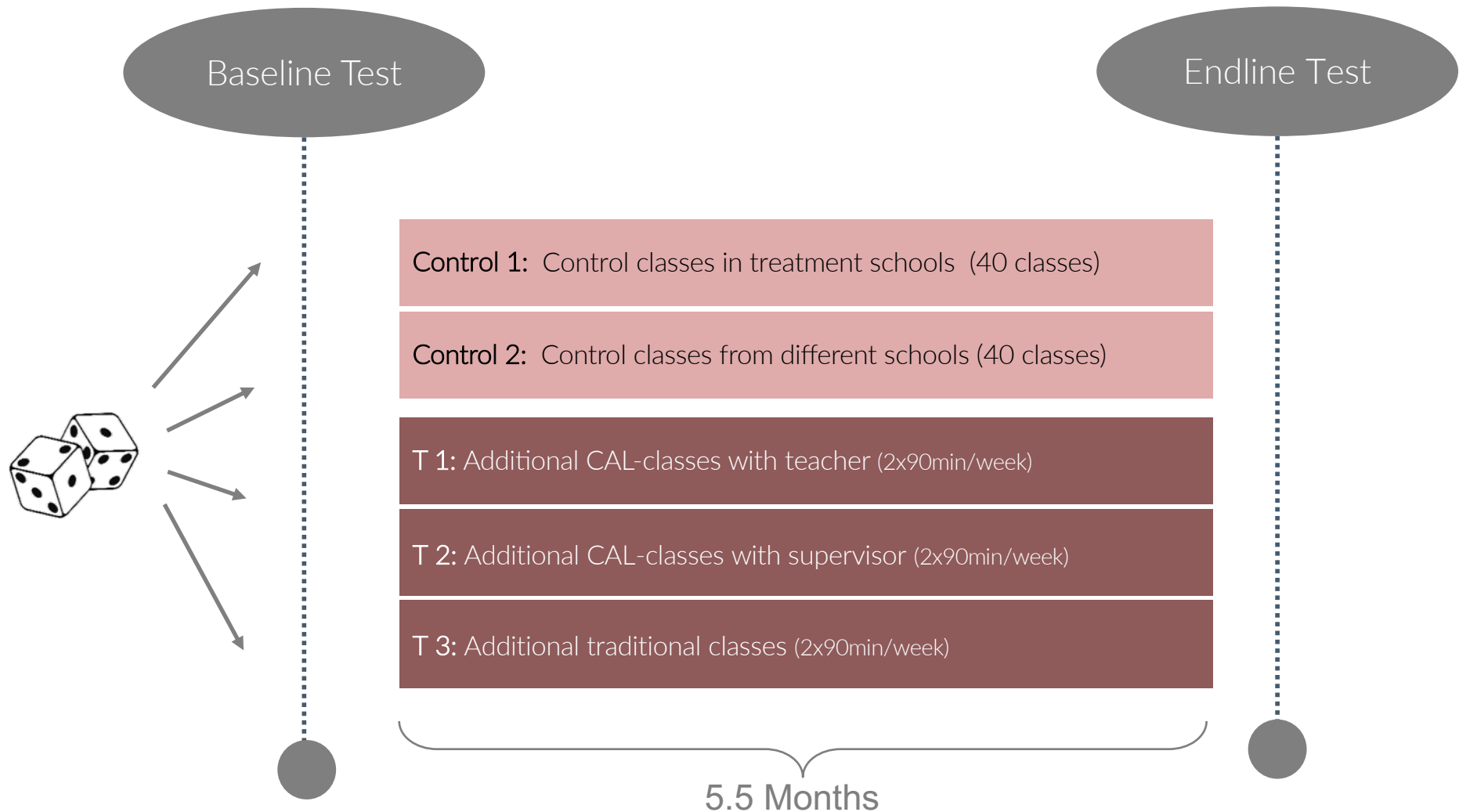


2 x 90 min./week  
39 classes, ≈ 800 children

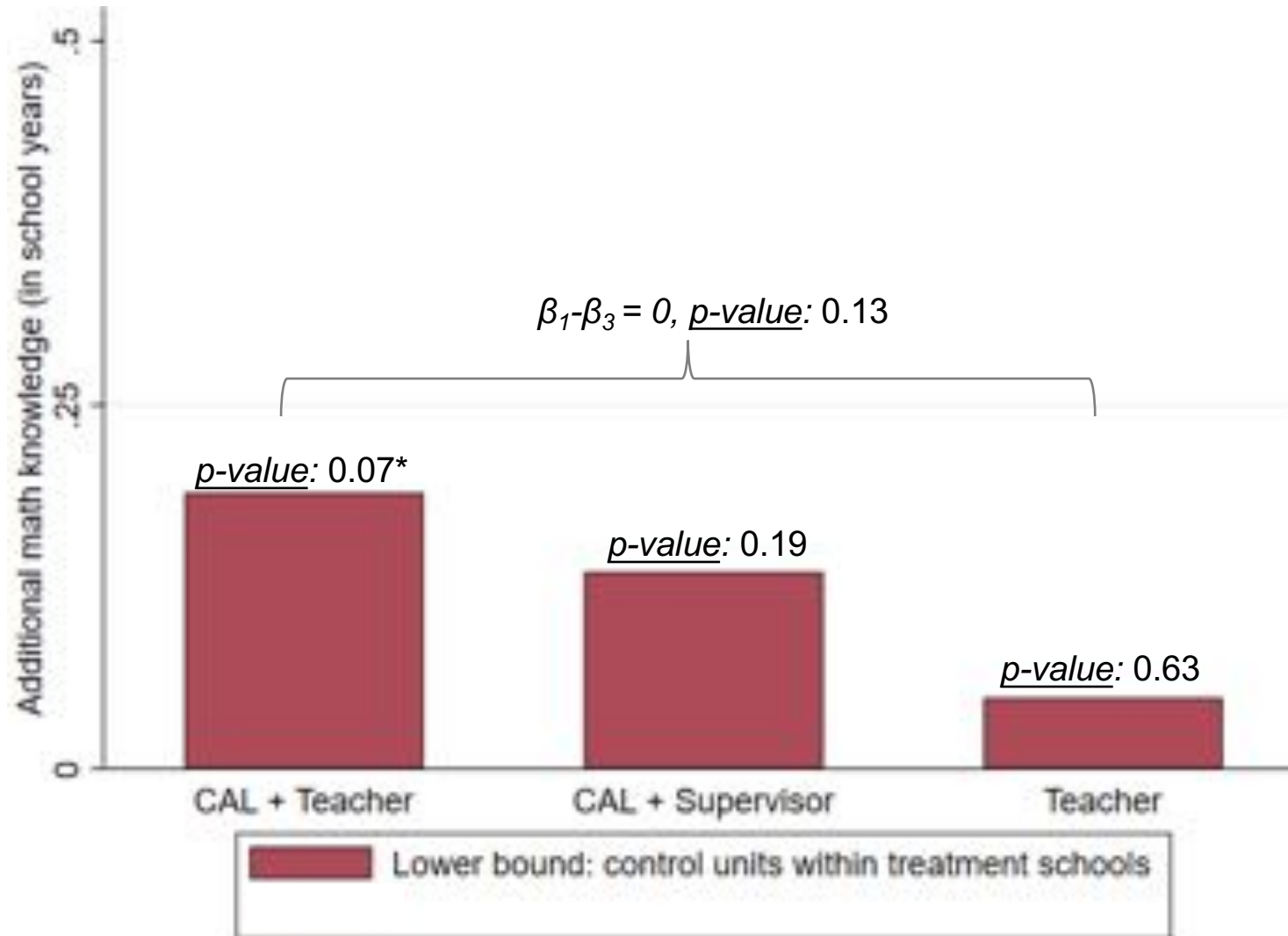


2 x 90 min./week  
30 classes, ≈ 800 children

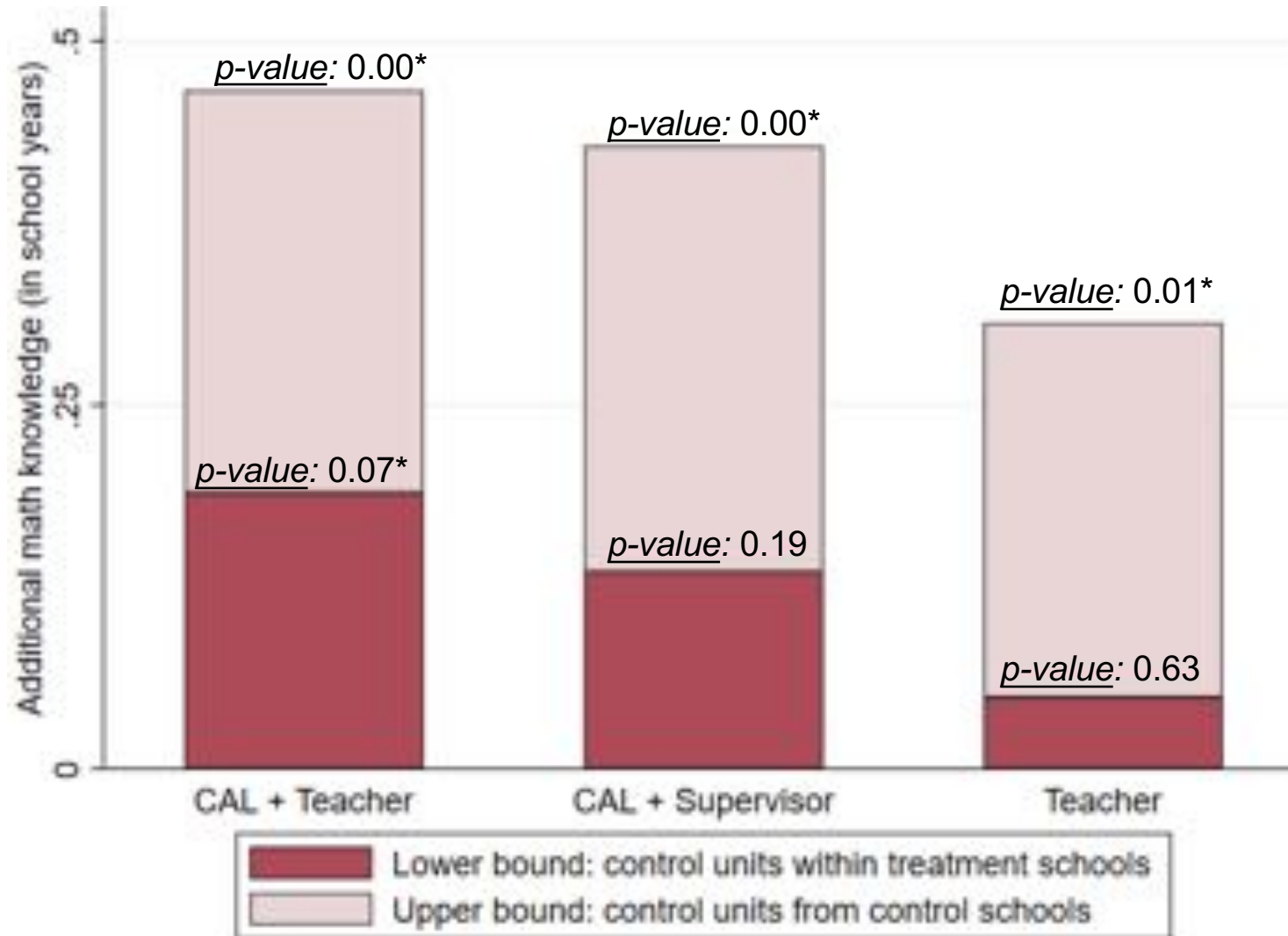
# CAL-IMPACT: DESIGN (IMPLEMENTATION BY WWW.CONSCIENTE.CH)



# CAL-IMPACT: RESULTS



# CAL-IMPACT: RESULTS



# CAL-IMPACT: LESSONS LEARNED

- CAL instructed by teachers has the largest impact.
- (Weak) evidence that CAL is more effective than additional lessons taught by teachers.
- Strong spillover effects.
- As a byproduct of the project, we noticed that teachers' knowledge of the content they were supposed to teach was really poor, therefore ...

