The Effect of Tutor CoPilot for Virtual Tutoring Sessions

Testing an AI Intervention to Improve Tutor Instruction

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Scaling high-dosage tutoring is key to closing achievement gaps

The Promise of Tutoring for PreK–12 Learning: A Systematic Review and Meta-Analysis of the Experimental Evidence

Andre Nickow[1], Philip Oreopoulos[2], and Vincent Quan[3]

"We find that tutoring yields consistently substantial ***positive impacts on learning****"*

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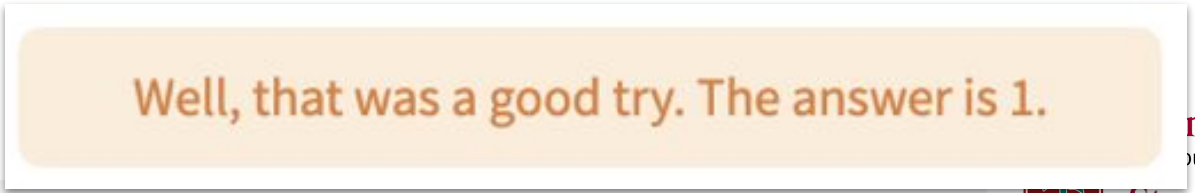
Remediating mistakes is key to student learning, but novice tutors struggle with remediation.

Imagine you're back in 3rd grade!

Novice tutors **don't engage** with the student.



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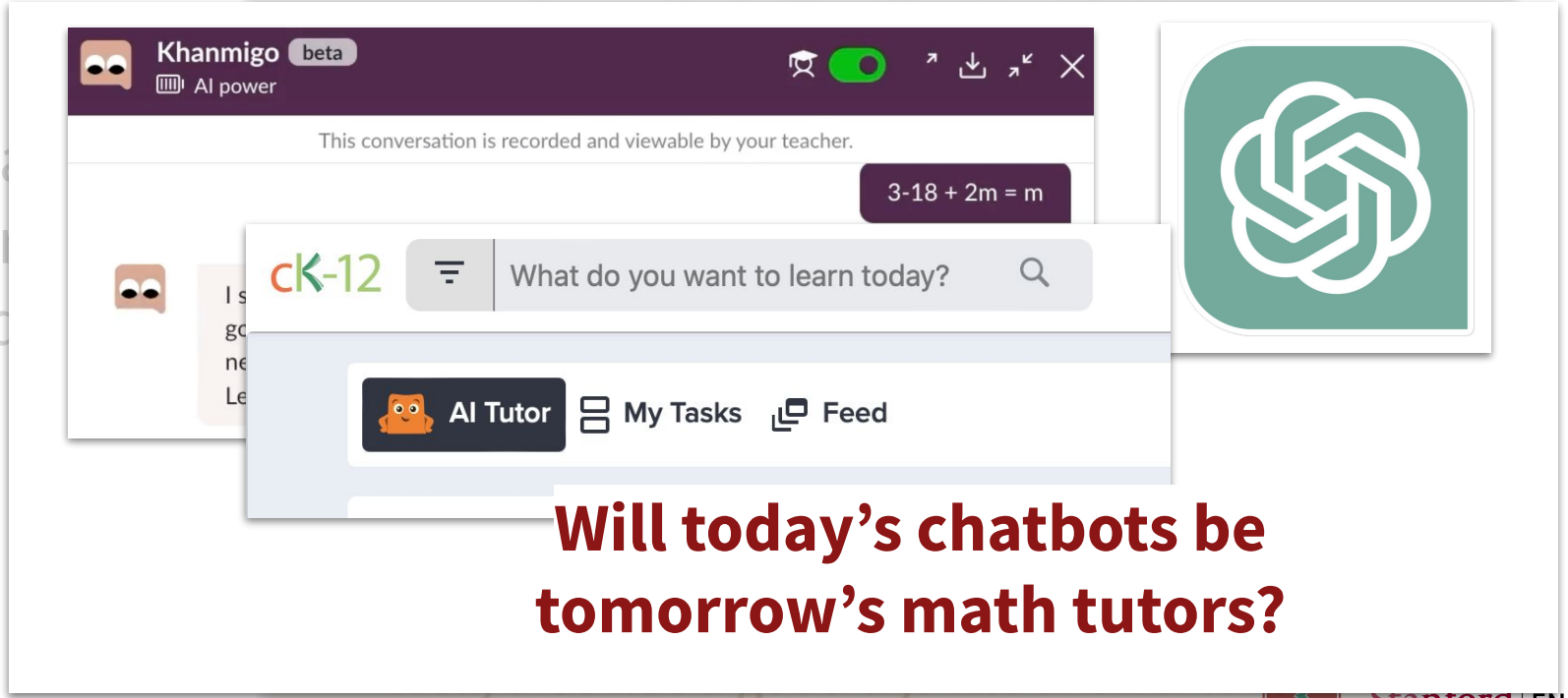
Will tutoring quality be improved with auto-tutors, like with ChatGPT and large language models (LLMs)?



