

# THINGS YOU SHOULD KNOW ABOUT...™

## PROJECTING FROM MOBILE DEVICES

### Scenario

Katie, a junior in Music History, plays keyboard on Mondays and Wednesdays in a performance session with her jazz ensemble. On Mondays the group meets with their conductor, Dr. Kerwyn. Their ensemble was one of three chosen to experiment with reading music from iPads. Dr. Kerwyn, who conducts from a score displayed on his own iPad, projects his copy of the score wirelessly onto an LCD TV screen, which is useful for tracking cues. For example, when instruments have dropped out for a number of rests, seeing the conductor's score gives band members a heads-up when the conductor is about to cue their parts. When Dr. Kerwyn gives instructions, he zooms in on a section of the score or circles it to draw class attention to it. If his comments are directed to the guitarist, for instance, he might change the projector feed, pulling it in from the guitarist's iPad to show only the music score for guitar.

This week their group has been working on an original score that Dr. Kerwyn has been writing. Using a whiteboard application that allows him to draw on the iPad with a stylus, he periodically stops the music to write in changes as the music is projected where the ensemble can see it. Students can download to their iPads any changes that affect their parts of the score. Occasionally when they play a newly changed passage, Dr. Kerwyn is dissatisfied and makes other changes. Katie enjoys the live feeling of playing music as it is built, particularly because Dr. Kerwyn has twice asked her opinion on a musical phrase.

On Wednesdays, the ensemble works with Dr. Kerwyn's graduate assistant, Dave. Katie's favorite part of these sessions is the improvisation game Dave conducts. Using a whiteboard app that can project a blank score, Dave draws in the tempo and a starting chord. Then he specifies the chord they will resolve after a specified number of measures. Sometimes he also changes the time signature. With only the count and a few specified chords, the ensemble had some tangles, a few of which were so complete, they ended in laughter. But as the semester approaches midterm, they have far fewer stumbles—even though Dave keeps trying to challenge them.

### 1 What is it?

As professionals in the academic community increasingly leave their laptops behind in favor of tablets and similar tools, **the pressure mounts for instructional and collaborative spaces to accommodate projection from such mobile devices.** Typical projection systems—with their cables, remotes, and data controllers—can be the antithesis of a lightweight, intuitive mobile device. Getting these two technologies to work well together can be harder than it looks, but the rewards are considerable. Mobile projection can provide the equivalent of a low-cost, interactive whiteboard, where diagrams, handwritten observations, and equations can be entered as needed to support class discussion. With a few clicks, the tablet might present lecture slides, interactive maps, or a video about the current topic. Where mobile projection offers wireless control, the instructor can manipulate these changes from anywhere in the room, allowing students to participate in activities using the mobile device. Currently the iPad leads the field in controlling mobile projection, but manufacturers of other tablets are expected to have similar options available soon.

### 2 How does it work?

**There are several ways to control a classroom projector with a mobile device.** One requires an iPad, a VGA or HDMI cable, and an LCD TV or projector. This is perhaps the least attractive of the options, however, because it requires cables to connect the iPad to the projector and because, depending on the specific versions of hardware and software being used, another application layer might be required to have true projector mirroring of all types of content being displayed. A second method is to use an iPad to wirelessly control a classroom laptop or desktop that is attached to the projector. In this way, remote connection software such as iTeleport, Doceri, Reflections, or SplashTop can be used to remotely control the connected Windows or Mac computer from the iPad. A third option, inviting in its relative simplicity, is to connect an iPad with an LCD TV or projector using Apple TV. No special software is required to achieve wireless control, with exact mirroring of iPad content. Another emerging technology in mobile projection is small, handheld (or “pico”) projectors. Although they have limitations relative to standard projection systems, they offer another option for projecting from tablets and other mobile devices.

### 3 Who's doing it?

Mobile projection technology has not been available long, and **many instructors, departments, and colleges are still experimenting with ways to use it most effectively.** In a language course at Smith College, for example, the professor uses a whiteboard app on her iPad to write Korean characters that are projected through Apple TV. She passes the device around to

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students, who use the stylus to enter questions, responses, and demonstrations for the class. Elsewhere at Smith, Apple projection is used for document sharing—multiple participants, each equipped with an iPad, can work on a single projected document. Similar collaborative efforts using iPad projection can be seen in a University of Tennessee class in environmental and soil sciences. The classroom is set up to accommodate four teams working collaboratively on separate parts of a larger class problem. Each team has its own projection and viewing area where Mac Minis drive the display technology and iPads (or laptops) are used to control presentation. Near the end of class, the work of all four teams is combined as the class works to resolve the larger issue.

## 4 Why is it significant?

Using wireless projection, instructors can hand off the tablet for student input or shift projection sources to allow students to show work from their own devices. Tablets and inexpensive apps make it easy to present ad hoc sketches that multiple participants can revise or music scores for work created and edited on the spot. They can eliminate the document cameras frequently used for formulas in math and chemistry, and they allow input of language text that uses characters unavailable on a standard laptop keyboard. Groups using iPads may come up with different content maps, different solution sets, or alternate answers to problems, which can then be projected to share with the entire class. A standard projection system with cables and a laptop can create a barrier between instructor and student, as it forces presenters to manipulate their content from a single location. Wireless mobile projection offers a solution that can clear valuable space in a room of any size, opening up more effective communication, **allowing instructors to move throughout the class, and creating new opportunities for sharing content with students.**

## 5 What are the downsides?

Perhaps the biggest drawback to mobile projection is that not all tablets can take advantage of it. To date, it is only available for iOS devices and Android tablets and phones equipped with an HDMI port, though the list of options is changing rapidly. Where it is available, proper network configuration can be a significant challenge. Apple TV, for example, is not designed with many of the safeguards expected in an enterprise network environment, leading to concerns about who—and under what conditions—has control of the content displayed. Finally, **a mobile projection setup can require considerable tweaking to get all hardware and applications to work properly.**

## 6 Where is it going?

Mobile devices are approaching ubiquity, and the ability to project from them is increasingly valuable in educational contexts. **The technologies to provide this capability are evolving very quickly**, and experimentation is already under way at several campuses to control classroom projection from hardware using the Android OS. Apple has recently announced that Apple TV will support wireless projection from Mac laptops. Already, users with smartphones can access cloud-based presentations and project them for group viewing. As mobile projection becomes more common, presenters may be more likely to bring their own tablets and smartphones as their first choice for controlling the presentation or as a backup in case the provided technology fails. In the end, fewer classrooms might need to be equipped with the computers that currently control projection. Also, classrooms (such as seminar rooms) that in the past could not easily accommodate permanently installed computers can now become technologically enabled.

## 7 What are the implications for teaching and learning?

**Projecting lecture slides, websites, and other data from a mobile device wirelessly changes the character of communication and interaction in the classroom.** The instructor who is not tethered to a lectern can move freely among students, passing the tablet controller to any student who wants to present visual information. This allows students to make an easy transition from content consumers to content creators. Where the projection system functions as an electronic whiteboard, the iPad can provide improved accessibility. A handheld device can be easier to manage for those who have difficulty reaching the top level of a physical whiteboard and can similarly provide convenience for those with mobility concerns. Finally, using the iPad as an electronic whiteboard means instructors can retain an archival copy of their in-class notes to share with students or to check subsequently to see how they explained a point, presented a formula, or provided crucial information.

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