# PART III

## TEACHER TESTS 2018

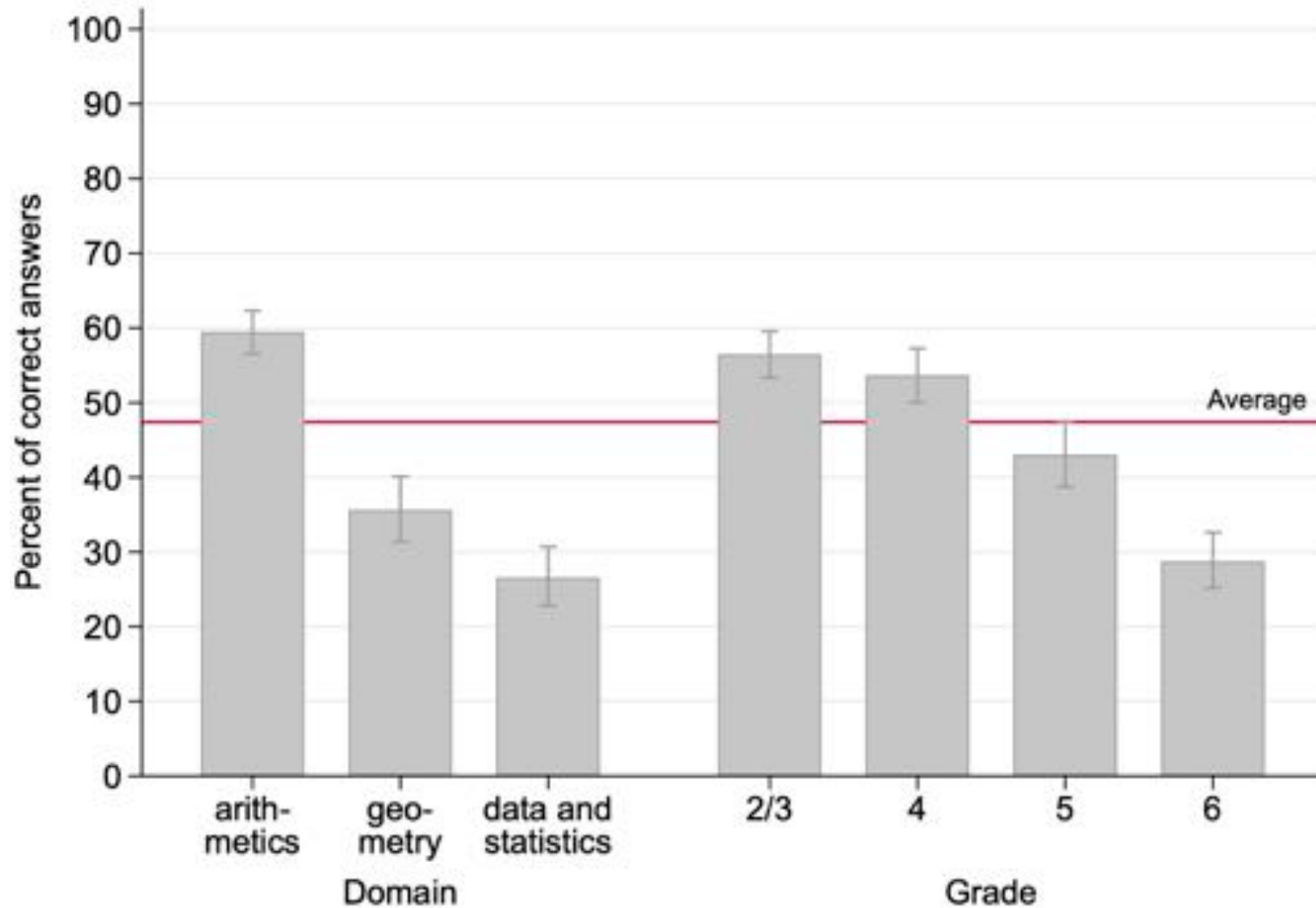


# TEACHER TESTS 2018: DESIGN

- Random sample of 224 primary-school math teachers in El Salvador (Department of Morazan)
- Math test covering topics taught in 2<sup>nd</sup> to 6<sup>th</sup> grade