Will today's chatbots be tomorrow's math tutors?

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Out-of-the-box LLMs do not improve pedagogical quality.

Large language models **do not engage** with the student out-of-the-box.

Actually, if Mike had 4 cookies and ate 3, we need to subtract. The answer is 1.

References:

Is ChatGPT a Good Teacher Coach? Rose E. Wang and Dorottya Demszky. BEA 2023. 🏆

Bridging the Novice-Expert Gap via Models of Decision Making. Rose E. Wang, Qingyang Zhang, Carly Robinson, Susanna Loeb, Dorottya Demszky. NAACL 2024.

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Scaling good pedagogy is hard & expensive!

Experienced teachers **do engage** with the student.

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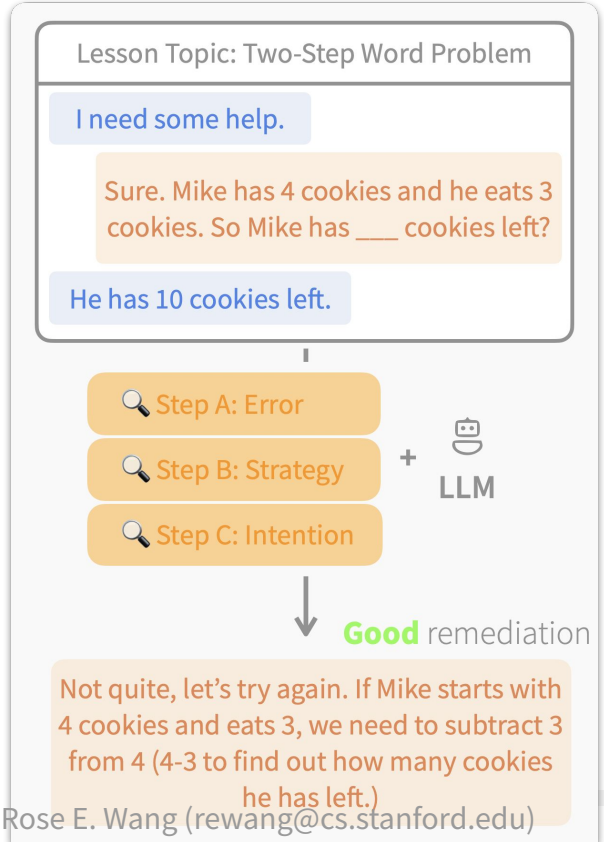
Let's surface experienced teachers' *decision process* in remediation with Bridge



Bridging the Novice-Expert Gap via Models of Decision-Making: A Case Study on Remediating Math Mistakes

Rose E. Wang Qingyang Zhang Carly Robinson
Susanna Loeb Dorottya Demszky

Scan to read more about this work!

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How can we help novice tutors teach better with real-time decision aids?

The Effect of Tutor CoPilot for Virtual Tutoring Sessions: Testing an Intervention to Improve Tutor Instruction with Expert-Guided LLM-generated Remediation Language

