



The Merits of Peer Discussion and Self-Explanation in Multimedia



Learning Environments

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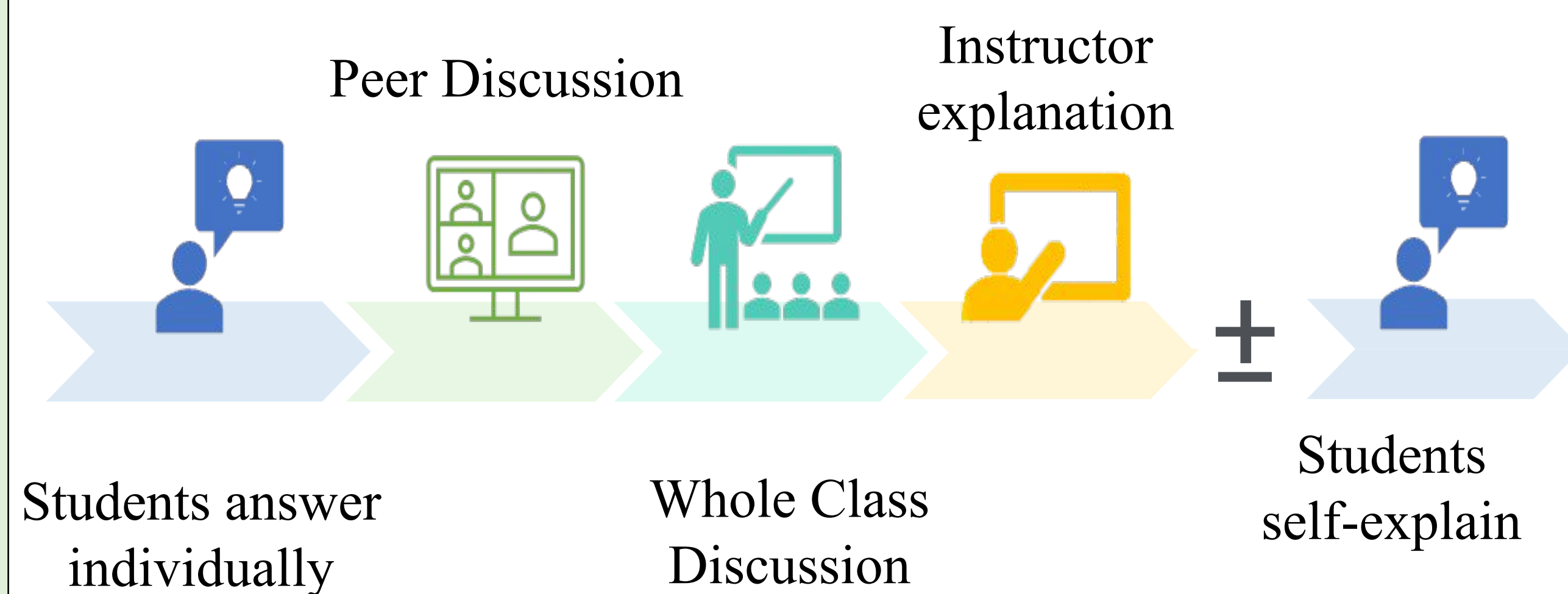
Background

Peer instruction (PI) is an interactive class activity that requires students to answer challenging conceptual questions and discuss their thought processes with peers. There are significant benefits of PI given that students are able to interact face-to-face and engage in *peer discussion*¹⁻³. However, synchronous discussion is not always possible for students. This necessitates the use of other effective instructional methods, such as “self-explanation” (SE) prompts, to mitigate the loss of peer discussion.