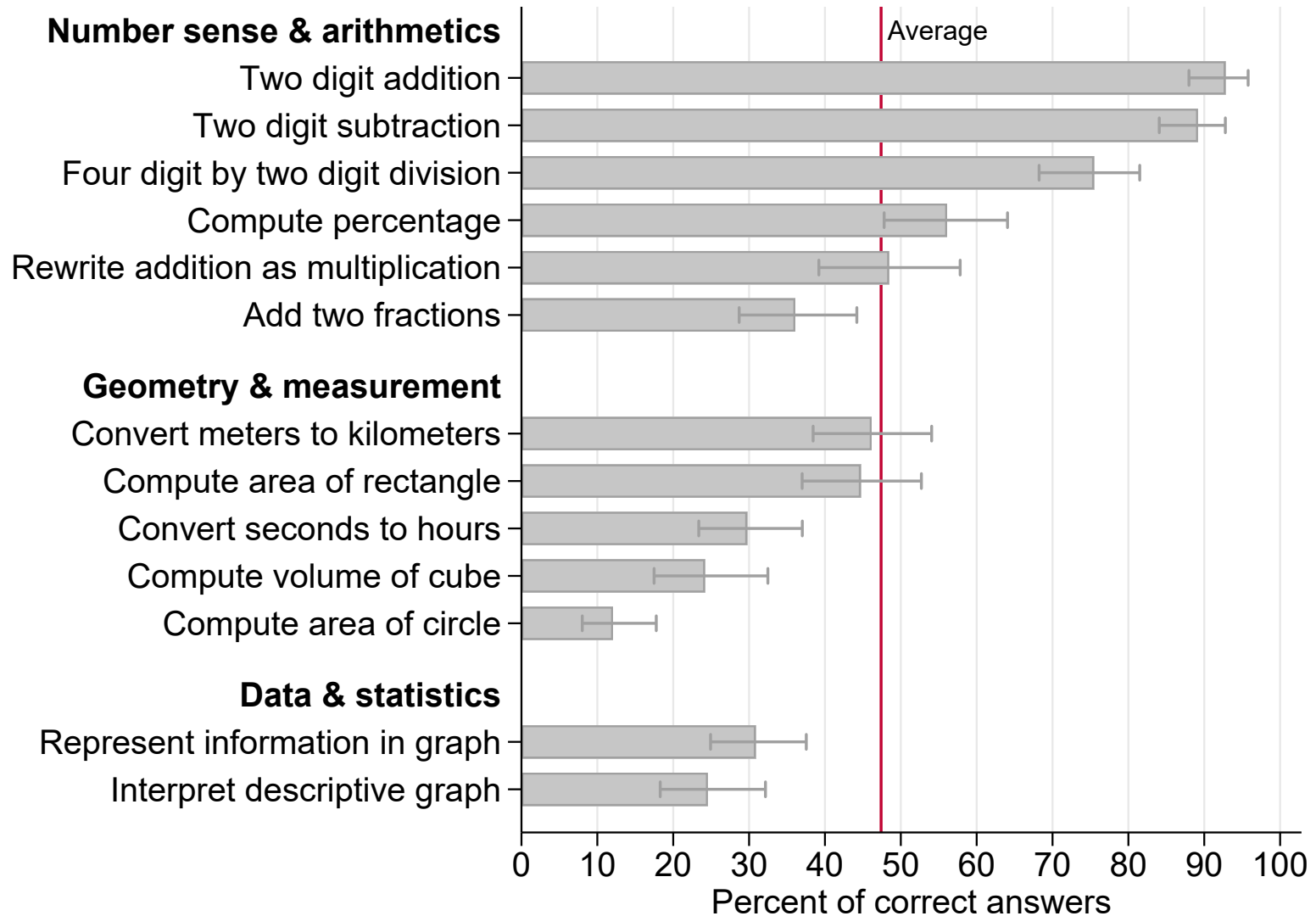


# TEACHER TESTS 2018: RESULTS



N = 224; survey design taken into account

# TEACHER TESTS 2018: RESULTS



N = 224; survey design taken into account

## AND IT SEEMS TO MATTER ...

**Table 2:** Relation between teacher's test score and students' learning over a eight month evaluation period

	(1)	(2)	(3)	(4)	(5)
Years-of-schooling effect					
– grade-specific score (in 10 PP)	0.131** (0.042)	0.125** (0.043)	0.133** (0.039)	0.155*** (0.037)	0.146* (0.057)
– overall score (in 10 PP)	0.124** (0.038)	0.117** (0.039)	0.130*** (0.036)	0.151*** (0.033)	0.159** (0.058)
Standardized learning effect					
– grade-specific score (std.)	0.093** (0.032)	0.088** (0.032)	0.095** (0.029)	0.111*** (0.028)	0.103* (0.043)
– overall score (std.)	0.098** (0.031)	0.092** (0.032)	0.102** (0.030)	0.121*** (0.028)	0.125* (0.048)
Class level controls	No	Yes	Yes	Yes	Yes
School level controls	No	No	Yes	Yes	No
Teacher controls	No	No	No	Yes	Yes
School fixed effects	No	No	No	No	Yes

Standard errors in parentheses (clustered by schools).

All models include controls for grade and CAL treatment assignment.

Number of observations: 2765 students, 119 teachers, 48 schools.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# PART IV

## COMPUTER-ASSISTED TEACHER TRAINING 2019



# CATT: COMPUTER-ASSISTED TEACHER TRAINING

In-service teacher training program to ...

- improve teacher content knowledge in math
- to improve their teaching,
- and, hopefully, to improve student math skills

**Treatment (incentivized):**

- self-studying using computer-assisted learning software
- participation in four workshops (problems solving, recapitulation)

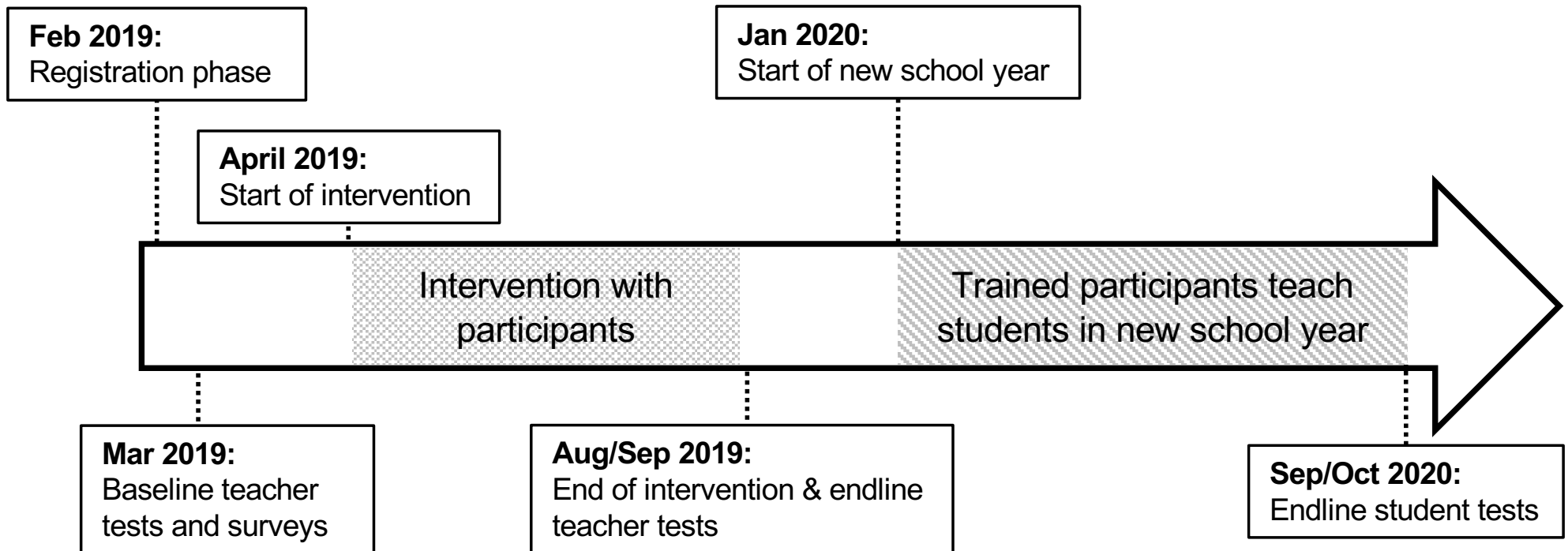
**Implementation:**

- Using *Kolibri* with *Khan Academy* contents
- In cooperation with NGO Conscience ([www.conscience.ch](http://www.conscience.ch))

