Center for Education Policy Research
HARVARD UNIVERSITY

Turnkey Technology: Setting up Schools for Effective Implementation

Video is a powerful tool for teachers to hone their expertise, share best practices, and receive feedback. However, the potential will not be realized if the right technology and infrastructure is not in place. Teachers and school administrators have demanding jobs, so it is essential to ensure that new technologies supplement their work without adding undue stress, confusion, and wasted time.

Thoughtful implementation of technology was a key consideration of the **Best Foot Forward project**, a study of how video use can improve classroom observations.

This section describes the components of a classroom video kit as well as the considerations that go into making an informed selection. We also share our knowledge of incorporating video technology into existing infrastructure and making sure that the necessary supports are in place, and we share some best practices for training teachers and administrators to use new video technology. This section contains both practical "big picture" considerations for district and school leaders and also more specific advice for the individuals who may be responsible for ultimately selecting and implementing the new video equipment.

IN THIS SECTION:

- What do I need to consider when selecting optimal video technology?
- What personnel, budgetary, and technological infrastructure do I need to support effective video use?
- How can I design an effective training that minimizes the need for training support and remediation throughout the year?

STEP 1: CHOOSE THE RIGHT TECHNOLOGY [P. 30]

STEP 2: SET UP YOUR INFRA-STRUCTURE [P. 34]

STEP 3: TRAIN TEACHERS AND OBSERVERS [P. 38]

"One of [my teachers] was frustrated at the very beginning with how the technology didn't work for her, so she didn't embrace it for the rest of the time. It became an impediment. So I don't know that she got a lot of out of it and wasn't as reflective as...others were."

Best Foot Forward principal, Colorado (2014)

Step 1: Choose the Right Technology

The classroom video kit is the keystone to any successful video observation process. Teachers will not reap the benefits of video if their equipment is difficult to operate. For your classroom video pilot to succeed, you will need to select high-quality technology that is user-friendly and well-supported.

KEY TECHNOLOGY TERMS
Hardware: technology that occupies a physical space, in this case things like a video camera, microphone, or computer
Kit: all the pieces of hardware and software needed to complete a video observation
Software: programs or websites accessed from a computer to support your use of video, such as for editing length or sharing with another person (a viewing platform is an example of software)
Viewing Platform: a website that allows people to share videos with specific people

If you choose a kit that is more complex to use, be sure to increase the amount of training and support to ensure successful implementation and adoption.

To choose the right technology, start by considering how the video will be used after being recorded. When you reach a decision, you should plan to pilot the technology with a small group of teachers and observers, collect their feedback, and adjust your technology and protocols as needed.

Researchers in the Best Foot Forward project replaced live teacher evaluations with videotaped observations. This required high-quality audio and a wide view of the classroom to provide optimal evidence for teachers and evaluators. When video is used for other purposes, such as distance learning for absent students or teacher team collaboration, the same caliber of audio and visuals may not be necessary. Similarly, you will also need to consider how teachers and observers will review the videos.

Classrooms are dynamic, student-centered spaces. This makes video capture more complex.

A CLASSROOM VIDEO KIT

Essential	Optional
• Video camera • Microphone (internal to camera or external) • Tripod or stand • Viewing platform	• Wide-angle lens • Storage container for equipment • Additional microphone

THE BEST FOOT FORWARD KIT

- Video camera (tablet)
- Robotic base
- Two external microphones
- Tripod
- Viewing platform

