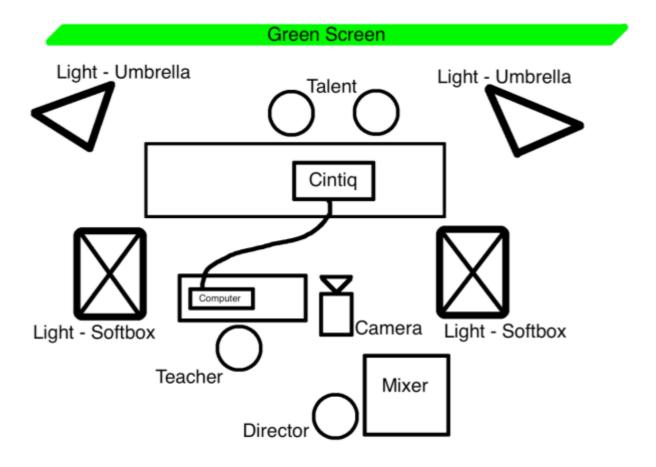# Filming & Audio Guide

This guide is split into three parts. First, a filming guide describes in detail how we set up our studio and filmed the math lessons. Second an audio guide provides a set of guidelines that we followed to create clear and consistent audio for our math lessons. Finally, the guide ends with the checklists we used on the day of filming to make sure everything was properly set up and turned on before filming began.

Filming

Because your equipment resources, studio space, and filming goals are likely different than ours, we do not present a step-by-step guide for filming. Instead, we pass along lessons we learned as we filmed our units, and offer some tips for getting the best footage you can.

We recommend you read the manuals for your equipment and software. When we got stuck, Google was our friend, and we were able to eventually figure out whatever problem we were having.

Our studio was set up according to the diagram below:

Positioning:
In our initial screen-test, the teacher was farther back and off to the left of the talent. This resulted in the talent looking more at the teacher and less at the camera, which had a weird effect when viewing. We repositioned the teacher so that she was close to the camera, which was centered on the talent. The director sat behind the camera and next to the mixer so he could monitor the camera and the audio (using headphones).

Lighting:
The green screen must be uniformly lit with as little shadow as possible in the view of the camera. Getting your lighting right on this will make post-production keying (the process of removing the green screen and replacing it with the student work) much easier. We used the umbrella attachments on the lights that were focused on the green screen to diffuse the light slightly to achieve more uniform lighting. We had the lights very close to the talent and the green screen, but out of view of the camera. We used the softboxes on the lights focused on the talent to create softer light, which made for better images of the talent.

The Cintiq:
This is the device to use if you want to record the talents' work and use it in the final video. We made worksheets for the talent and converted them to JPEG files. Then, we opened the files in Paintbrush (but any image editor will do) and let the talent inscribe their work using Paintbrush. We captured all of this using Camtasia. We highly recommend doing several practice runs using the Cintiq, Camtasia, and Paintbrush. We recommend that the teacher practices managing and organizing files on the fly, including saving and renaming the files as the talent write on them. Sometimes the talent would want to start over and you need to save the current file using a new name so you can open the original blank worksheet. This is far trickier than it sounds, but practice will help.

Juggling two mindsets:
The teacher has a very tough job. He or she must have the mindset of a teacher/researcher. This means pulling out all of the tricks and techniques one would normally use when teaching, conducting a teaching experiment/clinical interview, etc. However, the teacher must also adopt a mindset of an "actor." This means he or she has to be mindful of laughter, talking over the talent, managing the files (see above), where his or her hands are (not in front of the camera!), and so forth. This is challenging, and again, we recommend you practice!

Adopting a production mindset:
The entire team (teacher, director, talent, and anyone else) has to be aware they are filming videos. We did not script our videos, so there were many unexpected moments. However, for the first few lessons, the production team operated under the impression we had to get everything right in one take. But by the end we realized that if a file was saved incorrectly, if there was a loud noise in the hallway, or if something interrupted the talent, we could cut and restart. Post-production (see our Post-Production Guide for details) can fix many mistakes or interruptions, and it's okay to say "cut" to make sure you're getting it right. That said, other things are very difficult to edit out later. For example, if the teacher allows one of the talent to engage in off-task behavior (such as singing, messing with the microphone, waving, or leaning back in chair and staring off into space), and the

other talent says something very important mathematically, then to preserve that key utterance, you have to also include the behavior that does not look good on film.

General Filming Tips:

- Hide the microphone packs using adhesive-backed Velcro. We placed Velcro on the backs of each microphone and receiver, and then placed Velcro under the talents' table, under the teacher's table, and under the mixing table. This allowed us to position the microphone packs out of the view of the camera.

- Use gaffers tape to tape down cords. Our talent were high schoolers and middle-schoolers, so we wanted to make sure they were walking into a safe environment. There were many electrical cords roaming around our studio, but we tamed them by taping them to the ground.

- Make sure the talent's clothes—especially on their upper bodies—are colored differently than the green screen. Before they come in, ask the talent not to wear green tops, but just in case they do, have spare shirts or tops available. You may also want to ask them not to wear shirts that advertise products or athletic teams.

- To ensure a consistent look throughout filming (especially if you'll need to tear down the studio in between sessions as we did), use gaffers tape on the floor to mark off the locations of the lighting, tables, camera, mixing table, talent table, teacher table, and green screen. This will save you a lot of time when setting up, and it will ensure that your angles remain consistent throughout all of your videos.

