A Brief Overview of Our Process

Step 1. Figure out studio space and equipment needs. We purchased our equipment as needs arose (see Equipment and Software Guide for details regarding our final purchases). For example, initially we did not have an overhead camcorder, but we realized we needed one for the parabola unit. However, that meant we also needed to purchase hardware to mount the camcorder to the ceiling.

Step 2. Conduct practice runs. We practiced a variety of camcorder angles, as well as different ways to get the green screen uniformly lit, before we settled on how to film. We also experimented with having the teacher in different locations and ultimately preferred having her off-screen so that the focus was on the students. We found that the teacher and the director had to practice setting up and running Camtasia. We also practiced filming the first lesson with other folks at our research center, mainly other graduate students. As a result of conducting multiple practice runs, we codified and proceduralized our filming process (see Step 3).

Step 3. Codify and proceduralize. We made a pre-shoot checklist for setting up and revised it each time we practiced (our checklist can be found in the Filming and Audio Guide). We proceduralized the entire set-up of our studio so that when we started filming for our unit, we had most of the wrinkles smoothed out.

Step 4. Screen test your potential "talent." We call the students in the film "talent," to distinguish them from the students who will watch our videos ("vicarious learners"). We suggest bringing in potential talent and filming them engaging in mathematics that are different than the lessons you will eventually film, as a type of screen test. We got very lucky for our parabolas unit in that the students, Sasha and Keoni, knew each other and had great on-screen rapport. We could have been unlucky, though, and so we realized that we need to screen test in the future. You'll want students who are articulate, mature, and able to listen to their partner and engage in their ideas.

Step 5. Practice the post-production flow. As we started editing our raw footage and adding annotations and narration to highlight the main ideas of the talent, we created a post-production flow (see Post-Production Guide). If you're new to post-production, you'll want to use some of your practice runs and your screen test to practice your post-production workflow. There would be little worse than filming an entire unit, only to realize your microphones weren't working properly (see Filming and Audio Guide) or the green screen lighting was off, making the keying (the process of converting the green screen to something else) far more difficult than it should be.

Step 6. Organize your footage. We elected to keep all original footage on the SD cards so that we had redundancy. Everything we recorded for the units lives in two places – on an SD card and on an external hard drive, managed by Final Cut Pro X.

Step 7. Produce video lessons from the raw footage. Post-production ended up being much more involved than we had anticipated. We provide a more comprehensive description of this in our Post-Production Guide, but briefly it entailed the following steps:

- View the raw footage for a given lesson multiple times, separate the video into chunks, and omit 1/2 to 2/3 of the raw footage by using the main mathematical goals to guide this process.
- Clean up the various digital streams that need to be coordinated and superimpose the students onto a background.
- Add labels or other annotations on the video, using Final Cut Pro X, to highlight key mathematical features of the work produced by the talent.
- Create voice-over narratives to generate a story line.
- Create animation sequences using the talents' gestures and written artifacts to summarize their important mathematical discoveries.

These aspects of post-production are crucial but time-consuming.