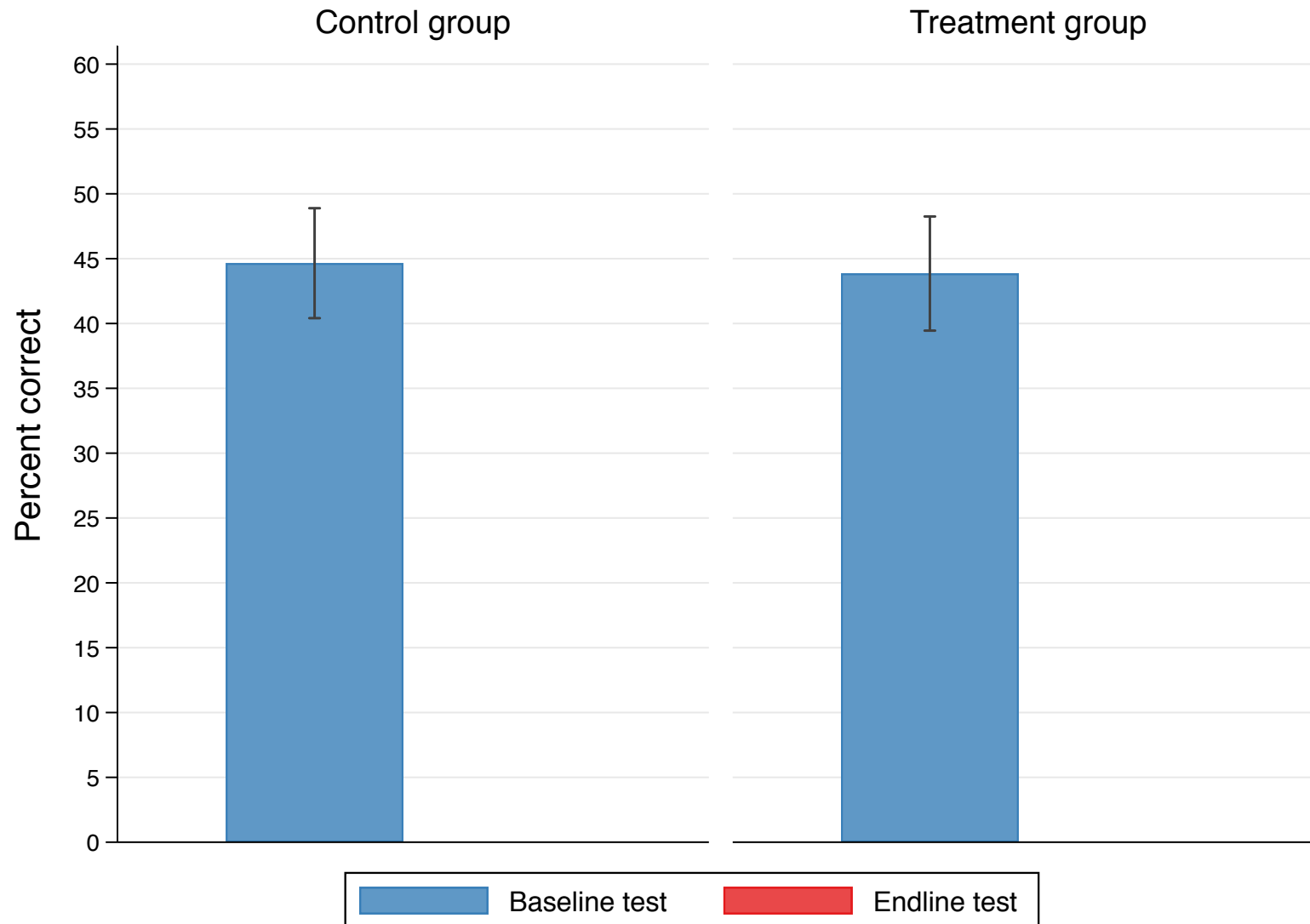
## CATT: SAMPLE/DESIGN

Population:	primary school math teachers in Morazán
Sample:	313 teachers from 175 different schools applied for participation in the study selection of the worst performing teacher of every school
Randomization:	87 teachers in the treatment group 88 teachers control group stratified by baseline test scores and gender
Balance:	almost identical baseline test results and balanced in variables such as gender, experience, and education
Attrition:	no endline test for 11 teachers (6%)

