Changes in elementary teachers' perceptions and facilitation of argumentation throughout year-long participation in professional learning

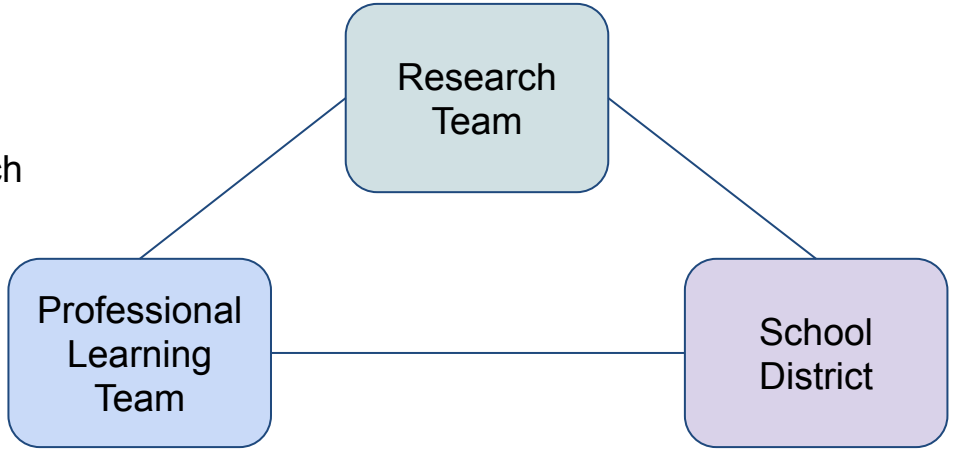
Matthew Wilsey, Coralie Delhaye, Melissa Collins, Sara Allan, Emily Reigh, Hilda Borko, Jonathan Osborne

Background & Rationale

- Argumentation is an key scientific practice (e.g. NRC, 2012), and there has been a recent emphasis on the practice (e.g. Tzung-Jin et al., 2020)
- Yet, classroom argumentation remains rare (Banilower et al., 2018; Osborne, 2010), particularly in elementary classrooms (Davis et al., 2006)
- Thus, there remain an opportunity to better understand and support teachers' capacity in facilitating classroom argumentation (Zembal-Saul & Vaishampayan, 2019)

