

## Getting Smarter in the Classroom: Interactive Whiteboards and Music Theory

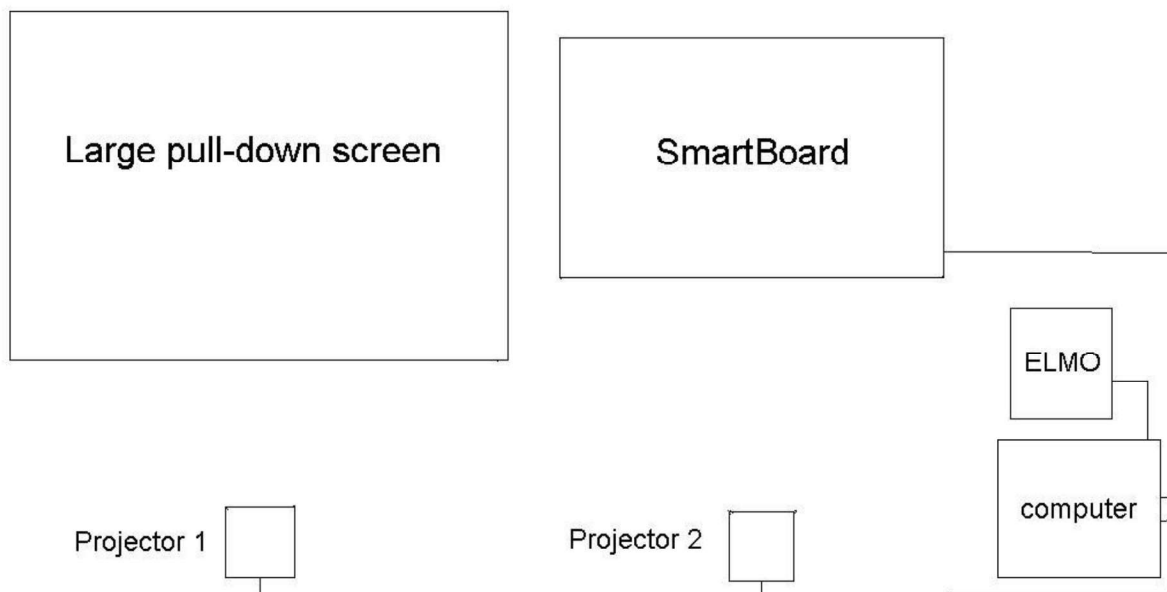
### 1. Background

Recently, our department acquired a SmartBoard for the classroom where we teach music theory and aural skills. We wanted to have an interactive whiteboard for our music education majors, who would potentially be using them in public schools, but we really had no idea what to do with it in our college music courses. The SmartBoard specialists that came to campus to demonstrate its many uses had very little help to offer us. None of the features that they discussed had very much to do with what I did in my music classes each day. But after a good deal of in-class experimentation, I found that there *were* some interesting uses for the SmartBoard in music theory, aural skills, music fundamentals, and other college-level music courses. I will describe here some of the techniques that I found to be the most successful, and will demonstrate these ideas with a number of short YouTube videos.

### 2. Classroom setup

To begin, I will describe our basic classroom setup (see Figure 1). First of all, there is a computer (ours is a Mac Mini) that is connected by a single Ethernet cable to the SmartBoard, which is installed on the wall like a traditional whiteboard. The computer is also connected to a ceiling-mounted projector, which projects the image of the computer screen onto the SmartBoard (see [Video 1](#)).

**Figure 1.** Classroom setup



The surface of the SmartBoard detects pressure and motion from the SmartBoard markers (or from your fingers) and translates these into actions on the desktop. In [Video 2](#), I demonstrate how to use the SmartBoard to interact with the desktop, performing basic tasks such as opening menus, files, and folders and switching between applications. Controlling the desktop with the SmartBoard is in many ways similar to controlling a screen cursor by moving the mouse on a mouse pad. In this sense, the SmartBoard is nothing more than a gigantic mouse pad on the wall.

Our particular SmartBoard setup is unique in that it includes a second projector that is pointed towards a somewhat larger pull-down screen. This second screen is a multi-purpose display area that I can use to duplicate the image on the computer screen or to show projections from the ELMO document camera (see [Video 3](#)). This setup allows me to project everything that I am doing on the SmartBoard onto the larger screen, which improves visibility in the classroom, since I am never blocking any content with my body (see [Video 4](#)). The large pull-down screen also magnifies what I am doing on the SmartBoard.

This setup also gives me the capability to show two different kinds of media at once. For example, I will often project PowerPoint notes or formal diagrams on the SmartBoard while I annotate pages in a physical score or write music on a piece of staff paper that is projected onto the big screen by the ELMO (see [Video 5](#)). The dual-display method gives me true multimedia capability. Before we had two projectors, I found myself constantly shifting back and forth between different types of media in class, which was tedious and potentially disorienting. Note that classroom lighting can sometimes be an issue. In order to help students see the displays better, I normally turn off the front row of lights in the room, and sometimes I turn off all of the lights, as in [Video 6](#). The only challenge with this approach is keeping students attentive and awake.

### 3. The SmartBoard vs. a traditional whiteboard

Now I'd like to direct my attention back to the SmartBoard, which in many ways acts as a substitute for a traditional whiteboard. When you open the Smart Notebook software (which comes bundled with the SmartBoard), you get a blank canvas that can be used simply as a whiteboard. Below the board there are four bins for colored pens (black, red, green, and blue) and a bin for an eraser. [Video 7](#) illustrates how these can be used to write on the board as if it were a regular whiteboard.