Objectives:

- Explore how self-explaining Peer Instruction questions influences success on quiz and exam questions
- Evaluate how PI and SE benefits are impacted by modality

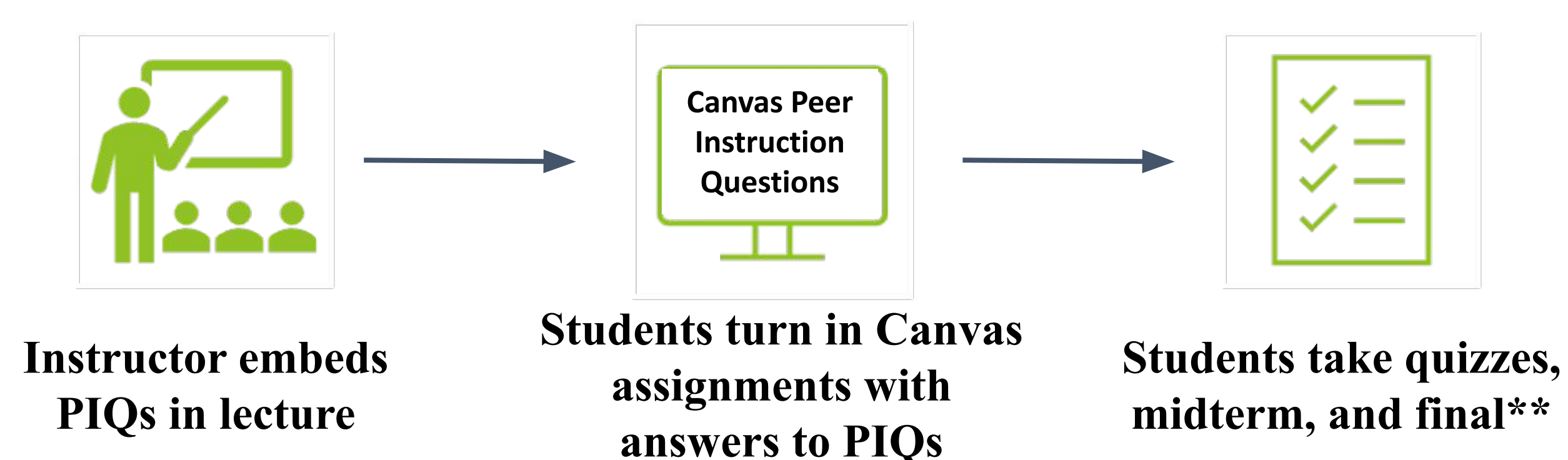
Peer Instruction Routine



Design & Materials

- 122 students in a hybrid Psychology research methods course
- Within subjects design, counterbalanced
- Students asked 2-5 embedded multiple-choice Peer Instruction questions (PIQ) per lecture
 - Self-explanation manipulation

Class Routine



*students are asked to self-explain PIQs in Canvas assignment for half of the quarter

**47.3% of assessment questions received Peer Instruction

Question Analysis

Determine if individual accuracy on quiz and exam questions was dependent on:

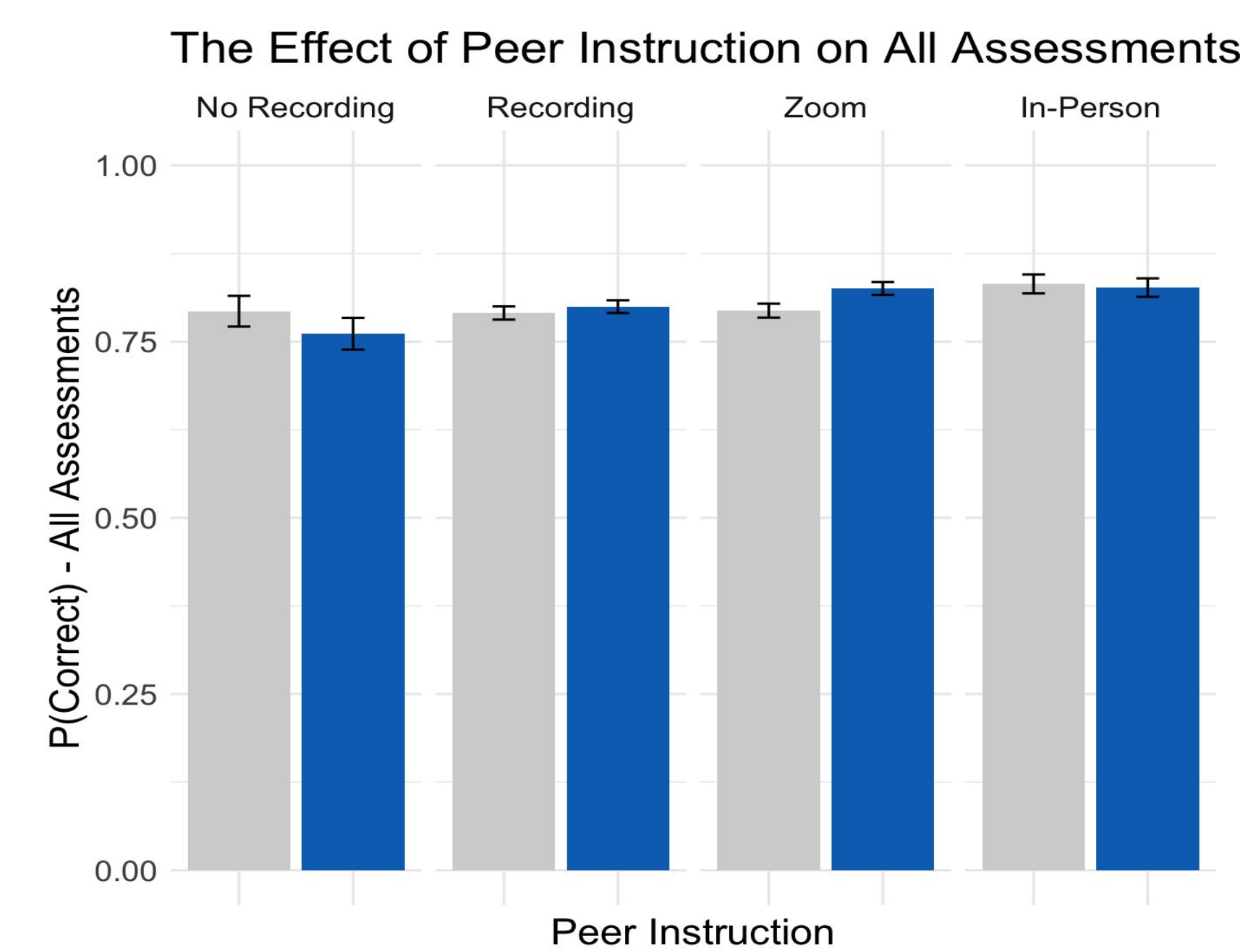
- Assessment question similarity to a PI question from lecture
- If the student was prompted to explain the question content

Item	Instructor Determined		Student-specific		
	Lecture #	Related PIQ?	Accuracy	Modality	Prompted to self-explain?
Quiz 4, Q1	5	yes	0	Zoom	yes
Quiz 4, Q2	8	no	1	Zoom	yes
Quiz 4, Q3	4	yes	1	In-person	yes
Quiz 4, Q4	2	yes	0	Recording	yes
...