5 WAYS TO USE VIDEO OBSERVATIONS

1. Self-reflection
2. Peer collaboration
3. Teacher coaching
4. Formal observation
5. Best practices library

OUR GUIDING RULE ON TECHNOLOGY

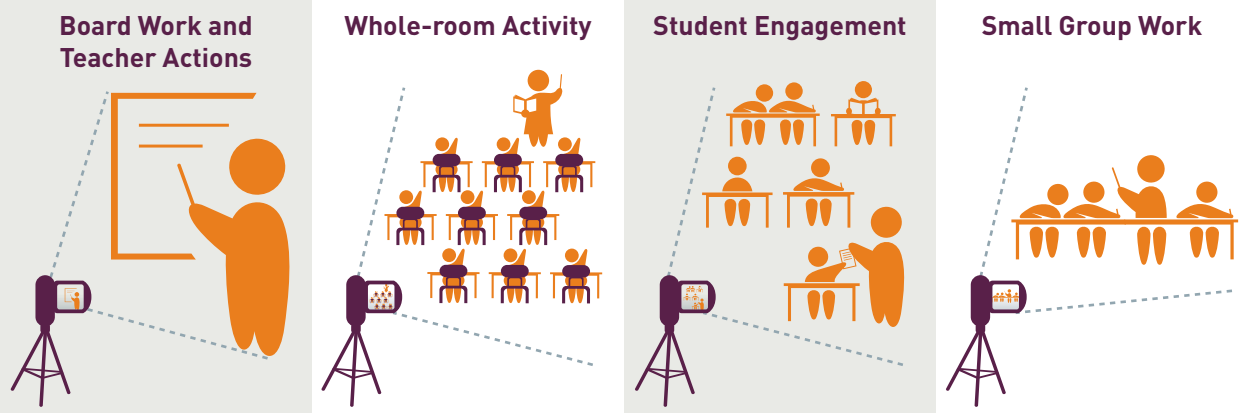
When selecting your technology, a single priority should guide your decision-making: simplicity and ease of use. Prioritizing this will yield the best results. If not, make sure that technological support is readily available to the teachers and administrators involved in the process. It can be tempting to invest in a high-tech setup that would result in video with the highest-quality image and sound. However, most teachers don't have time to master a complex system on top of their daily demands. No matter the complexity of the camera kit, purposeful training can help prepare your teachers to capture the most important parts of the lesson.

CAMERAS

Teachers today rarely stand at the front of the classroom lecturing students for hours on end: Classrooms are much more dynamic, student-centered spaces. This makes video capture more complex. A live observer can move around a classroom or easily shift focus from student work in one corner to the lesson chart paper in another, but a video camera on its own cannot. That's why it's important to prioritize the focus features of a particular video camera.

Some sophisticated devices allow you to film an entire room with a wide-angle lens or a moving robot base, while a smartphone on a sm all tripod may be perfect for filming small group work. A semi-permanent installation may work well if each teacher is using his or her own camera, you know what view you want to have consistently, and the room is secure. A more portable setup would be preferable if teachers will use the camera dynamically (sometimes filming the entire class, other times small groups), share a single camera between classrooms, or need to bring it home at times. The Hardware Decision Guide will help showcase various features that support your purpose.

A Window into the Classroom: What Can a Camera Capture?



MICROPHONES

In addition to dynamic visuals, classrooms also provide a challenging soundscape. For example, a teacher delivering direct instruction is relatively easy to capture, but when students engage in group work there will be a lot of competing noise that can be difficult to understand during playback. You can choose between microphones that are built into the camera or external microphones that can be placed in the classroom. With external microphones, choose wireless technology whenever possible so that teachers have free range of motion, and you don't add any tripping hazards. You have a few choices for how you record audio in the classroom.

1. **Camera's internal microphone:** Although the simplest solution, an internal microphone has limited range and will generally capture whatever is loudest in the classroom, such as a teacher giving instruction or the student sitting close to the camera having a conversation.
2. **Single external microphone:** A single microphone can often be used easily with most cameras. With any external microphone, choose wireless microphones whenever possible, and decide whether this is something that teacher wears or if it is strategically placed among a group of students.
3. **Dual external microphones:** Using two microphones is a little more complex, so use our guiding rule on technology: Make the complexity of the kit proportionate to the support available. However, if used well, this option can give a clear recording throughout the lesson of both the teacher and another area of the room. For example, a second microphone could be used to capture student questions more clearly or to pick up smaller conversations.

   Certain microphones will work better for capturing teacher–student conversations than for hearing a small group discussion. At this time, the only way to hear nearly everything that happens in a classroom is to have a sound crew there with a variety of equipment. However, the options listed here are versatile, and our Microphone Guide can explain further details and help you determine what's best for your schools.

