

Designing Flexible, Asynchronous Online Professional Development to Impact Teacher Learning and Practice

Incorporating video in the professional development (PD) environment offers great potential for teachers to unpack the relationships among pedagogical decisions and practices, students' work, and the disciplinary content. With video, teachers have the opportunity to observe and study the complexity of classroom life, to reflect on their own instructional decisions, and to integrate multiple domains of knowledge to solve problems of practice. As video technology and online video sharing have become more accessible and widespread, video-based professional learning can leverage the benefits of digital platforms.

This paper reports on the design and preliminary findings on teacher learning from the Video in the Middle (VIM) project (NSF #1720507) adapting face-to-face mathematics PD materials designed to increase lower secondary math teachers' capacity to teach challenging mathematical concepts to a digital format. The digital adaptation includes multiple self-contained modules that can be experienced in two-hour time frames, varied sequences, and in flexible collaboration formats. The VIM modules are designed to be offered in three different digital delivery formats: (1) independent, (2) locally facilitated groups, and (3) VIM project staff -facilitated groups. Each module places a video clip at the center, or "in the middle," as teachers take part in an online experience involving mathematical problem solving, video analysis of classroom practice, and pedagogical reflection. Before and after teachers watch each clip, they participate in activities designed to ensure that the teachers engage deeply with both the mathematics content and the focal instructional components. VIM Modules will be offered in a public Canvas course which will be free for anyone to preview and use. An export of all VIM modules will be provided using a format that can be opened by programs that support Common Cartridge files.

In order to examine the impact on teachers' mathematical knowledge for teaching, their teaching practice, and their students' mathematics performance, a RCT study was conducted in February/March 2020 with 57 teachers randomly assigned across the three delivery formats (Independent: 20, Locally facilitated: 21, VIM project staff-facilitated: 17). All teachers experienced the same four two-hour modules for a total of eight hours of professional development. Participants taught grade levels ranging from 6th grade to high school.

Teachers were asked to complete a weekly online teacher log consisting of eight questions. With the questions "I am able to apply VIM ideas when working with my district's adopted materials" and "VIM activities help deepen students' conceptual knowledge of algebraic ideas", there was a 15% increase from weeks one to six in teachers answering, "To a great extent". With the question "I am able to understand student solution methods that are different than my own", the percentage of teachers answering "To a great extent" increased 14% from week one to week six. We are currently disaggregating the teacher log data by condition and will include the results in our final paper. An interesting preliminary analysis shows that the strongest evidence of substantial improvement for all three questions is in the independent group. In addition, we are conducting teacher interviews regarding their experience with the modules, their insights into the formats, and the impact their experience had on their teaching practice.

Keywords: scale, professional development, mathematics, digital professional learning, video