Results

Modality Across Quarter

In-person	Zoom	Recording	No Recording
9.6%	35.3%	51.7%	3.4%

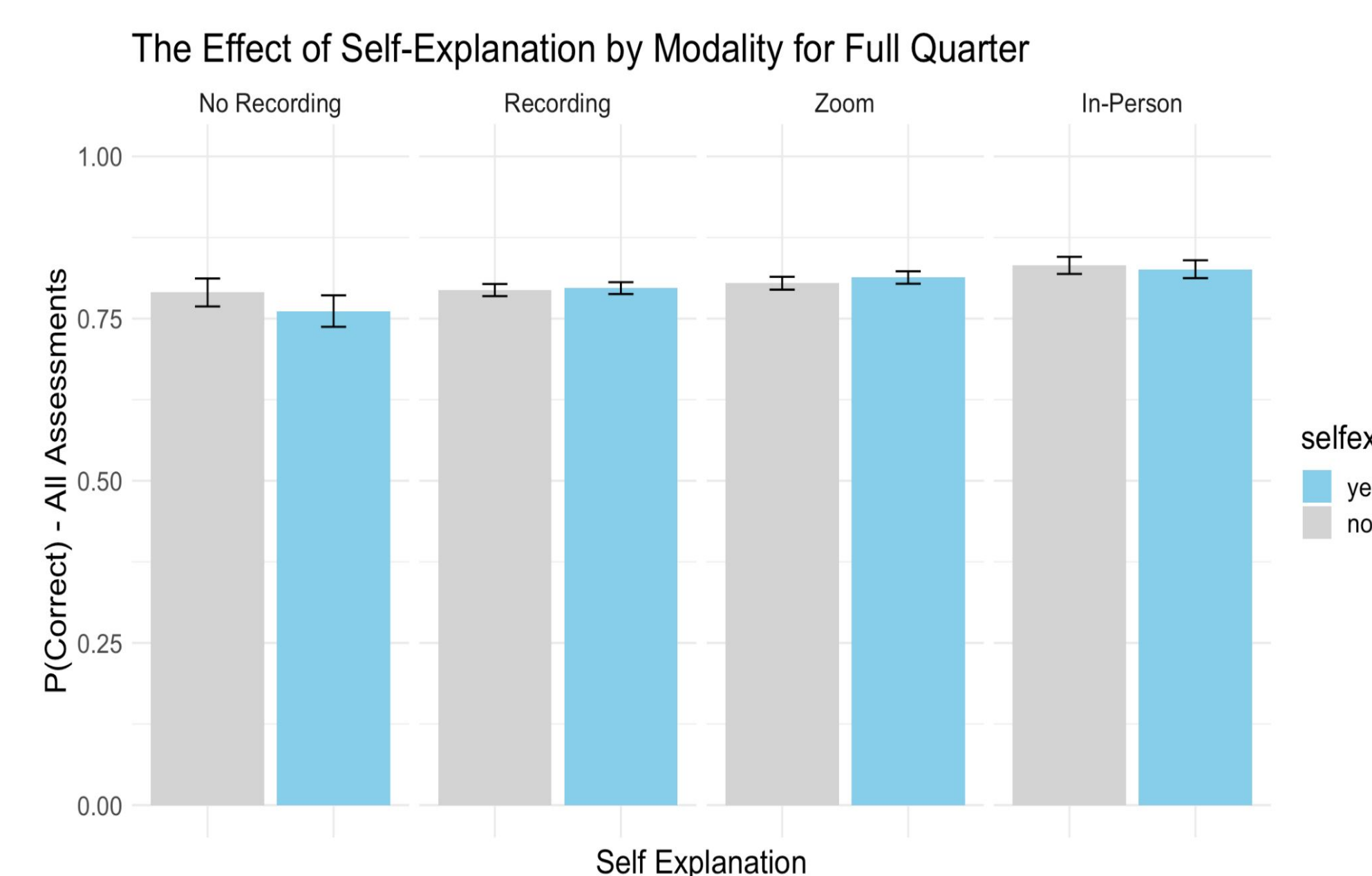


Significant benefit of Peer Instruction for Zoom Students

- Significant main effect of PI, Modality, and their interaction
- Students attending synchronously on Zoom benefited significantly from the opportunity for Peer Instruction ($p < .001$)
 - Benefits did not exist for any other modality

No significant benefit of self-explanation

- Students were prompted to self-explain their answers to PI questions for 50.3% of related assessment questions.
- No significant effect of self-explanation regardless of modality



Conclusions and Discussion

- Students attending synchronously on Zoom benefited significantly from the opportunity for Peer Instruction ($p < .001$)
- No significant effect of self-explanation regardless of modality
- Significant benefit of attending class in-person compared to watching the recording or watching no recording.

Limitations:

- The questions that receive PI are not random
 - questions that received PI are typically challenging conceptually
 - PI is used to strengthen knowledge of challenging concepts
- Exams and quizzes were open-note, so students may have relied on this advantage
- Prompting students to self-explain does not equal thoughtful explanation of concepts

Future Directions

- Replicate study in an in-person classroom
- Examine student performance based on self-explanation effort
- Balance PI questions and peer discussion opportunities across topics of varying difficulty

References

1. Dancy, M., Henderson, C., & Turpen, C. (2016). How faculty learn about and implement research-based instructional strategies: The case of peer instruction. *Physical Review Physics Education Research*, 12(1), 010110.
2. Smith, M. K., Wood, W. B., Krauter, K., & Knight, J. K. (2011). Combining peer discussion with instructor explanation increases student learning from in-class concept questions. *CBE—Life Sciences Education*, 10(1), 55-63.
3. Schell, J. A., & Butler, A. C. (2018, May). Insights from the science of learning can inform evidence-based implementation of peer instruction. In *Frontiers in Education* (Vol. 3, p. 33). Frontiers.

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