VIEWING PLATFORMS

In most cases, we recommend an online viewing platform—that is, a website that allows people to share videos with one another. A viewing platform that can integrate your district's rubric and provide analytics will be needed for evaluation purposes while you may only need viewing and commenting features for other types of coaching and collaboration. See the Viewing Platform List to find the resource that best meets your needs.

COST MANAGEMENT

Classroom video technology can be an expensive endeavor, particularly if you select a camera kit for every teacher or choose devices with elaborate features. The good news is that purchasing a camera unit doesn't have to break the bank.

If you don't have one camera per teacher, schools or teams can share a camera kit and log off of the device once they've retrieved their personal video footage. Another cost-saving option could be to leverage something already in schools, such as tablet devices, which can be outfitted with supportive accessories to aid sound and angle. Some devices use an SD card, in which case you could provide these to teachers to use with their smartphone or certain tablet devices.

Return to your original purpose for using video. For example, you'll want widespread technology access for formal observations and evaluations. For creating a video library of best teaching practices, you may only need to have one setup at each school or even a few kits at the central office that could be shared among schools. Viewing platforms for watching the videos can be free or cost a small annual fee.

RECOMMENDATIONS

1. **Consider your space and goals.** Some cameras are easily moved, like a classic camcorder or smartphone, while others can be affixed to a wall or ceiling. You'll want higher-quality video for formal evaluation than you might need for peer collaboration. Check that the technology you select is compatible with your context.
2. **Put your technology to the test.** Before planning for implementation at full scale, try piloting your kit with a small group of teachers. Their experience is an excellent way to uncover what works well, what should be adjusted, and what should not be implemented at scale. It is wise to include teachers with varying competency using new technology.
3. **A good relationship with your technology vendor goes a long way.** Once you find your dream equipment, you still need to plan for a dream partnership with the technology vendor. You want to find a partner that is knowledgeable, accommodating, and responsive and that provides you with any analytics you need.

TECHNOLOGY TOOLS

TOOL ID	RESOURCE	DESCRIPTION	INTENDED AUDIENCE
T1A	Choose the Right Camera	A guide to matching video equipment to your goals*	District administrators, school administrators, instructional leaders, teachers
T1B	Audio Design: Microphones for the Classroom	A description of different types of microphones and their best uses*	
T1C	Viewing Platform Vendor List	A guide to platforms that can be used for reviewing classroom videos*	

**Please note that this does not constitute an endorsement of any products or services.*

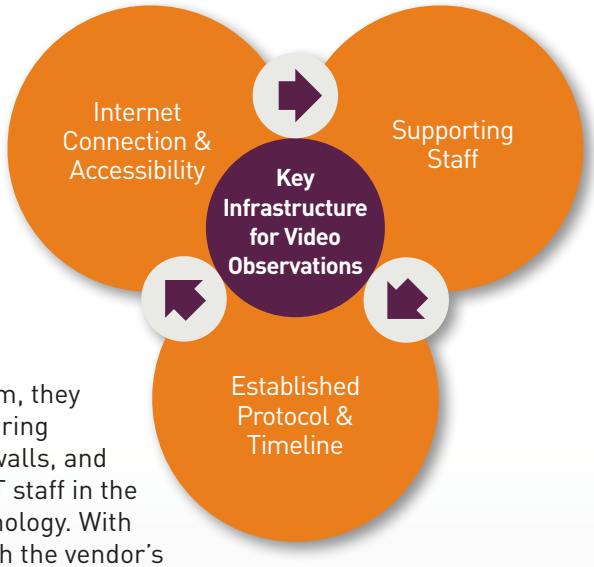
"If you're going to have issues, thank goodness that there are people there who are going to help you."

Best Foot Forward teacher, Delaware (2014)

Step 2: Set up Your Infrastructure

When implementing a new technology in schools there will be malfunctions and glitches that you just can't plan for. However, you can plan to have people and protocols in place to respond to these challenges, which will ensure that your program runs as smoothly as possible.

There are at least three key considerations for infrastructure: network connection and accessibility, support staff, and an established protocol and timeline.



