

How to Translate Professional Learning to Virtual Settings

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When the COVID-19 pandemic moved teaching and learning to remote and virtual spaces, teacher professional learning moved online as well. Educators discovered that online asynchronous professional learning offers some benefits that may be worth keeping for the long-term: teachers and leaders have more control of their professional learning schedules, flexibility to balance competing priorities, and fewer logistical constraints. And research studies comparing online and traditional face-to-face offerings are encouraging: in some settings, online professional learning has been found to improve teachers' attitudes and self-efficacy (An, 2018) and led to high satisfaction and relatively high levels of information sharing (Yoon et al., 2020).

Online professional learning also has drawbacks, however. Participating educators sometimes feel isolated, stuck behind a computer screen without the rich social interactions of face-to-face experiences, and some find that their online opportunities are not engaging or lack meaningful connection to their teaching practice. That's because simply copying successful face-to-face professional learning materials into an asynchronous setting may not result in an engaging and quality experience.

To create consistently high-quality teacher learning opportunities, many online asynchronous approaches need improvement, and they need to be tailor-made for the online setting. That was our goal when we began designing and implementing Video in the Middle (VIM), an online professional learning program for middle and high school math teachers. We have learned that we can effectively embed evidence-based elements of in-person professional learning – such as the use of classroom artifacts, facilitation structures, and opportunities for teacher interaction – into an online asynchronous program. This allows districts and schools to

personalize the professional learning to their educators' specific needs without the logistical barriers of scheduling and transportation.

The Video in the Middle project

The VIM project is a series of two-hour learning modules, delivered asynchronously and designed to expand teachers' knowledge and practice related to the critical middle and high school mathematics concepts of linear functions and similarity (Seago et al., 2018). While each module can stand alone and provide an individual teacher with focused learning on a single topic, together, the 40 VIM modules offer district leaders and other facilitators the opportunity to assemble a sequence of modules that meets specific teacher learning needs.

Each module has the same format of activities, where a video of classroom instruction is sandwiched between other learning activities, discussion boards, and reflections (Figure 1). At the beginning of the module, teachers explore the mathematics task that will be part of student and teacher instruction in the video clip. The tasks promote reasoning and problem solving, such as the Growing Dots task in Figure 2.

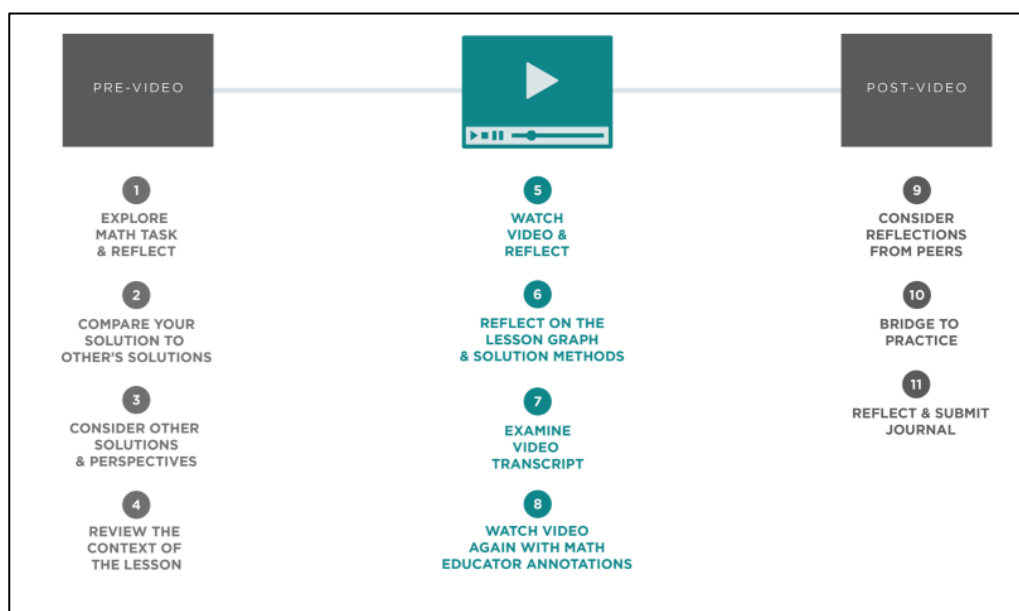


Figure 1. Each VIM Module follows a common structure with a video “in the middle.”