Rose E. Wang, Ana Ribeiro, Carly Robinson, Dorottya Demszky, Susanna Loeb

https://osf.io/8d6ha





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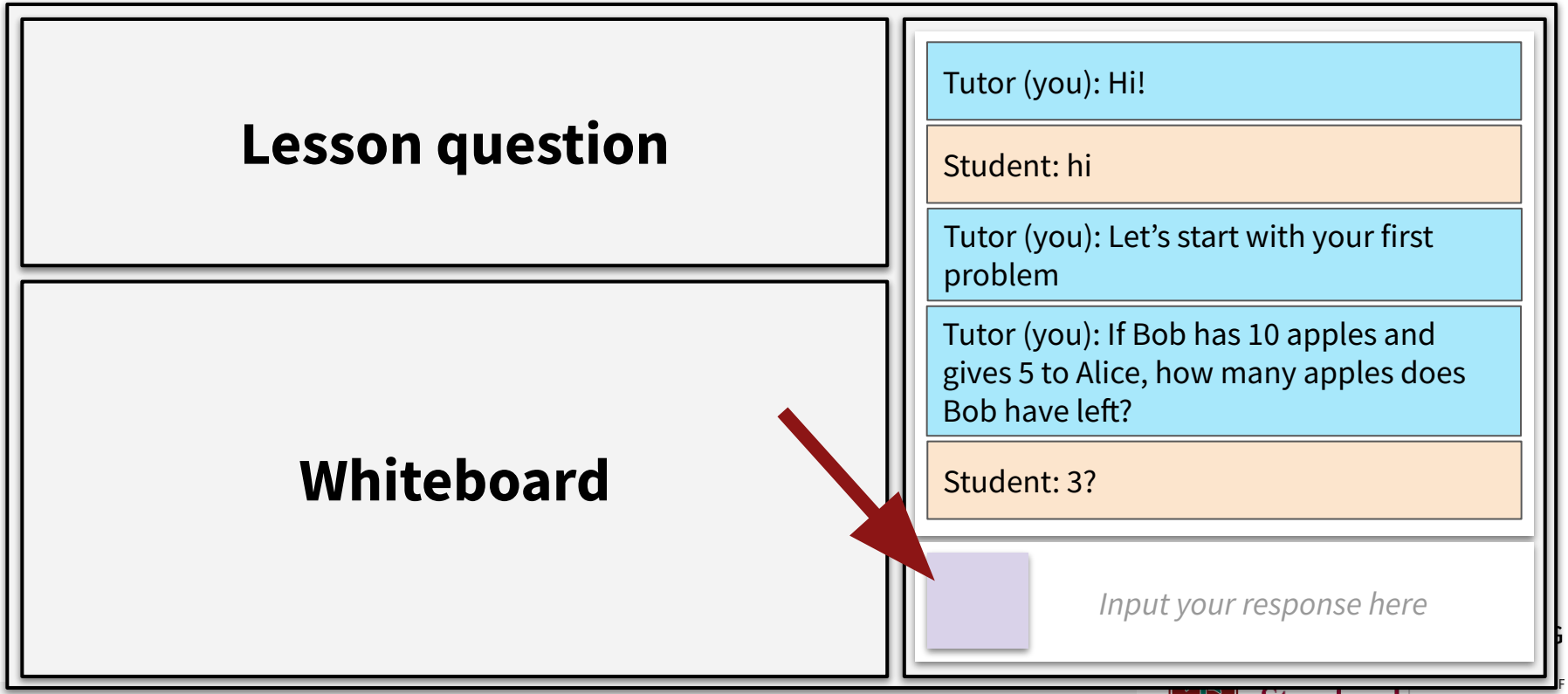
Tutor CoPilot is an AI-in-the-loop, real-time decision aid