NETWORK CONNECTION

For teachers and observers to share videos and interact with them, they need to use the Internet. In addition to requiring the Internet, sharing videos can prove challenging due to large file sizes, network firewalls, and download restrictions. To minimize this challenge, include your IT staff in the process of planning and testing before launching new video technology. With some cameras and sharing platforms it is important to speak with the vendor's support or engineering staff in order to identify particular obstacles that could prevent successful use. Some common culprits we've encountered include the following:

OBSTACLES TO UPLOADING VIDEO TO THE INTERNET	
Computer/ network speed	Videos are large files and get larger as the quality increases. Older computers, or ones with low storage capacities, may struggle to play video smoothly, especially online.
Browser compatibility	Some viewing platforms are optimized for a specific web browser, such as Chrome, Safari, Internet Explorer, or Firefox. Your platform vendor will know this information, and your local IT team can ensure the necessary programs are installed.
Firewalls	Most districts use firewalls to filter certain content. If your district blocks sites like YouTube for watching videos, this may impact other websites for sharing video.
Plugins	Playing video online usually requires a plugin module, which is software that works with your Internet browser. Plugins usually need to be downloaded, and some districts restrict download capabilities.
MAC addresses	Some video cameras may have a MAC address, a unique identifier that allows that device to communicate with a network. If you have a camera that uploads directly to a platform, your IT team may need to safe-list the MAC addresses for any cameras being used.

TECHNICAL SUPPORT

Even the best technology may have glitches, so having support personnel available to work through challenges will preserve momentum in adoption of the new technology. An internal point person can work with teachers and administrators in a troubleshooting role, or at the least act as a liaison with vendor support teams.

Your vendor should always provide support: They know the technology best. As an educational institution with a multiple purchases, it is reasonable to expect a technology vendor to provide a case manager for your district. This person should be able to work with your IT staff to provide any technical details for implementation and to work with you throughout the year in providing analytics. There may be cases where your support does not actually come from the product manufacturer. Some retailers provide support for their products.