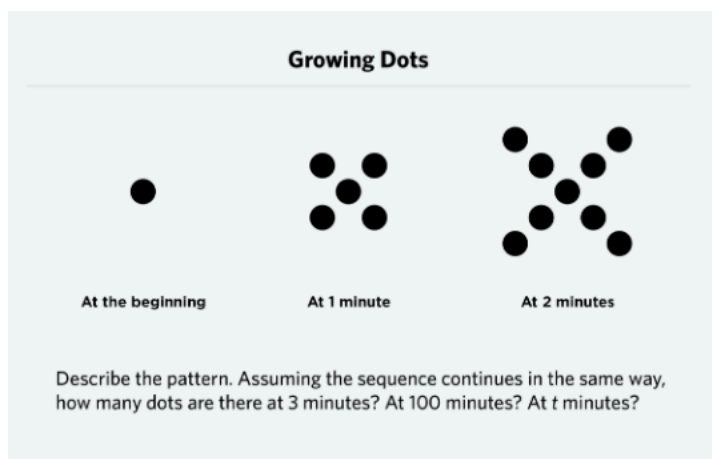


Figure 2. An example mathematics task.

Teachers complete the task independently, and then post their solutions on a community wall to share asynchronously with other teachers. Additional slides and handouts present a variety of mathematical methods and representations on the task, and teachers then review these both before and after viewing the video clip.

Classroom video is central to the VIM project. The videos in each VIM module present classroom instruction, student thinking, and teacher decision making. Learning about the mathematics task and the context of the lesson—what students had learned before and the teacher’s goals—sets up teacher's engagement with the video clip. Then, by analyzing students’ mathematical thinking from video, teachers gain insight into the range of students’ mathematical understanding and are better prepared to target instruction more effectively to the concepts, practices, and skills that remain to be learned (Kazemi & Franke, 2004). In this manner, videos and artifacts of practice, even from another classroom, spark teacher learning about both content and instruction and elicit reflection around next steps they can take in their own classroom contexts. Teachers then continue their analysis by annotating the video transcript, noting where they see productive teacher questioning or highlighting of particular student thinking. Annotation

of the video is also done asynchronously using an online platform that allows teachers to see and respond to others' ideas in a forum-like environment. The module closes with additional journal prompts and an opportunity for teachers to share a final reflection on an online community wall.

To investigate how the VIM modules support teacher learning, we iteratively tested the modules with 18 teachers and then recruited an additional 68 teachers to complete the modules and share their learning. Participating teachers completed four VIM modules across eight weeks, completing online posts and journal responses as well as weekly surveys and post-study interviews. To measure teachers' learning, we analyzed the written responses from 61 teachers who completed all modules for evidence of specific mathematics teaching practices and discussion of how their thinking changed. Analysis of the written reflections of 61 teachers who used the VIM modules in online asynchronous settings suggest teacher learning gains related to the key instructional practices that were the focus of each module; additional interview and survey results complimented the qualitative and quantitative analyses.

Designing high-quality online asynchronous teacher professional learning

Based on our experiences with developing and studying VIM modules, we offer four recommendations for others who are interested in designing and implementing high-quality, engaging online asynchronous professional learning for teachers.

Recommendation 1: Use content that has worked well for your audience in the past as a guide. In development, we structured each module around activities that facilitated teacher learning in face-to-face sessions and then reformatted them to work in an online environment while maintaining the essential ingredients and interactions. For example, we considered the reflection questions we usually ask teachers during in-person learning, as well as their typical

responses, and then used that information to detail the activities, questions, and prompts in the online environment.