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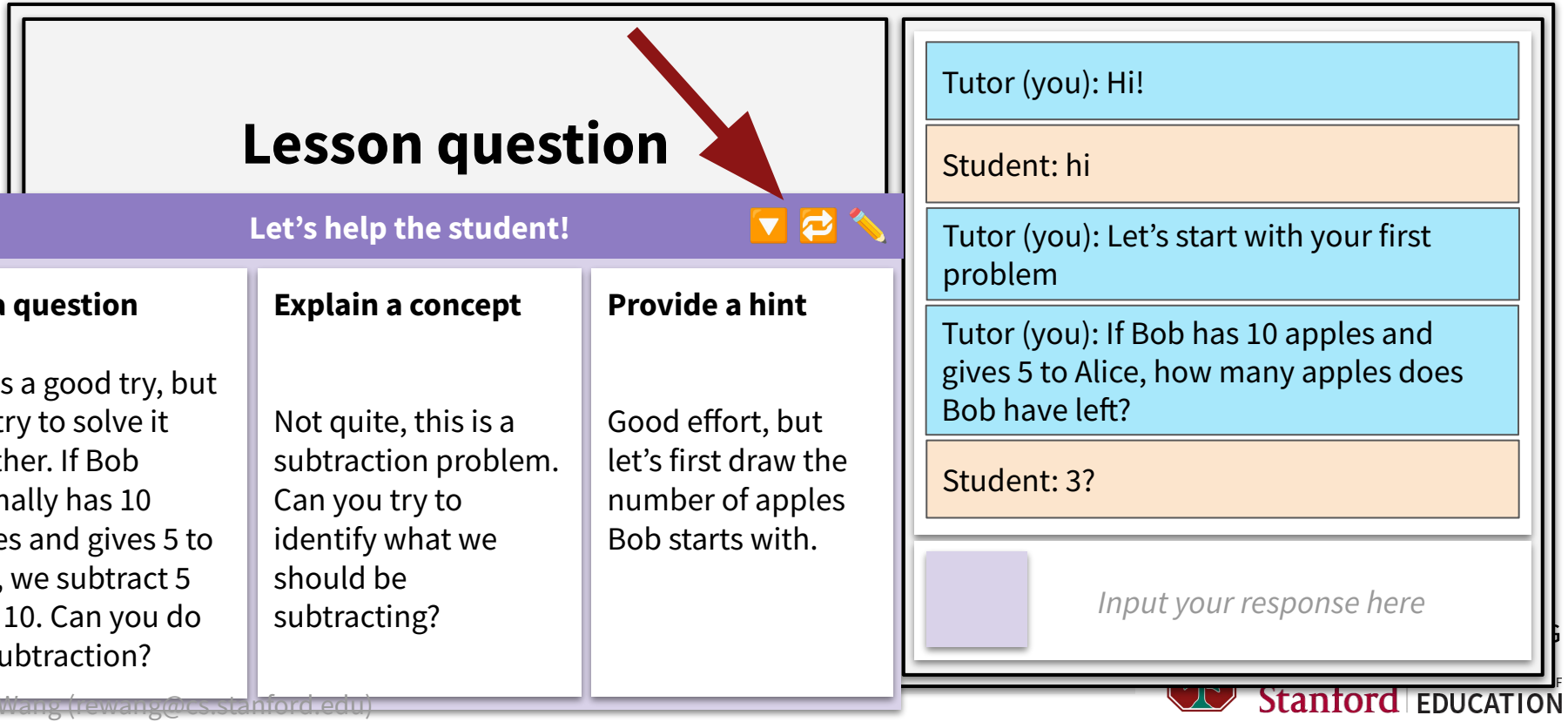
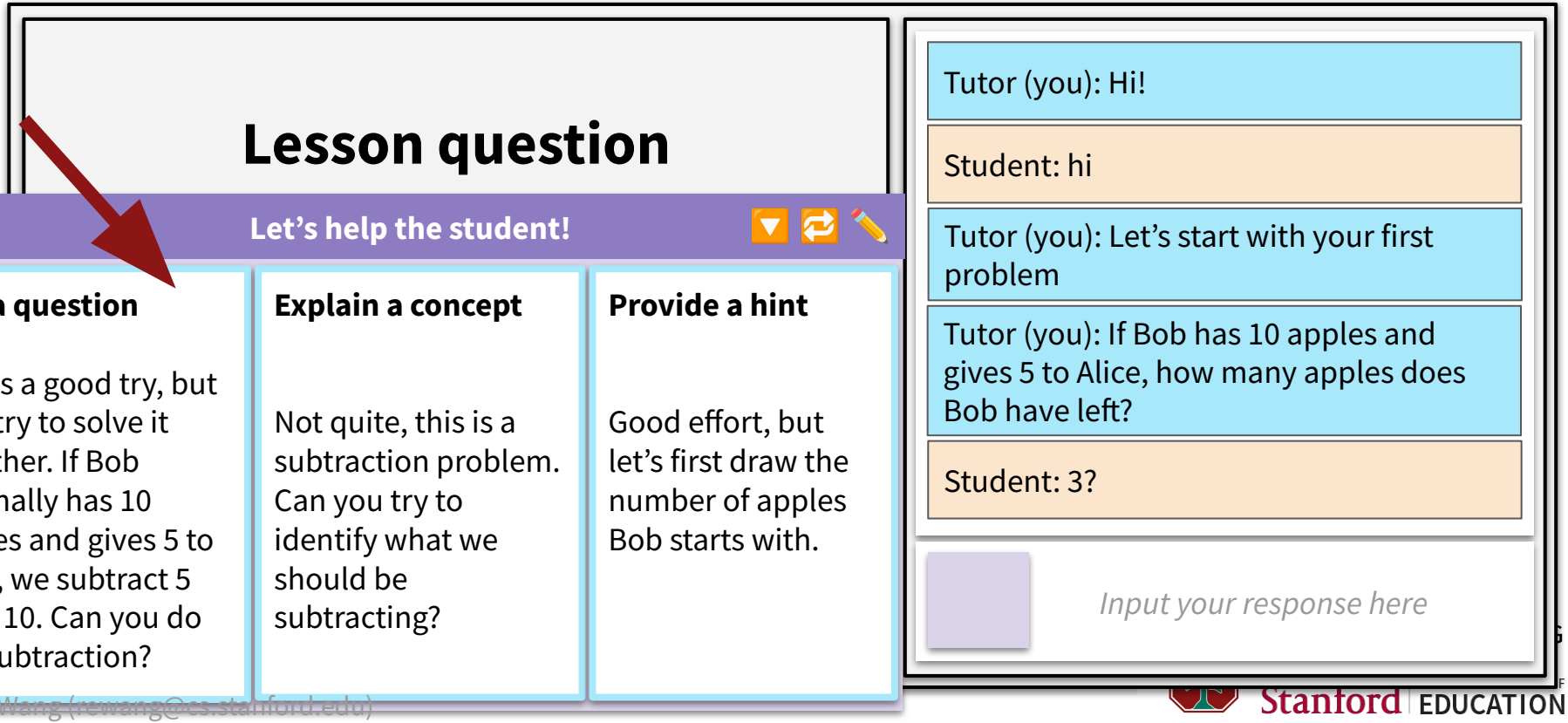
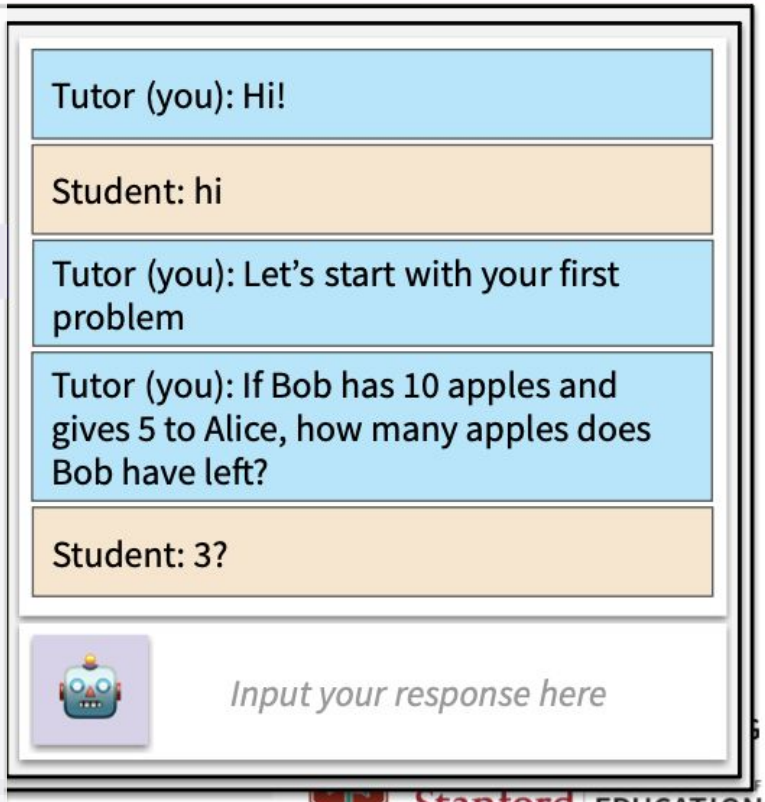