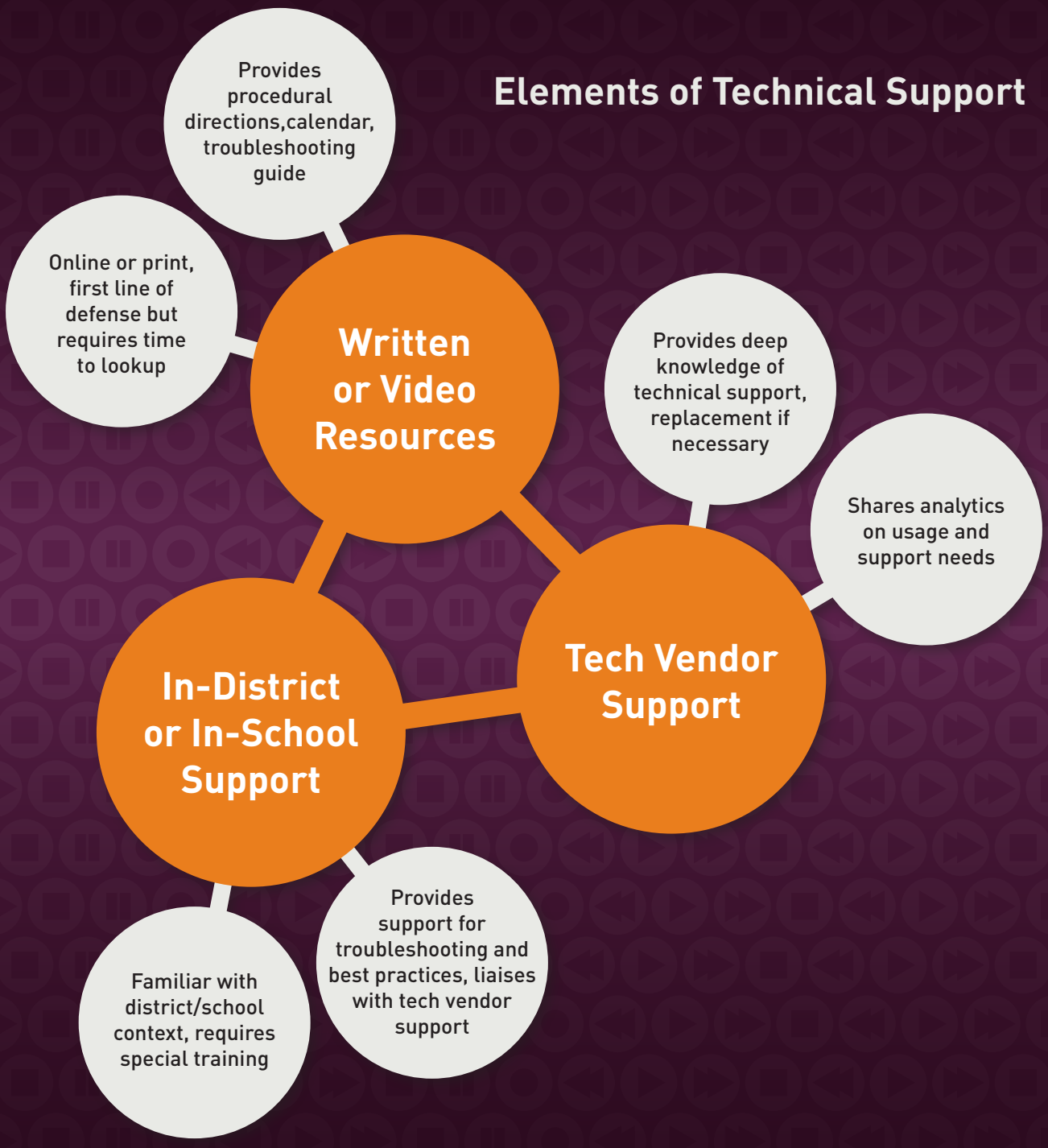
As you move past the initial phase of training, support needs will subside but not diminish. Consider appointing a willing teacher or other school-based tech coordinator to be an in-school trainer. This person may go through a more in-depth training and practice before others so that he or she can answer ongoing questions and provide continued support for teachers and observers. Schools will benefit from readily available support because it allows teachers to reach out to a coworker for support rather than an external technology provider, and thus increases teacher comfort with the process. A support protocol that requires the individual teacher to spend even 30 extra minutes on trial-and-error troubleshooting is not going to be popular.

In addition to designated people who can support teachers and administrators, it is wise to provide help materials that can be accessed at any time. A binder providing directions for setup and use, troubleshooting tips, a scheduling calendar, and frequently asked questions is helpful. A how-to guide can also be created online and include videos. While a guide is an important element of your support infrastructure, it is not a standalone solution; also be sure to utilize the in-district or in-school support staff as well as the tech vendor support described above. Giving teachers and administrators a clear outline on these three distinct resources and how they work together will reduce frustration when problems arise.

An internal point person can work with teachers and administrators in a troubleshooting role, or at the least act as a liaison with manufacturer support teams.

CHECKLIST FOR LAUNCH

- ✔ Video and audio equipment has been selected and tested.
- ✔ IT staff has checked network access to viewing platform.
- ✔ IT staff has tested network abilities to handle video.
- ✔ Step-by-step procedures for setup, filming, uploading, and sharing have been shared.
- ✔ A calendar of benchmarks and due dates has been created and shared.
- ✔ Directions to in-person, phone, or written support are accessible.


Elements of Technical Support
Written or Video Resources
Provides procedural directions,calendar, troubleshooting guide
Online or print, first line of defense but requires time to lookup
Tech Vendor Support
Provides deep knowledge of technical support, replacement if necessary
Shares analytics on usage and support needs
In-District or In-School Support
Provides support for troubleshooting and best practices, liaises with tech vendor support
Familiar with district/school context, requires special training

TIMELINE

Be certain to build in as much time as possible to pilot new technology before implementing at scale. Your new video observation system may involve video hardware, audio hardware, and an online viewing platform, all of which need to work cooperatively and consistently. As described in Choose the Right Technology, it is important to pilot technology before wide-scale implementation to ensure that your AV equipment is compatible, that you can upload to computers smoothly, and that uploading to an online platform is not blocked due to video file size, network firewalls, or browser compatibility.