- If there has been a breakthrough mathematically, the teacher should ask one or both of the talent to re-explain the idea. Having multiple instances of the expression of a key idea is very helpful when editing.

- The teacher should be careful not to talk while the talent are speaking. When multiple people are speaking, editing becomes very difficult.

Audio Guide

- Check your camcorder manual to change the sound-input setting to "line-in" when using external microphones (recommended!).

- Be consistent. We labeled our microphone/receivers. Each person (talent and teacher) used the same microphone for each filming session. The microphone receivers were plugged into the same channels on the mixing board each filming session. EQ was set for each person at the first filming session and then remained set for the entirety of the unit. Levels were tweaked each filming session to ensure proper balance of voices.

- Do a sound-check prior to each filming session. Have each person talk for a period of time while you listen with headphones. Adjust levels so that the vocals are clear but not clipping or distorting. Then have everyone talk together to make sure the overall levels are not too loud.

- Monitor the audio throughout the filming session. Sometimes you'll notice that the levels need adjusting. Better to do it mid-filming than in post-production.

- Use the microphone on the computer when recording in Camtasia. The easiest and most efficient way to sync the camera footage with the Camtasia footage is through the audio sync features of Final Cut Pro X (FCPX). If you mute the microphone on Camtasia, you will have to manually sync the camera and Camtasia footage, which is time-consuming and difficult.

- Building off the previous bullet, clap three times once everything is recording. This helps FCPX sync the two video sources.

- FCPX has a suite of audio adjustments. Make your adjustments early in the post-production process, because as you cut the footage into multiple clips, it becomes more cumbersome to apply the same audio tweaks to multiple clips.

- For voiceovers, like with filming, be consistent. Use the same microphone in the same channel each time you record a voiceover.

Checklist for Filming

This list is an example, and it certainly will not meet all of your needs. However, note the detail in the list. We found this fine-grained detail to be necessary to ensure that every filming session was smooth and consistent.

Pre-talent Set Up

<u>Cameras</u>

- ☐ Slide Front Camera into tripod
- ☐ Connect power cable to Front Camera (not the yellow jack)
- ☐ Connect mixer cable to line-in (red jack) on Front Camera
- ☐ Check memory cards' remaining capacity for both cameras
- ☐ Attach overhead camera to arm
- ☐ Connect overhead camera power cable to overhead camera

<u>Mixer</u>

- ☐ Place on mixing table
- ☐ Plug power cable in
- ☐ Plug output cables in

<u>Mics</u>

- ☐ Check batteries on Mic 1
- ☐ Place Mic 1 at Chair 1 (left chair as you look at screen)
- ☐ Check batteries on Mic 2
- ☐ Place Mic 2 at Chair 2
- ☐ Check batteries on Mic 3
- ☐ Place Mic 3 at Teacher's Chair
- ☐ Check batteries on Mic 1 Receiver
- ☐ Plug Mic 1 into Mic 1 on mixer and attach receiver to desk
- ☐ Check batteries on Mic 2 Receiver
- ☐ Plug Mic 2 into Mic 2 on mixer and attach receiver to desk
- ☐ Check batteries on Mic 3 Receiver
- ☐ Plug Mic 3 into Mic 3 on mixer and attach receiver to desk

<u>Filming area</u>

- ☐ MacBook Air to teacher's table
- ☐ Connect power to MacBook Air
- ☐ Cintiq to talent's table
- ☐ Connect Cintiq to computer
- ☐ Cintiq angled using appropriate stand height (right now that's the middle one)
- ☐ Connect to power to Cintiq
- ☐ Cintiq pens to table (NO STANDS)
- ☐ Wipe screens of Cintiq
- ☐ Wipe screens of MacBook Air

Lighting

- ☐ Plug in all four lights
- ☐ Route cables for maximum safety

With Talent Set-Up

Lighting

- ☐ Turn on all five lights
- ☐ Adjust front lighting to appropriately light subjects
- ☐ Adjust back lighting to appropriately light green screen – try to remove all shadows

Cameras

- ☐ Check angle of Front Camera
- ☐ Check for overly dark shadows on green screen. Adjust lighting if necessary
- ☐ Check angle and viewing window of Overhead Camera
- ☐ Check mixing settings on Front Camera (need to state what these should be)

Mics

- ☐ Turn on receivers and mic packs
- ☐ Check battery level and/or replace batteries
- ☐ Clip mics to subjects and place packs under table (Velcro?) or on subject

Mixer

- ☐ Perform audio check procedure for each channel

Filming area

- ☐ Have subjects perform calibration procedure on Cintiq
- ☐ Open Camtasia on both MacBook airs

Filming

- ☐ Ask for all cell phones to be silenced, all computers (except MacBook Air) to be shut down
- ☐ No chewing gum
- ☐ Adjust seat height
- ☐ Signs outside of both doors stating FILMING DO NOT DISTURB
- ☐ Hit record on Overhead Camera,
- ☐ Hit record on Front Camera
- ☐ Open Camtasia and choose 1080p (full screen) and be sure mic is enabled. Hit record.
- ☐ Clap three times to help with later syncing of camcorders in post-production.