# CATT: TIMELINE

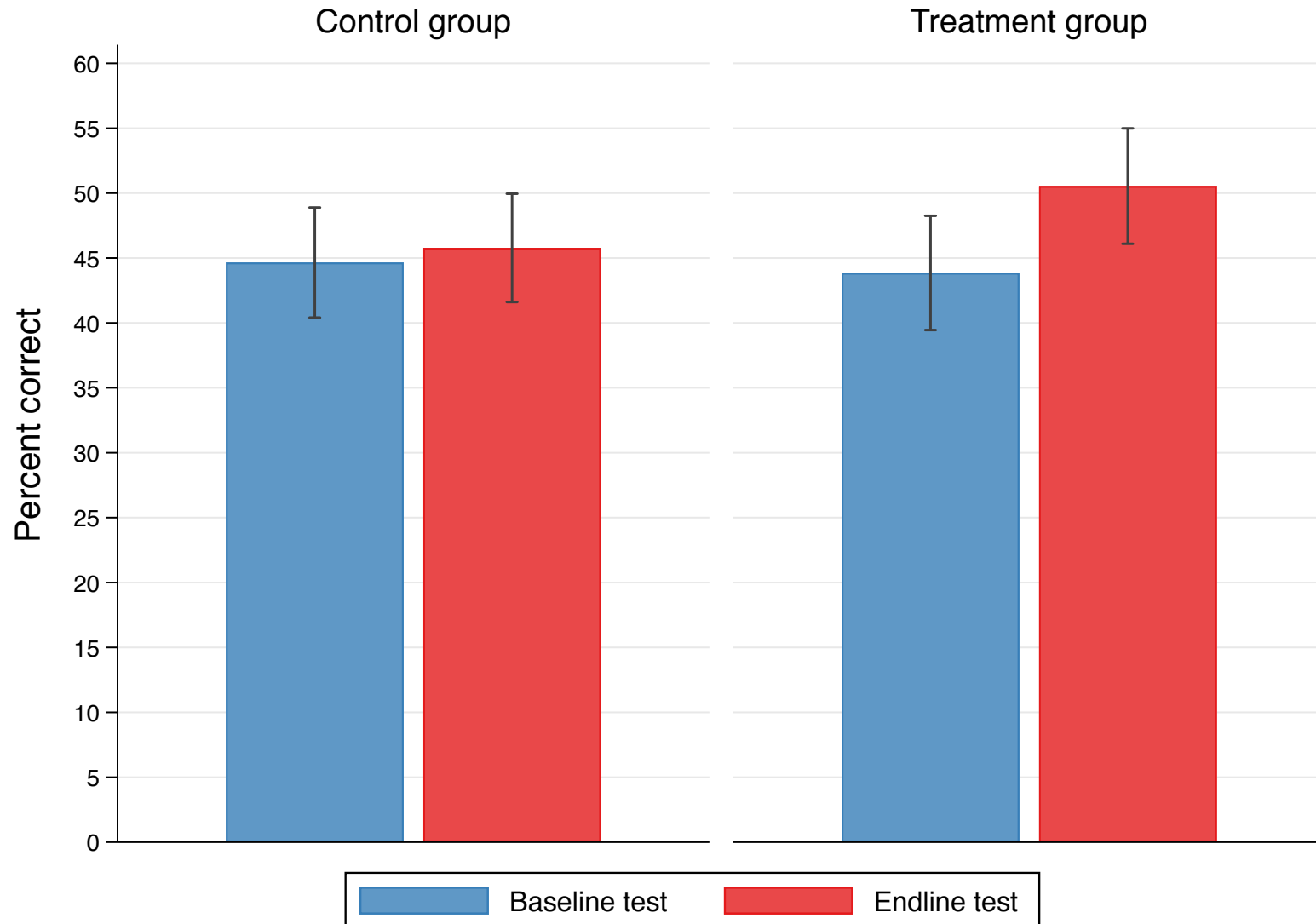


# CATT: PRELIMINARY RESULTS

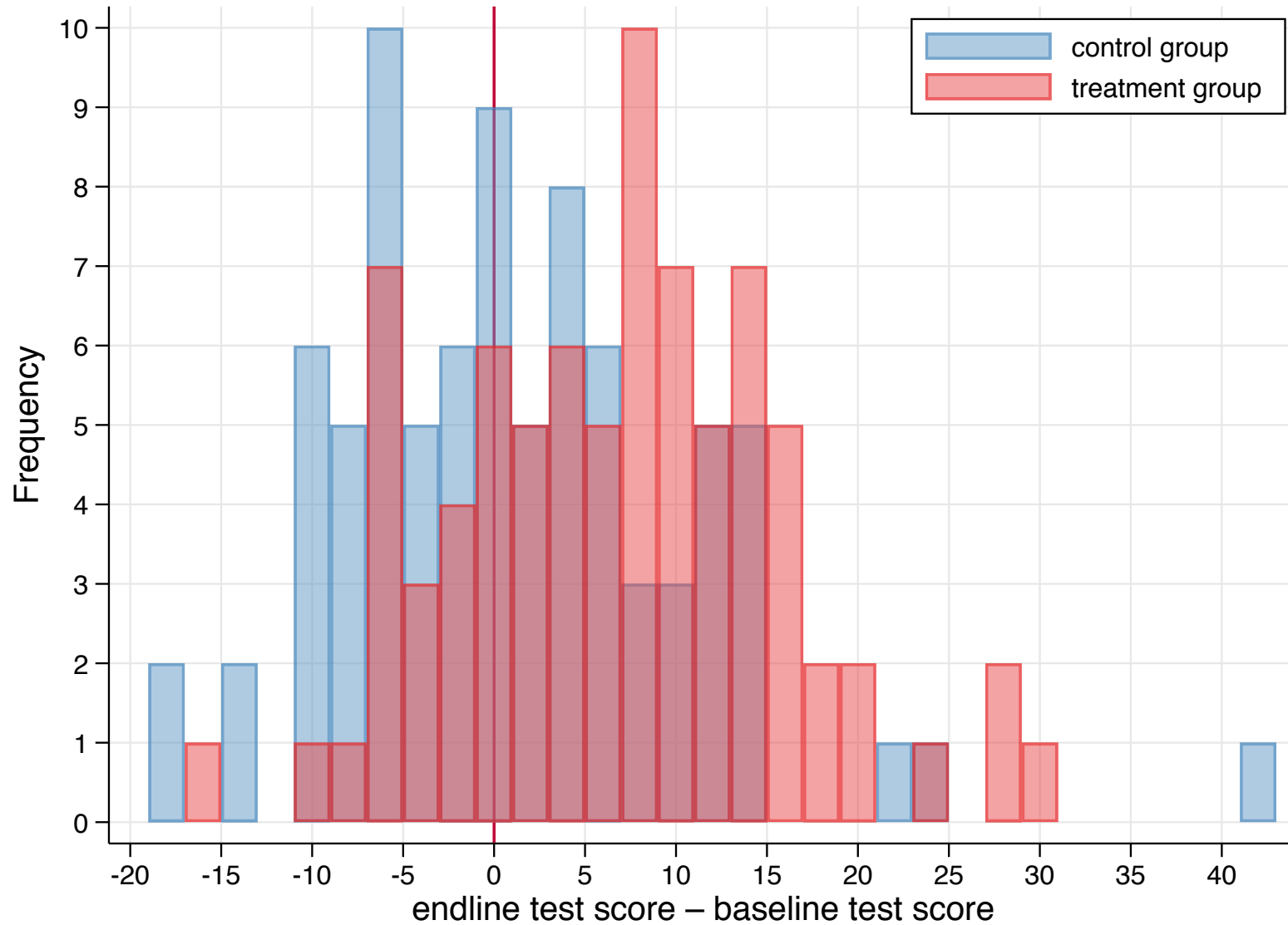




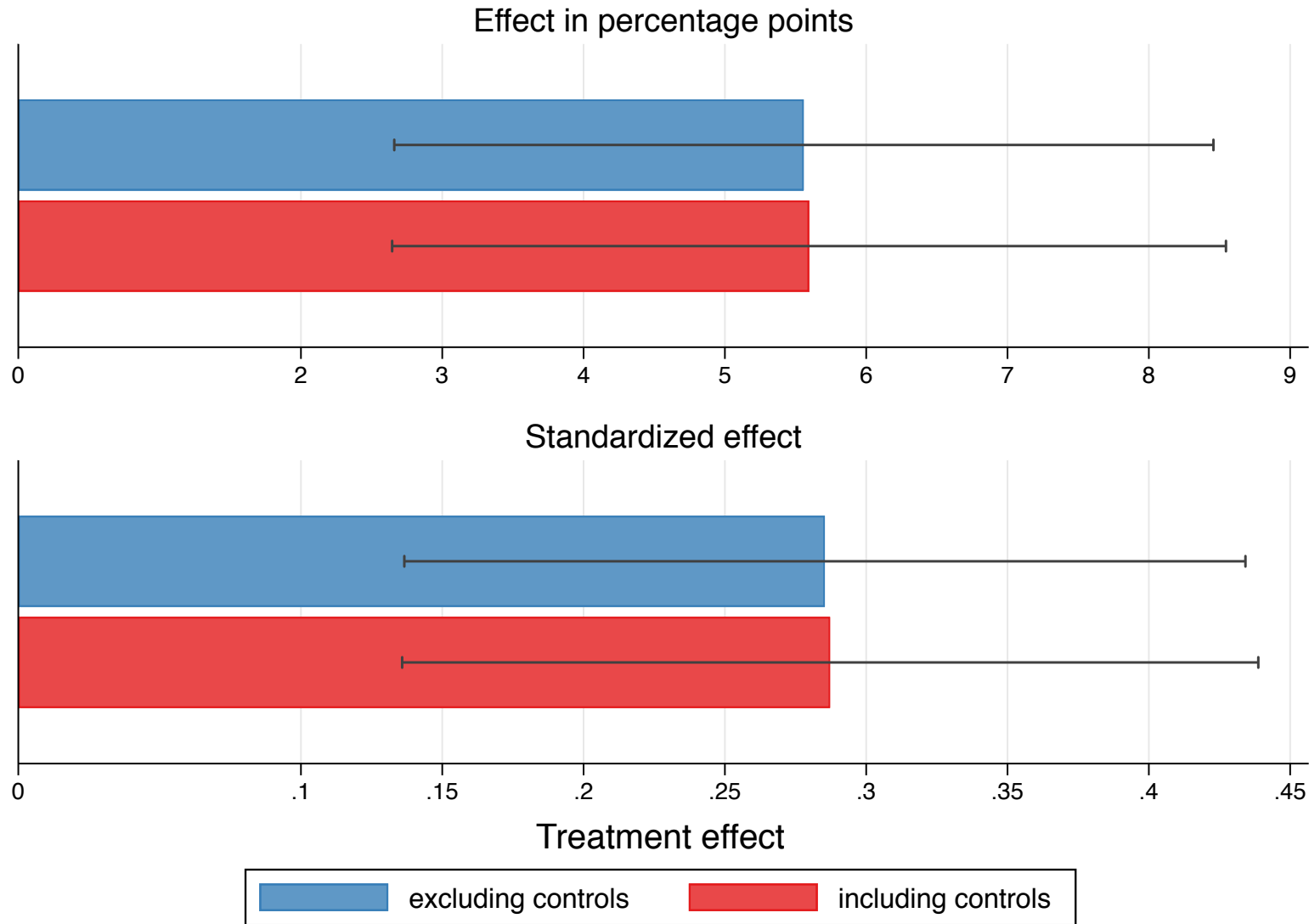