Partnership

Design-based
Implementation
Research Approach



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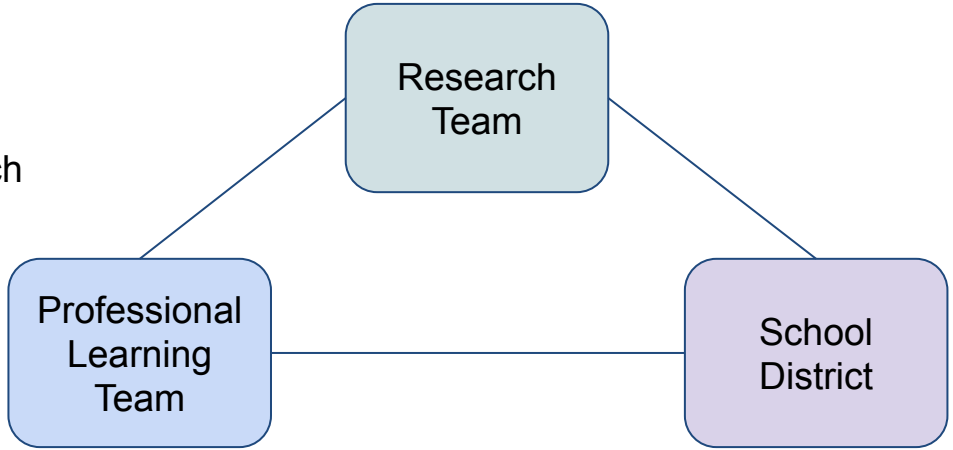
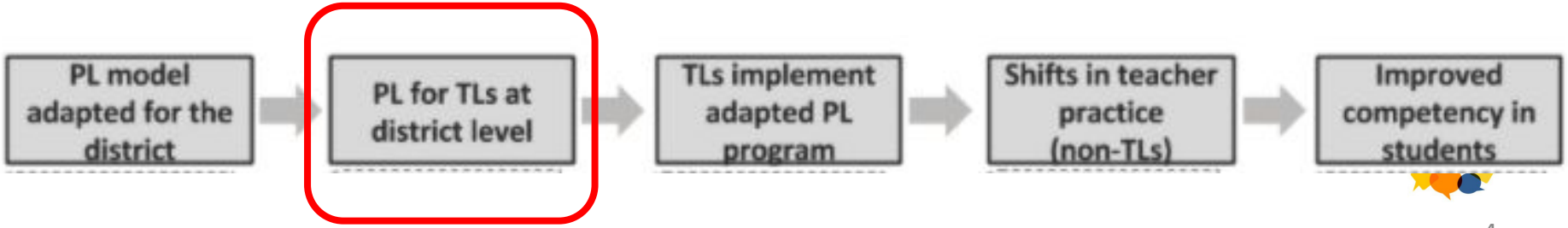
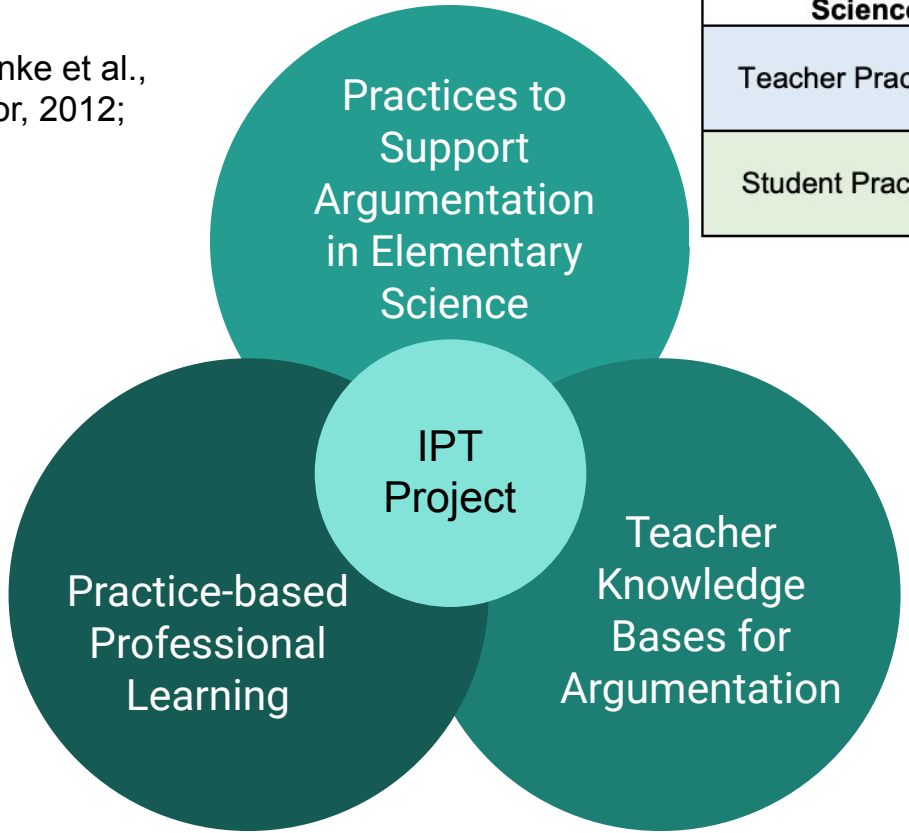




Conceptual Framework

(e.g. Alexander, 2020; Franke et al., 2015; Michaels & O'Connor, 2012; Mercer & Howe, 2012



Science Discourse Instrument	
Teacher Practices	Ask
	Press
	Link
Student Practices	Explain/Claim
	Co-Construct
	Critique

(e.g. Carlson & Daehler, 2018; Zembal-Saul & Vaisharmpayan, 2019))

