Online Practice Suite: Practice Spaces, Simulations and Virtual Reality Environments for Preservice Teachers to Learn to Facilitate Argumentation Discussions in Math and Science

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Project Collaboration includes researchers from ETS, Indiana University, MIT, Towson University, and UNC-Chapel Hill

Online Practice Suite (OPS) Overview

- The OPS includes three different practice-based learning activities focused on supporting preservice teachers (PSTs) in learning one core teaching competency: **facilitating discussions that engage students in argumentation.**

OPS Activity #1: Focused Practice Spaces (FPS)
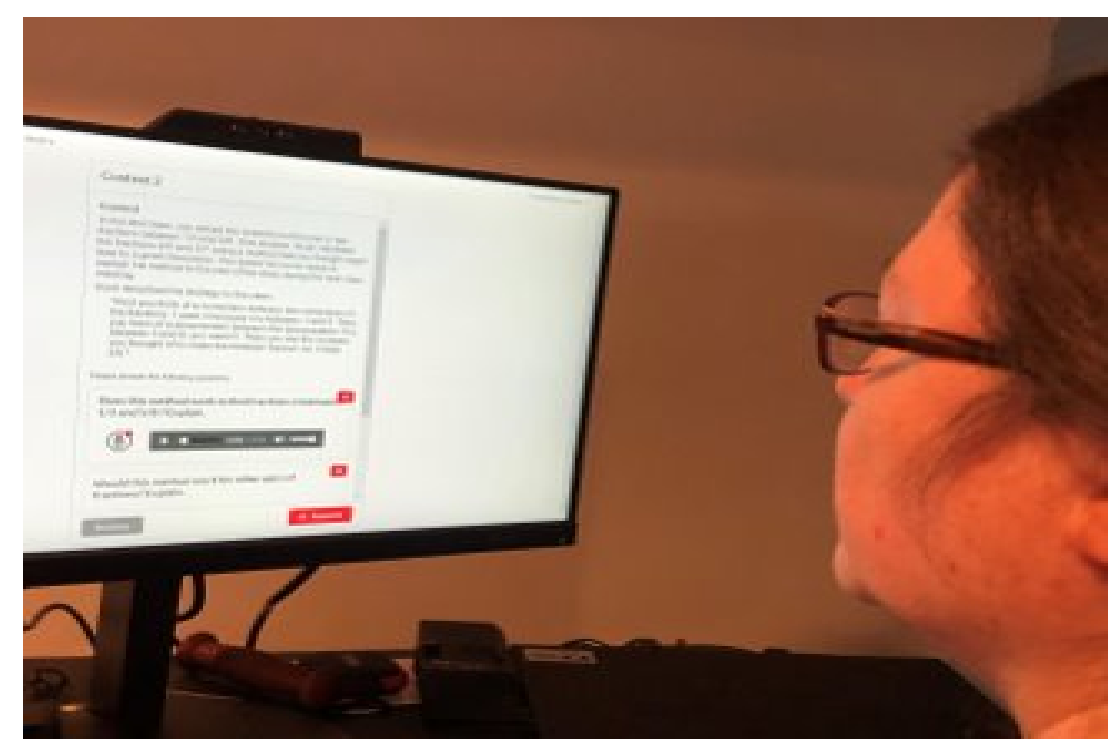
- Focuses on 1-2 teaching skills
- Involves one-on-one "chat" with student or involves teacher responding to app-based simulation
- Facilitates repeated practice

OPS Activity #2: Avatar-Based Simulations (ABS)

- Involves coordination of multiple skills
- Includes small group of 5 students
- Reduces complexity

OPS Activity #3: Virtual Teaching Simulator (VTS)

- Involves coordination of multiple skills across multiple student groups
- Situated in a full classroom
- Teacher is embodied in the classroom

- Each OPS activity will be integrated into mathematics or science method courses as part of smaller microcycles including the following:

Preparation for OPS Activity → Engagement in OPS Activity → Debrief/Reflection on OPS Activity

Research Design

Research Question	Main Data Sources	Data Analysis Approach
In what ways does the enacted OPS impact PSTs' ability to facilitate argumentation-focused discussions in mathematics and science, their noticing skills, beliefs about content instruction and their preparedness to teach, and understanding of argumentation and discussion?	Pre/post measures for PSTs include: • Enacted practice scores (elementary: ABS task; secondary: FPS task) • Teacher noticing scores • Beliefs/understanding measures [e.g., Mathematics Beliefs Instrument (MBI) and Teacher Beliefs about Effective Science Teaching (TBEST)] • Survey on PSTs' perceptions of preparedness to teach and their understanding of argumentation and discussion • Background questionnaire (pre only)	• Examine evidence of improvement between pre/post timepoints using enacted practice measures and noticing measure • Examine changes between pre/post timepoints in PSTs' beliefs, perception, and understanding of argumentation and discussion
Across a diverse set of educator preparation program contexts, how do teacher educators (TEs) use and adapt the OPS to address the needs of their PSTs within their settings and meet challenges within a post-pandemic teacher education landscape?	For PSTs (during OPS implementation): • Audio/video recordings and/or logs of chats from OPS activity sessions • Artifacts from preparation and debrief/reflection activities • Task survey responses about each completed cycle of enactment For TEs (during OPS implementation): • Logs detailing class activities/assignments used to support OPS • Observation notes from preparation and debrief/reflection activities • Surveys and interview about TE's use and understanding of OPS and TE support materials	• Build descriptive accounts of TE use cases based on full OPS implementation • Examine patterns and generalizability of TE use cases to identify emergent best practices generally and within specific constraints and/or contexts

Main Project Phases

Phase 1: Development and Tryouts	Phase 2: Pilots	Phase 3: Main Study
• Design, test and refine individual OPS activities • Small-scale tryouts/reviews by individual PSTs and/or teacher educators (TEs) • Each OPS "team" will lead the development and tryouts for one of the OPS activities	• Test and refine coordinated OPS activities and TE supports within method courses • Includes 8 TEs and ~160 PSTs (~20 PSTs/section) • Each participant will work with one of our PI institutions directly around coordination and implementation • No pre/post measures	• Test and refine **revised** coordinated OPS activities and TE supports within method courses • Includes 12 TEs at universities outside our partner institutions and ~240 PSTs (~20 PSTs/section) • Each participant will work with one of our PI institutions directly around coordination and implementation • **Pre/post measures**

Project Impact

- Advance knowledge about how to productively develop and deploy mixed-reality technological approximations of practice to support PST learning
- Deepen understanding of how TEs use these novel approaches and how specific contextual factors may make particular use cases more or less productive
- Produce empirically and theoretically grounded design principles and heuristics for these types of practice-based activities to support PST learning
- Generate set of practice-based task activities for use and adaptation
- Direct impact on up to 400 PSTs and up to 20 TEs across multiple institutions

Project Team

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