Tutor CoPilot generates suggestions for multiple strategies.



Tutor CoPilot supports the tutor—it doesn't replace.

Tutors possess important knowledge that is not readily apparent from the chat!
e.g., curriculum, previous interactions…



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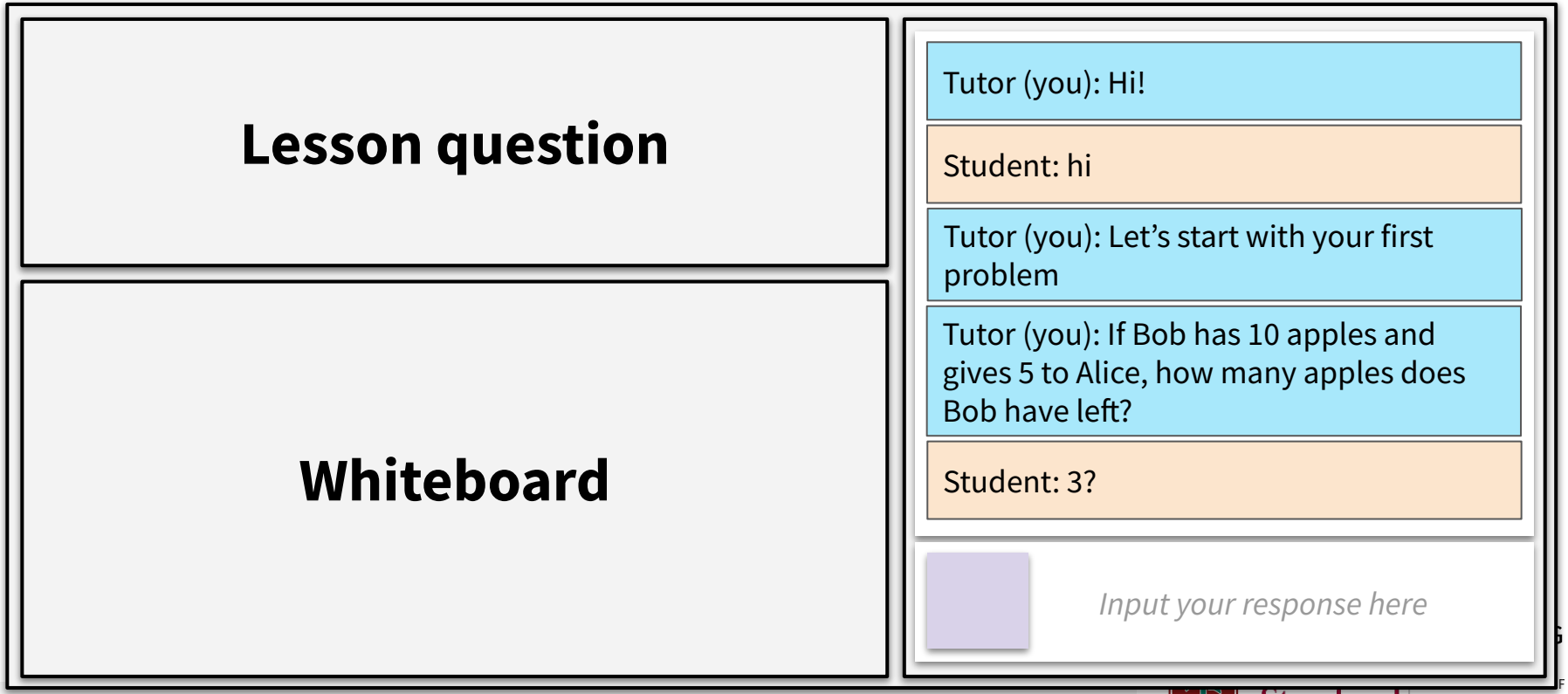
Tutor CoPilot is a tutor-facing real-time decision aid