One example of this is the process we created to help teachers learn from others' work, even though they engage with one another asynchronously. In the face-to-face version of the PD, once teachers have completed the task, we typically have them share in small groups or pairs in order to explore and make sense of others' solution strategies. We reimaged this activity for an asynchronous, online setting by asking teachers to post photos of their work on a discussion wall, that we called a Community Wall, and prompting teachers to review the solutions posted by others, reflect on questions about others' work (such as, "What do you notice? What do you wonder?"), and post comments in response. To facilitate further interaction, we encouraged them to check back later for more responses if they were the first to post. In this community space, teachers shared their ideas and engaged in discussion about the mathematics, similar to how we have seen in face-to-face environments.

Recommendation 2: Use artifacts of classroom practice. Across virtual and face-to-face setting, artifacts of classroom practice such as classroom video and student work can encourage teacher learning and reflection. Artifacts help connect teachers to the instructional context in ways that reading about a classroom or hearing about it from someone else just does not do. Incorporating video is an especially good way to provide an opportunity for teachers to analyze the relationships among pedagogical decisions and practices, students' thinking, and disciplinary content in ways that improve their instructional practice (Borko et al., 2011). Teachers who participated in the VIM project found that videos of teacher instruction and student interactions highlighted the complexity of classroom instruction and illustrate the breadth of student solution strategies. These videos presented opportunities to learn about both the mathematics and how to

teach it, and also fostered rich discussion around the realities of teaching. As video technology and online video sharing have become more accessible and widespread, video-based PD is well-positioned to leverage the benefits of digital platforms (Teräs & Kartoglu, 2017).

Recommendation 3: Embed key facilitation moves into the design. While classroom video and student artifacts offer opportunities for teacher learning, in traditional face-to-face workshops facilitators need to enact particular strategies to promote meaningful teacher discussions and rich learning around videos and classroom artifacts to leverage these artifacts as tools for teacher learning (van Es et al., 2020). Without facilitator guidance, teacher analysis of video or student work can result in an unproductive sharing of ideas, or worse, lead to an unfair critique of teachers or students. In the VIM module structure, where teachers complete activities online and asynchronously, we embedded key facilitation moves (van Es et al., 2014) into the prompts, activities, and discussion boards. The prompts and activities as written keep the focus on noteworthy events and student strengths and to encourage teachers to make connections from classroom artifacts to their own teaching, without a facilitator monitoring or participating.

Four categories of key facilitation moves were built into and across VIM modules; see Table 1. First, ***to orient teachers to the video to prepare for the analysis task***, each VIM module begins with teachers completing a mathematics task and detailing their solution approach, why it made sense to them, and what they might do to prepare to use this task with students. These activities and prompts elicit teacher ideas in the context of the task which keeps the focus on the task and the mathematics.

A second key facilitation move is ***sustaining an inquiry stance*** through prompts and activities that direct teacher attention to noteworthy student ideas. For example, after watching the video, VIM activities prompt teachers to attend to classroom interactions and reflect on student ideas and instructional moves. Subsequent module activities present commentary from

mathematicians and other mathematics educators to encourage teachers to consider these ideas and make connections to alternative solution methods or instruction. In this study, teachers responded in both a private journal and online discussion boards that others could review.

Other key activities helped *to maintain a focus on the video and the mathematics*. In each VIM module, one activity prompts teacher participants to annotate a transcript of the video and respond to questions highlighting mathematical and pedagogical interactions, thereby grounding the analysis of the video in specific evidence. Participants are also prompted to make connections between their ideas and the ideas of other mathematics educators.

