

Proofs Project Partners: Implementing Research-Based Instruction Across Institutions

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The Proofs Project is an NSF-funded research project investigating persistent challenges students experience in Introduction to Proofs courses. These challenges are framed in terms of epistemological obstacles (EOs) students and instructors experience during classroom interaction, even within research-based practice (Brousseau, 2002; Sierpińska, 1987). The project has generated video modules illustrating such obstacles and tasks that instructors can use to elicit and address them. Now, in the second year of the project, instructors at three different universities have begun using project materials in their Introduction to Proofs courses. These three instructors participated in a three-day Proofs Project workshop at Virginia Tech, during the Summer of 2023. Here, we report on their experiences implementing project materials to intentionally elicit and address EOs they have experienced in prior instruction. Data come from surveys conducted at the end of the summer workshop; at the start of the following Fall semester, as they taught their Introduction to Proofs course; and at the end of that semester. In addition to discussion of these findings, Authors 2, 3, and 4 will report on their individual experiences in implementing project materials to elicit and address students' experience of persistent challenges.

At the time of the workshop, one instructor had taught Introduction to Proofs more than five times; one was teaching the course for the fifth time; and one was "terrified" to be teaching the course for the first time. Following the summer workshop, all three instructors were eager to implement project materials and, indeed, had begun making instructional plans using those materials, during the workshop. They anticipated the materials—especially tasks and video clips—would help them address and elicit EOs related to students' treatment of logical implications, quantification, and particular methods for proving, such as proof by cases.

Each instructor elicited EOs that had been identified in prior research. One instructor noted, "For example, even after discussion, students will still take the negation of P implies Q as 'If P , then not Q ' or 'If not P , then not Q ,' when trying to negate a sentence written in everyday language." (cf., Dawkins & Hub, 2017; Epp, 2003). She found that when students became aware of such obstacles, they were able to begin addressing them on their own, or in discussion with peers. In reflecting on such an approach, another instructor shared the following:

I think I am gaining an appreciation for the value of eliciting EOs. It's a lot easier to just let some of them fly under the radar, particularly in the classroom. I suppose in the past I had assumed/hoped that students were struggling with some of these concepts while engaging with the homework—that's how I remember experiencing many of them for the first time. During the presentation, the three instructors will share, compare, and contrast such experiences.

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