(e.g. Ball & Cohen, 1999; Jackson & Cobb, 2013)

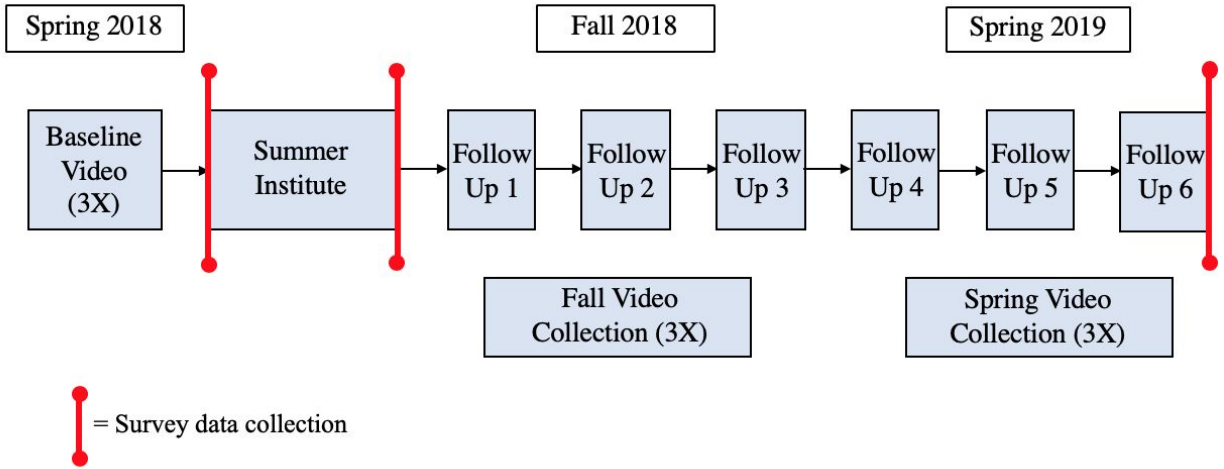
Research Questions

1. In what ways did teachers' practice of facilitating classroom argumentation change during the first year of the project?

2. In what ways did the teachers' perceptions of classroom argumentation change during the first year of the project?

Methods: Data Sources

- 10 Elementary teachers
- Classroom video & survey data



Methods: Data Analysis

Video Data

- Segmented for whole class discussion
- Coded with SDI2
- Two coders for each video segment
- Linear regression analysis