To support group collaboration, the VIM modules included discussion boards and spaces for educators to interact with each other and prompts to encourage it. Prompts on the online discussion boards encourage teachers to ask each other questions and discuss their responses. In our study, teachers appreciated seeing others' solutions and frequently made comments such as "I like your method! I struggled to find an alternative method. Thanks for sharing this!" and "This method is similar to mine, but yours is clearer." These comments fostered asynchronous conversation as other group members then chimed in with supportive comments or questions.

Teachers said that seeing others' solution methods encouraged them to use new approaches in their own problem solving and encouraged them to reflect on their understanding and on their students: "Will students use this method?" and "I think that this method is one that I would show my students first." In this manner, teachers facilitated their own community through their comments and responses to each other.

Table 1. Facilitation moves¹ in online asynchronous VIM modules.

Category	Examples of structures and prompts by category and type embedded in VIM activities
1.Orient teachers to the video (or classroom artifacts) to prepare for the analysis task	Embed questions to elicit teachers’ ideas on the task and possible solutions
	Include additional information and resources about the classroom context or mathematics presented in the video
2.Sustain an inquiry stance	Highlight noteworthy student ideas with post-video questions
	Embed questions to prompt teachers to explain their reasoning or elaborate on their ideas
	Provide an interpretation of an event, interaction, or mathematical idea from the video
	Include details of alternative points of view
3.Maintain a focus on the artifact and the mathematics	Embed follow-up questions that focus on the artifact and analysis
	Prompt for evidence to reason about teaching and learning
	Make connections between ideas posted in discussion boards
4.Support group collaboration	Allow teachers time to reflect on their ideas and instruction
	Invite teachers to share their similar and different ideas
	Confirm and support contributions

¹ Modified from van Es et al. (2014).

Recommendation 4: Encourage teacher reflection and sharing. Time for reflecting, sharing ideas, and connecting with others matters for teacher engagement and interest, and that is true in virtual spaces as well as in-person ones. In the VIM modules, online community walls and discussion boards provide a space for teachers to interact with and learn from others and journals provided teachers with a personal writing space. This independent time is unique to asynchronous online platforms, as many face-to-face professional learning opportunities do not allow enough time for teachers to step back and contemplate ideas at their own pace. Teachers in VIM found that this opportunity to pause and reflect independently before engaging with others gave them “space to think and space to share.” In this manner, the facilitation of the virtual

environment is both in prompting and encouraging discussion as well as creating spaces for teachers to interact with each other and the content.

Prompts also encouraged teachers to make connections from the classroom artifacts to their own practice. For example, one community board prompt asked teachers to use the sentence starters, “Mathematically, I’m thinking…” and “Pedagogically, I’m thinking…” to reflect on their learning about both the mathematics and their teaching. Responses emphasized teacher learning in these areas and how they connected the mathematics and their instruction: “Mathematically, I’m thinking that there are so many ways to approach this problem that are accurate and creative. Pedagogically, I’m thinking about how I can validate each of these approaches with fidelity without losing too much instructional time.”

Conclusion

For professional learning to lead to changes in instructional practices, we know that teachers need rich experiences that attend to content, classrooms, and community. We also know that flexible ways to access such PD are needed now more than ever as teachers attempt to balance such opportunities with many other responsibilities. High-quality, online PD experiences such as VIM have the potential to provide more teachers with flexible, convenient access to critical learning opportunities that have often been available only to a lucky few. Embedding classroom artifacts, key facilitation moves, and opportunities for teacher reflection and collaboration in the asynchronous module structure not only facilitates teacher learning but also structures an engaging and enjoyable experience. One teacher captured how the course experience worked for her this way: “I like this particular experience because I can go at my own pace and it was still almost like it was facilitated because there were questions that you had to answer. We weren’t having discussions necessarily, but there was group input.”

By incorporating the recommendations above, particularly the facilitation moves in Table 1, teacher leaders and PD providers can translate successful in-person learning experiences into impactful online, asynchronous learning experiences. Building these recommendations into professional learning experiences can leverage technology to facilitate ambitious teaching and greater student achievement.

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