The easiest time to introduce a new process is at the start of the school year, so prepare to have technology tested and training prepared for the first day of school. In addition, if you're using video as part of a formal observation or professional development program, then you should set a timeline of benchmarks and due dates for tasks like recording and uploading videos, sharing work, or providing feedback. If the infrastructure as described here is not in place by your launch date, then you will likely lose momentum early on, and workloads will build up until later in the year.

RECOMMENDATIONS

1. **Appoint a resident expert.** Having someone locally available to support your educators will streamline support, help identify recurring challenges, and reduce frustration. Consider incentives for a "video captain" or IT specialist who takes this mantle.
2. **Ask for a support manager with your technology vendor.** Having someone who has intimate knowledge of the technology and how you will use it will help ensure that the process meets your expectations and that you have a direct point of contact to track successes and challenges.
3. **Provide written or video resources for reference.** When using video, teachers and principals may choose to complete observation work outside of school hours. Should they encounter any difficulty at this time, it is helpful to have support materials available.
4. **Test the whole process, adapt, and repeat.** If there are certain elements that cause regular difficulty, work with your in-district and vendor support to troubleshoot, and, if needed, replace particular components or protocols.

INFRASTRUCTURE TOOLS

TOOL ID	RESOURCE	DESCRIPTION	INTENDED AUDIENCE
T2A	Infrastructure Checklist for Launch	A checklist to ensure your infrastructure is in place before teachers and administrators start using the technology	District administrators, school administrators
T2B	Sample Support Structure	An organizational chart to streamline support for users	
T2C	How to Talk to Technology Vendors: A Guide for Education Leaders	Advice for making the most of your collaboration with tech vendors	

"You want to spend time reflecting on the video, not trying to figure out how to play it."

Best Foot Forward teacher, Colorado (2014)

Step 3: Train Teachers and Observers

As part of the Best Foot Forward project, teachers and observers were trained to use self-controlled audio and video equipment, as well as an online platform for sharing videos and providing feedback and evaluation. Teachers and administrators completed either a five-hour in-person training or a blend of online training modules and in-person support early in the school year. Many teachers and school administrators expressed a desire for periodic trainings throughout the year to continue to improve their use of video.

Strong initial training and ongoing support will sustain successful use of video in the classroom. Effective technology implementation provides a foundation upon which schools can build a better observation process. If the foundation is weak, the real work of teacher development will suffer. Therefore, it is essential to provide opportunities for early, hands-on practice with the equipment and immediate feedback. In this section, we'll look at the **who, what, when, where,** and **how** of implementing a strong training opportunity for your educators.

WHO SHOULD ATTEND TRAININGS ON CLASSROOM VIDEO?

Learning to use video is a collaborative experience for teachers and administrators. Make sure that they work together to understand the big picture and where their responsibilities in the observation process come together. It may seem intuitive to separate teachers' and administrators' trainings, so that each group is focused on the specific skills that they will need to succeed; however, with Best Foot Forward, we learned that having both parties come together to define their roles, expectations, and goals in the observation process can be highly effective. While you'll still want to have specific training sessions for each group on the pieces of technology that they will use, getting both groups to invest in the process by having a joint conversation will improve long-term engagement and mutual support.

As you plan your training, consider how you will also train the people who will lead support, whether they're IT staff, district staff, or specific teachers. These people should have the most in-depth knowledge of the technology and should receive comprehensive training and practice.

WHAT SKILLS SHOULD BE COVERED IN TRAINING?

The technology you select will mandate the particular skills your teachers and administrators need to learn to become proficient. Identify each discrete step in the observation process. You should provide the opportunity for all participants to go through the full observation cycle. Teachers should setup their equipment, film, upload, and share a video. Observers should practice accessing and sharing feedback on the video. See our Sample Training Agenda for an example of how to train educators for formal video observations.