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Sampling plan

Southern school district, 2023-24

In-school, High-dosage tutoring (1-3 sessions/week)

1534 students

874 tutors
- Treatment: 429
- Control: 450

(Numbers not equal because of attrition between initial assignment and study launch)

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Randomization

1x2 experimental design. Randomization of **tutors**.

(1) Treatment group: Tutors get access to Tutor CoPilot in their tutoring sessions

(2) Control group: Tutors do not have access and they tutor as normal in their tutoring sessions.

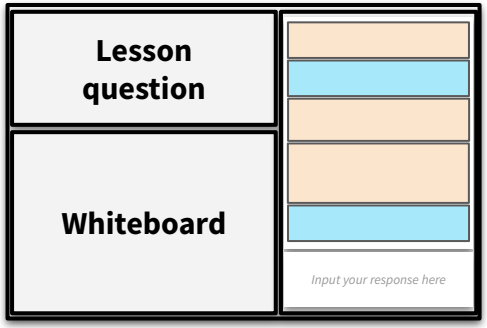
The design plan and outcome variables

Randomized Controlled Trial (1.5 months)

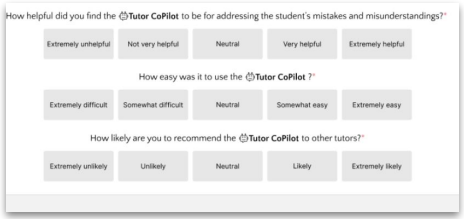
Tutor

Pre-study survey

Tutoring



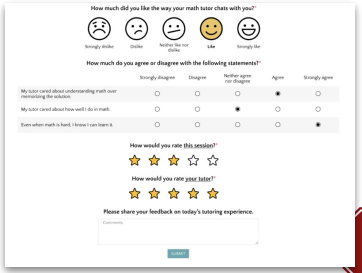
Post tutoring survey



Post-study survey

Student

Winter MAP



Spring MAP

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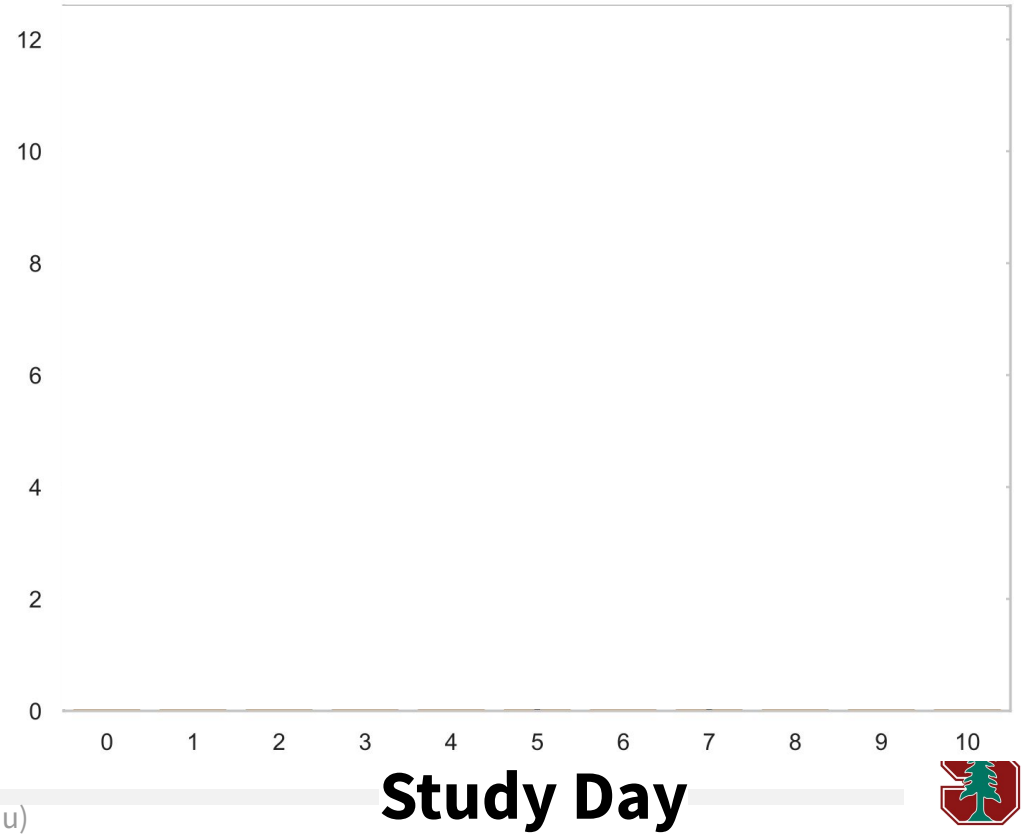
Treatment Tutors use Tutor CoPilot 2-4 times per session

