



Using a Suite of Online Simulations to Promote Elementary Preservice Teachers' Facilitation of Argumentation-Focused Discussions in Mathematics and Science: Selected Results



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The Online Practice Suite (OPS)

- Suite of three scaffolded online simulations that can be integrated into methods courses
- Used by teacher educators (TEs); supports preservice teachers (PSTs)
- Focuses on one core teaching competency: **facilitating discussions that engage students in argumentation**

Eliciting Learner Knowledge (ELK)



- One-on-one "chat" in which PSTs role play a teacher and a student
- Facilitates repeated practice
- Generates transcripts for reflection

Avatar-Based Simulation (ABS)



- Teacher leads a 20-minute discussion among 5 student avatars
- Involves coordination of multiple ideas and dialogic components

Virtual Teaching Simulator (VTS)



- Teacher leads a 35-minute discussion among four groups of students in a class
- Involves coordination among groups
- Teacher is embodied in the classroom

Research Questions (RQs)

RQ1: How does engagement in the OPS within elementary mathematics and science methods courses improve PSTs':

- ability to facilitate argumentation-focused discussions (AFD),
- beliefs about their preparedness to teach and effective instruction,
- noticing skills, and
- understanding about argumentation?

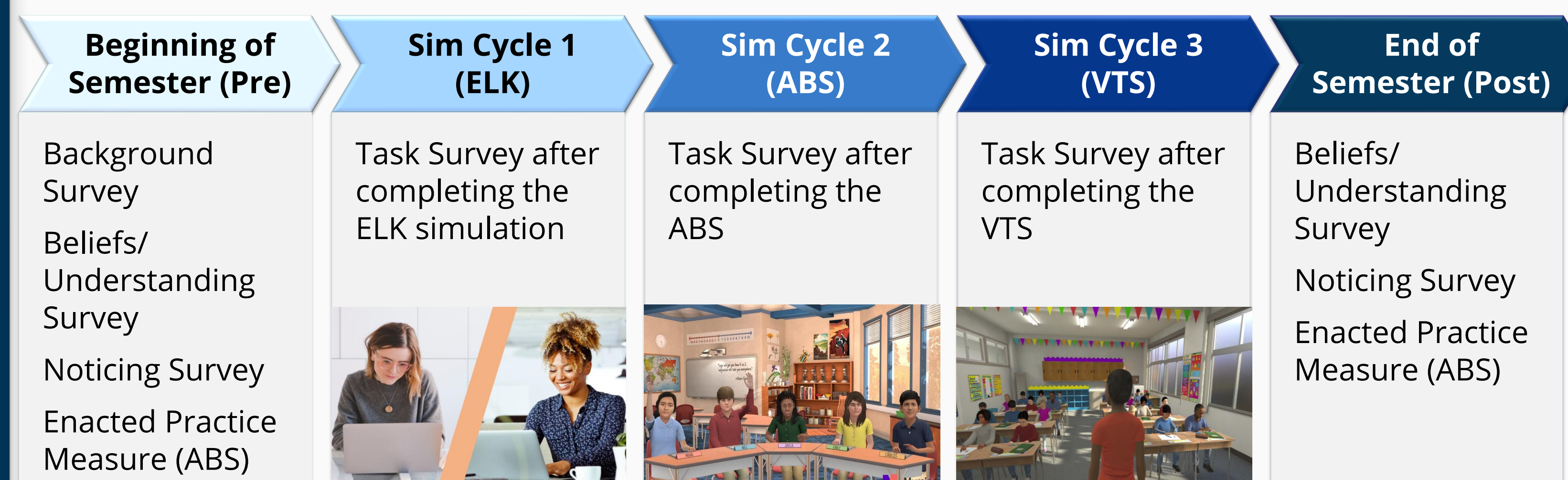
RQ2: What learning do PSTs report as supporting their progress from one online simulation to the next?

Data Collection and Analysis

Study examined the use of the OPS during a single semester implementation during Spring 2022.