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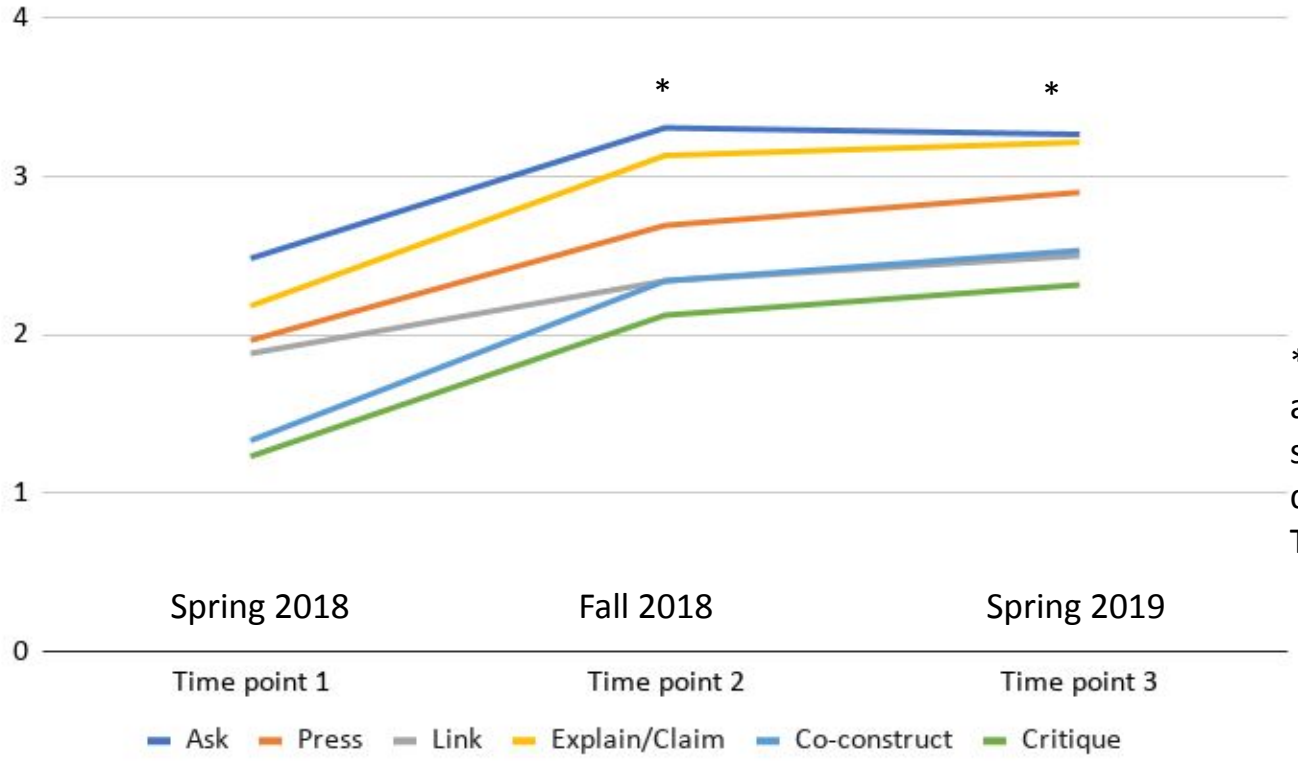
Survey Data

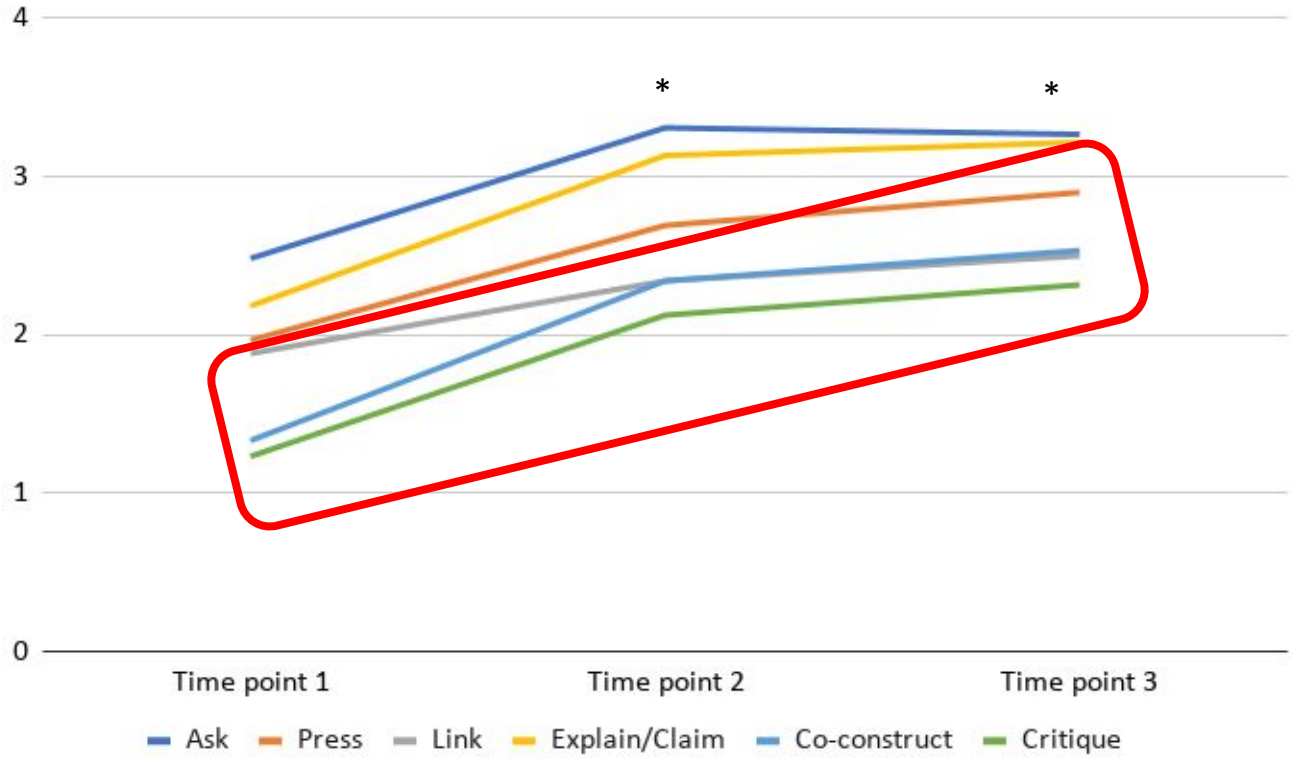
- *Attitudes toward Argumentation* scale
- *Confidence in Teaching Science* scale
- No test for significance (small N)
- Inductive coding of open-response items