Number of Tutor CoPilot Uses in Session



Preliminary findings

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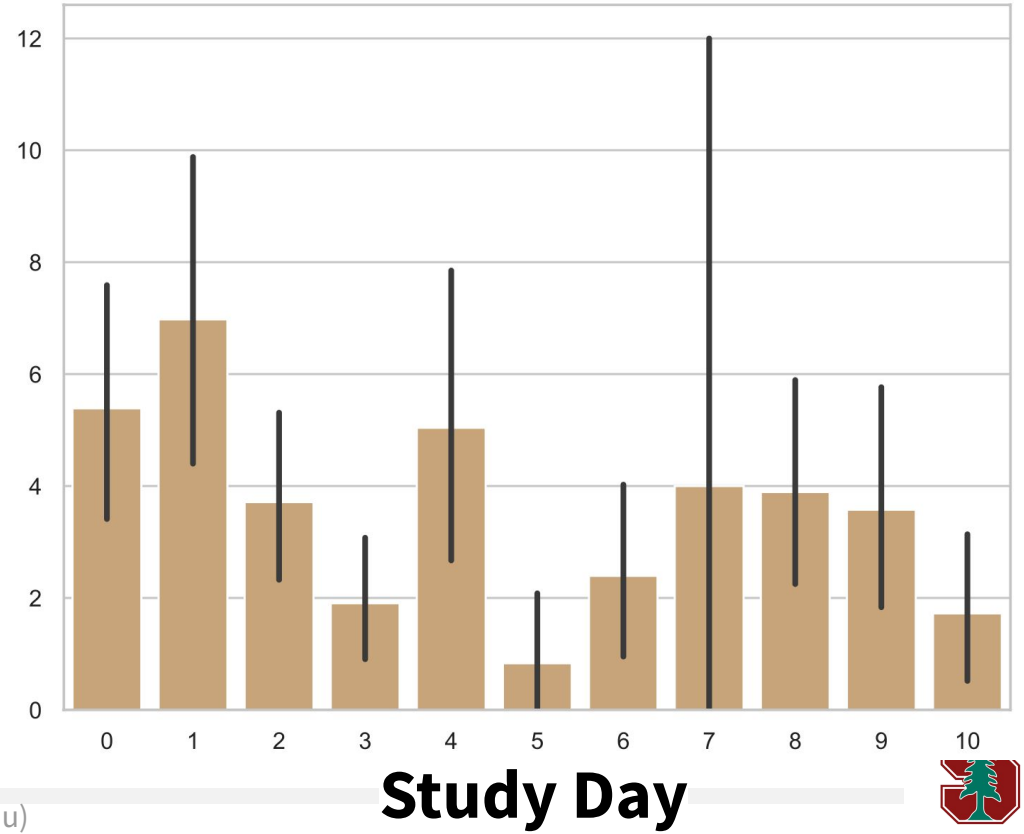

Preliminary findings

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Tutor CoPilot results in positive student perception of the tutor and tutoring session

Preliminary findings

Panel B. Student survey outcomes

Dependent Variable:	My tutor cared about understanding math over memorizing the solution.	My tutor cared about how well I do in math.	Even when math is hard, I know I can learn it.
Treatment Effect			
Control Mean			
n	410	410	410

*Note. +p<0.1; *p<0.05; **p<0.01, ***p<0.001, Estimates are from our primary model, which controls for baseline math scores, student demographics, and a fixed effect for strata (school x grade).*

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Tutor CoPilot results in positive student perception of the tutor and tutoring session

Preliminary findings

Panel B. Student survey outcomes

Dependent Variable:	My tutor cared about understanding math over memorizing the solution.	My tutor cared about how well I do in math.	Even when math is hard, I know I can learn it.
Treatment Effect	0.163 (0.124)	0.261* (0.121)	0.215+ (0.125)
Control Mean	4.122 (0.068)	4.232 (0.067)	4.203 (0.067)
n	410	410	410

*Note. +p<0.1; *p<0.05; **p<0.01, ***p<0.001, Estimates are from our primary model, which controls for baseline math scores, student demographics, and a fixed effect for strata (school x grade).*

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Positive trends in session outcomes like participation points awarded.