Teachers and administrators will have varying levels of comfort with technology. Before beginning the training, you can ask teachers to self-rate their comfort with technology or give them a short activity to evaluate their readiness. Tailor training based on this level of comfort. When developing your training and support structures, consider how you can differentiate training based on these levels. Underscore the value of video, take the time to address any concerns, and provide a clear pathway to ongoing support. Consistently highlight that a mindset based on learning and growth, not prior knowledge or skills, will lead to success.

Beyond discomfort with the technology, the experience of watching oneself on video can make many teachers uneasy at first. This will change over time. Break the ice early by having teachers film each other in pairs and watch the video. In the long run, these steps will make teachers more comfortable with video and encourage them to direct their own learning.

WHEN IS THE BEST TIME FOR TRAINING?

Training should occur at a time when both teachers and administrators can meet together, so consider professional development times or school staff development days. You can also consider breaking training into multiple days covering discrete skills or plan to have check-in trainings to troubleshoot areas of need throughout the school year.

WHERE SHOULD TRAINING TAKE PLACE?

Whenever possible, hold the training in the context in which video will be used: Training to film in the cafeteria will not be as effective as giving teachers the opportunity to set up the technology in their own classroom (or a classroom similar to theirs) and testing the camera in their unique space.

You should measure the success of training by assessing each teacher's independent ability to setup equipment, record video, and upload video to a shared platform. Similarly, observers should complete an online mock observation in full.

HOW MIGHT VIDEO FIT INTO EXISTING TRAINING OPPORTUNITIES AND HOW IS SUCCESS MEASURED?

Most school districts train their observers on how to complete teacher observations and evaluations, and many also train teachers to understand their instructional rubrics and strategies for growth and professional development. When implementing video, consider how you can build off of what already exists: Administrators may practice scoring by tagging a video using the rubric, or teachers may learn to identify certain practices by reviewing them on existing video. Using this prior knowledge will allow you to introduce video as a new tool in the process, not a new process in itself.

You should measure the success of training by assessing each teacher's independent ability to setup equipment, record video, and upload video to a shared platform. Similarly, observers should complete an online mock observation in full. Use data from this final assessment exercise to provide differential supports to those who are still struggling with the technology.

KEEP IT SIMPLE

As with your technology, keep training simple. Once you design your optimal teacher and observer training, bring in fresh eyes to re-evaluate your design for simplicity and clarity. Remember that a simple implementation and training process will lead to deeper teacher learning. In addition, always keep in mind that it is the quality of instruction, not the quality of video, is the central concern—a low-resolution video of great teaching and learning is better than a high-definition video of an empty classroom!

RECOMMENDATIONS

1. **Prioritize your essential skills.** There is a lot to be learned when introducing a new technology into schools. Format your training so that the most important skills are clearly identified and participants have an opportunity to practice each of them.
2. **Bring teachers and observers together.** Video observations will be a shared experience, so it makes the most sense to bring all parties together at the start, rather than beginning separately and coming together at a later point in the process. Not having a shared understanding is likely to increase confusion and decrease satisfaction.
3. **Hold more than one training session.** Troubleshooting any challenges early on will smooth the implementation process. Some teachers might have difficulty the first times they attempt to record, or administrators might have questions once they begin reviewing in earnest. Consider a check-in session after the first month or recurring training opportunities, and film at least one training to save as a support resource.

TRAINING TOOLS

TOOL ID	RESOURCE	DESCRIPTION	INTENDED AUDIENCE
T3A	Teacher Letter: Benefits of Video Observations and Common Questions about Privacy and Video Use	A template letter to teachers highlighting the benefits of using video for classroom observations and evaluation, as well as responses to possible concerns over privacy	Teachers (to be modified by district or school administrators)
T3B	Classroom Video Training Example	A sample lesson plan for a training for teachers and principals on using video for formal observations	District administrators, school administrators, instructional leaders
T3C	MTTS Study: Quick Guides	Some how-to videos for using video technology in the classroom from the MTTS Study	Teachers, instructional leaders, school administrators, district administrators
T3D	Measuring Training Success	A rubric to evaluate the efficacy of your technology training	District administrators, school administrators, instructional leaders