Findings: RQ1



*All changes at T2 and T3 are significantly different than at T1

Findings: RQ1



Findings: RQ2

Mean Composite Score:

- *Attitudes toward Argumentation* scale:

  3.4 → 4.55 (on a 5-point scale) after SI;
  4.6 at the end of the academic year

- *Confidence in Teaching Science* scale:

  2.97 → 3.52 (on a 5-point scale) after SI;
  3.4 at the end of the academic year

Findings: RQ2

I'm excited to teach my students argumentation! They love to talk and to share their ideas, and it is exciting to be able to give them a framework in which they can make those ideas more relevant and reach deeper with their ideas, as well as learning to share in a way that lets students learn from each other more effectively.

- Opened-ended Response on Post-SI Survey

Implications

- Practice-PL can have impact
  - Significant initial changes, but then leveling off
- Contingent and dialogic aspects of argumentation remain challenging
  - Planning v. in the moment decision-making
- Mechanism of change
  - PL analysis

Thank you!

Questions and further discussion:

Matthew Wilsey (mwilsey@stanford.edu); Coralie Delhaye (cdelhaye@stanford.edu); Melissa Collins (macollins@berkeley.edu); Sara Allan (sara.allan@berkeley.edu); Emily Reigh (evreigh@stanford.edu); Hilda Borko (hildab@stanford.edu) ; Jonathan Osborne (osbornej@stanford.edu)

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Student Practice: Explain/Claim

4	Students **consistently** offer extended explanations using science ideas and reasoning appropriate to the discipline OR **consistently** make claims that are supported with evidence/reasoning.	
3	Students **occasionally** offer extended explanations using science ideas and reasoning appropriate to the discipline OR **occasionally** make claims that are supported with evidence/reasoning.	
2	Students **rarely** make claims that are supported by evidence/reasoning OR rarely give extended explanations. Alternatively, students' contributions are best typified as emergent.	
1	There is **no evidence** of student **effort** to engage in emerging or proficient use of the explain/claim practices.	
0	No class discussion OR class discussion was not related to science.	
Quality of practice	**Emerging** Observations without explanation (e.g. I think that the hot water is rising to the top of the beaker.) Claims without evidence or reasoning (e.g. I don't think that would happen during the day, only at night.) Incomplete or irrelevant explanations.	**Proficient use of the** Observations with explanation (e.g. I think that the hot water is rising to the top of the beaker. The cold water is sinking to the bottom of the beaker because it is more dense.) Claims with appropriate evidence/reasoning (e.g. I think that seeds are alive because they turn into something living.) Extended explanations with reasoning (e.g. Since the land heats up faster than the ocean, the air above the land will get heat up and rise.)