- Five elementary teacher educators (two mathematics, three science; five different public universities in the U.S.)
- 66 PSTs enrolled in their methods courses

Data Collection:

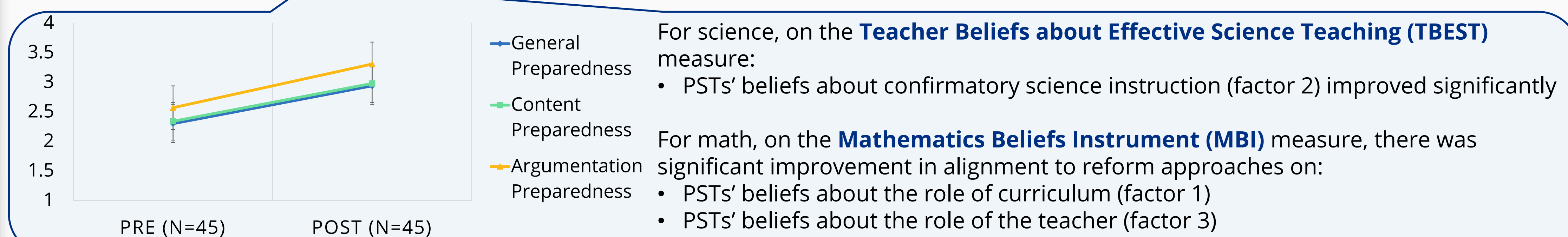


Data Analysis:

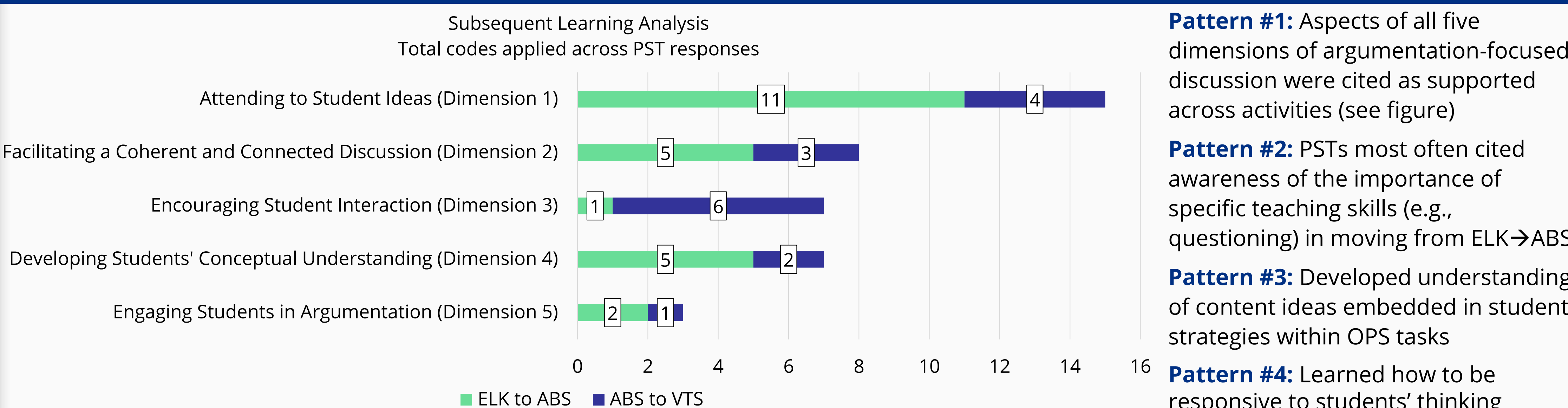
- **RQ1a:** Rater scoring of video-recorded performances; pre/post scores compared using a paired t-test on each of five scored dimensions.
- **RQ1b:** Paired t-tests to compare PSTs' pre/post scores on each scale of each measure (one general, one math/science specific).
- **RQ1c:** Calculated a score at each time point for correctly identified aspects as either absent or present in the video clips. Paired t-test using the scores on noticing measure at pre and post time points.
- **RQ1d:** Raters coded responses to repeated survey questions; codes were disaggregated and compared pre/post.
- **RQ2:** Raters coded responses to survey questions. Times each code was used was calculated, organized in a table, and represented in graphical form.

Findings

Research Question 1



Research Question 2



Implications and Impact

- Developing and utilizing a coordinated and scaffolded set of online simulations can be useful for helping PSTs develop proficiency in complex instructional practices.
- PSTs enrolled in a semester course in which OPS was utilized experienced significant improvement in their ability to engage in high-quality teaching practice (AFD).
- Suggests that some outcomes (e.g., beliefs) may develop in tandem with teaching skills

Future Research

- How TEs integrate the OPS within their courses to support PST learning
- Using AI-powered models to provide automated scoring and feedback on PSTs' discussion performances
- How the nature of formative feedback relates to PST learning
- Transfer of PST learning to their work teaching students in real classrooms
- Implement the OPS in more diverse PST settings to explore usefulness



Learn more about the project by visiting our website or showcase video!