# CATT: PRELIMINARY RESULTS



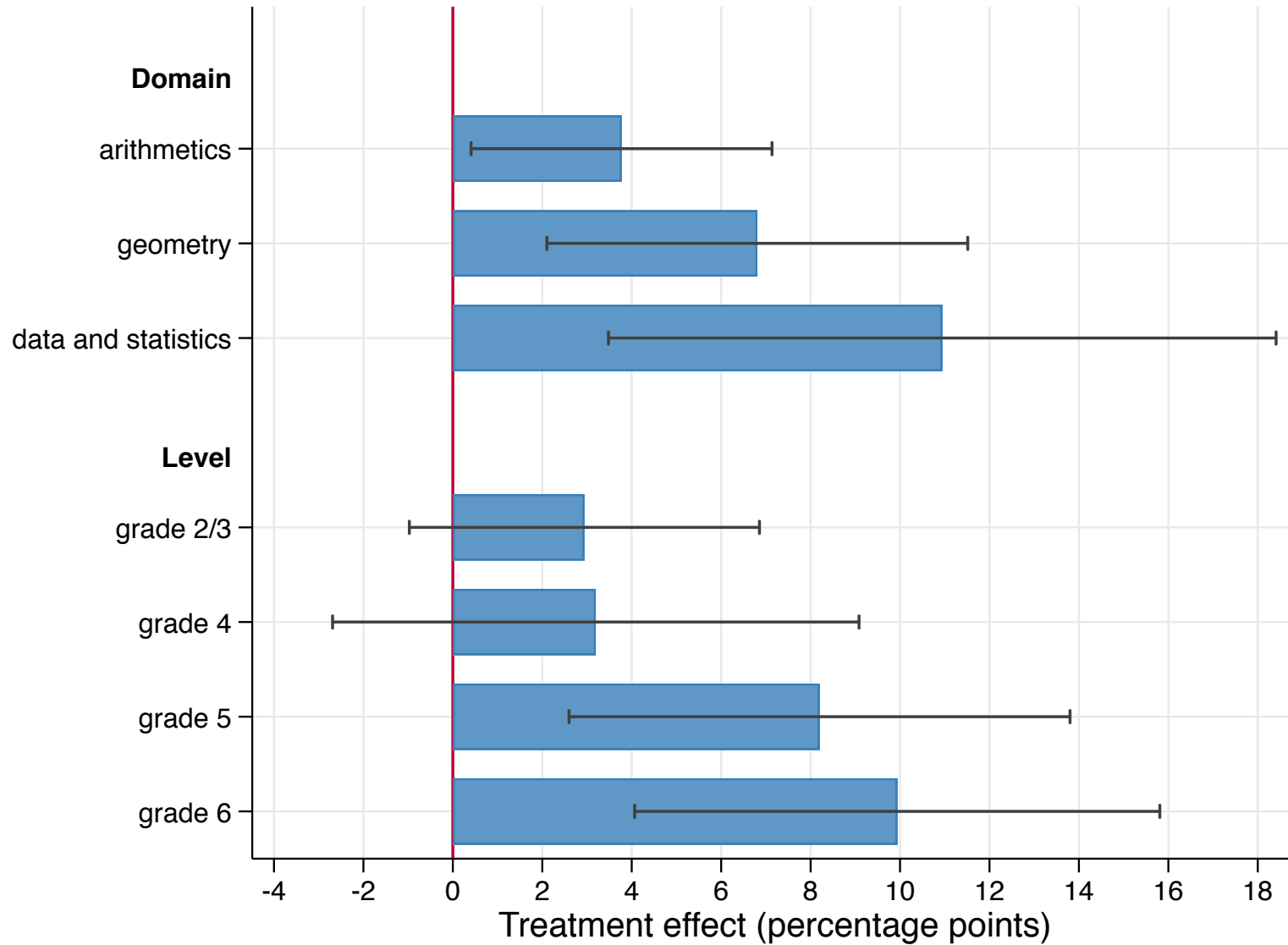
# CATT: PRELIMINARY RESULTS



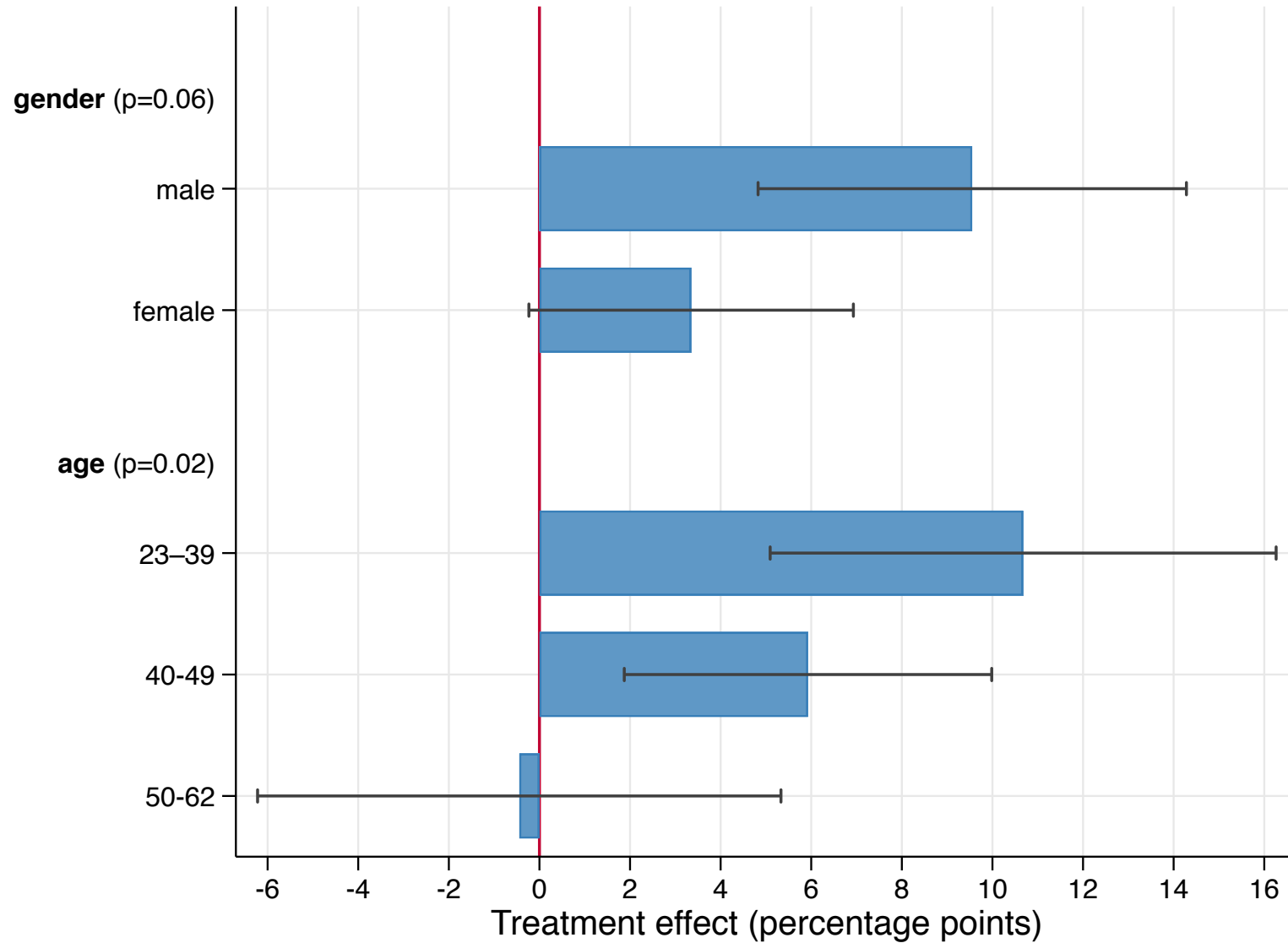
# CATT: PRELIMINARY RESULTS



# CATT: PRELIMINARY RESULTS



# CATT: PRELIMINARY RESULTS



## TO BE CONTINUED ...

Next year we will see whether teachers' knowledge gain translates into better learning outcomes among students.