Preliminary findings

Panel A. Session outcomes and Ratings

Dependent Variable:	Participation Points	Participation Points (Standardized)
Treatment Effect	0.3117 (0.4715)	0.0491 (0.0508)
Control Mean	13.1744 (0.4307)	0.0075 (0.0424)
n	1074	1074

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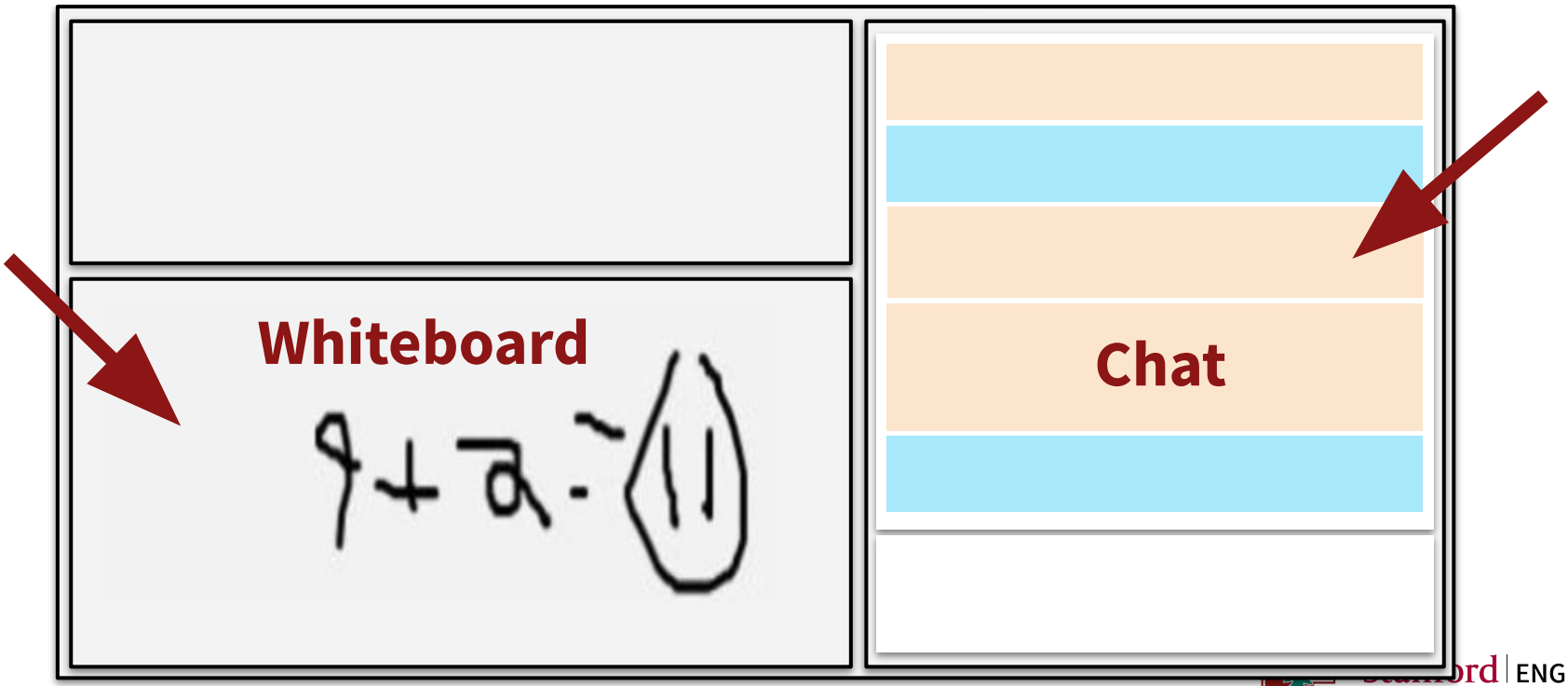
We plan to additionally measure student and tutor engagement via chat and whiteboard.



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Real-time decision aids for improving human decision-making

Teaching is *hard*: Backstage, hidden decisions being made.

Tutor CoPilot **:** An AI-in-the-loop, real-time decision aid for improving tutoring instruction.

Future open questions: e.g., Who are these tools most effective for?

Future use cases: e.g., How can these tools improve other areas of interaction and instruction?

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