In the right-hand panel within the Notebook software, you have access to a gallery of content that can quickly be added to the board. For example, staff lines can easily be added to the background, allowing you to use the SmartBoard as a lined whiteboard (see [Video 8](#)). This is perfect for everyday tasks such as spelling chords, writing out scales or key signatures, or doing simple voice-leading exercises.

The “My Content” folder in the gallery pane is the best place to keep useful backgrounds and graphics, such as the circle of fifths (see [Video 9](#)). There is a set of music graphics that comes pre-packaged in Notebook (quarter notes, eighth notes, treble clefs, etc.; see [Video 10](#)) but because of the complexities of music notation, these generally won’t be very useful in college-level music courses. Most of these materials would be more appropriate for an elementary music classroom. And the same is true of most of the music-related materials that have been uploaded to the SmartExchange website (found at <http://exchange.smarttech.com/search.html?subject=Music>)—these materials are designed primarily for K-12 education.

One noteworthy feature of the SmartBoard that would *not* be possible with a traditional whiteboard is the ability to move notes (and other objects) around on the board after you have drawn them, as illustrated in [Video 11](#). With practice, this feature allows you to make simple alterations to the music on the board without having to erase and redraw the notes.

#### 4. SmartBoard tools

There are number of useful tools that you can access in the Notebook toolbar, such as the highlighter tool, the arrow tool, and the calligraphy pen. These are demonstrated in [Video 12](#). I use these tools most often for annotating musical scores. Basic shapes such as lines, boxes, and arcs can be drawn as well (see [Video 13](#)). The shape tools can be used to annotate scores as well, or to create simple formal diagrams. Note that you can use the properties tab on the right-hand side of the screen to edit some of the basic properties of objects, such as their color, width, or transparency, as illustrated in [Video 14](#). Some of the other tools in the Notebook toolbar are flashy and fun, but not very useful for college-level music teaching (see [Video 15](#) for a few of these).

In addition to the main toolbar, there is also a floating toolbar on the side of the screen that can be expanded for easy access to annotation tools like highlighters and pens (see [Video 16](#)) and to the spotlight tool, which can be used to draw your students’ attention to something important on the screen (see [Video 17](#)). Unlike the other toolbars, this floating toolbar is also accessible when you are using other applications.

#### 5. Preparing and working with content

The SmartBoard has several other advantages over a whiteboard: (1) content can be prepared beforehand (and can even be prepared outside of the classroom), (2) the instructor can page through multiple pages of content (rather than having to erase the board and restart), and (3) work that is done in class can be saved for future reference.

In my music fundamentals class, we have a workbook that we spend a lot of time working on together in class. Before I had the SmartBoard, I had to make copies of the same workbook pages every semester. Then, I would use the document camera to work on these physical copies. I could never write in the actual workbook, because then I wouldn't have a blank page to make copies with in the future. And I wasted a lot of paper. Once we acquired the SmartBoard, I started scanning in all of my workbook pages as PDF images, so that I could reuse them indefinitely in the future. In class, I would just open these PDF files on the computer and write on them directly using the SmartBoard tools, as shown in [Video 18](#).

One of the problems I encountered in using PDF files was that the SmartBoard would add an ink layer over the top of the application (the PDF reader). And once an ink layer is created, you can't access the background layer, which prevents you from being able to scroll the page up and down, for instance. Touching the screen makes this ink layer disappear—giving you access to the desktop again—but it also causes your work to disappear. One way that you can save your work is to use the camera button to take a picture of your work, as illustrated in [Video 19](#).

A better way of handling this issue is to import your PDF files or images into a Notebook file. This will allow you to scroll within pages and even jump to other pages without losing any of your work, as illustrated in [Video 20](#). In [Video 21](#) I demonstrate how to annotate these pages, move from one page to another, and save the work that was done in class for later reference. One of the biggest advantages of the SmartBoard is that you can create multiple pages of content and switch between them without having to erase the board or switch to another board in the room. And if you install the Notebook software on your personal computer, you can prepare this content in your office, rather than at the SmartBoard.

## 6. Annotating musical scores

In my Music Theory III and IV courses, we work extensively with musical scores. I typically download public domain scores from [www.imslp.org](http://www.imslp.org) and put them in a packet for students and myself to analyze in class. One nice feature of the Notebook software is that I can take a PDF score from imslp.org and import it directly, so that each page becomes an image on a separate Notebook page. This process is demonstrated in [Video 22](#), in which I import the score for Bach's Unaccompanied Cello Suite no. 1.

[Video 23](#) presents an (admittedly impromptu) analysis of this cello suite in real time, using an online Naxos recording, a public domain score from imslp.org, and the SmartBoard annotation tools. One particularly useful tool that is demonstrated here is the magic pen. If I circle something in the score with the magic pen, it draws students' attention to that musical idea with a spotlight. If I draw a box around something with

the magic pen, it zooms into that area like a magnifying glass. I can also circle or underline ideas in the score for temporary emphasis—these magic pen symbols will disappear in 10-15 seconds.

## 7. Hiding and revealing content

Another rather handy feature is the window shade, which allows you to hide and reveal content on the screen. [Video 24](#) provides a quick demonstration of the window shade tool. This feature is particularly useful in aural skills courses. As [Video 25](#) illustrates, using the window shade in dual-page view allows you to hide the answer to a dictation problem on one page while the student works on the other page. You can then reveal the correct answer next to the student's answer for comparison. In general, I have found that students are more willing to come and put their work on the board when they are able to use the SmartBoard. One limitation of the SmartBoard that we own is that only one person can write on the board at a time. However, the newest generation of SmartBoards has multi-touch capability, allowing two people to write on the same board at once.

## 8. Using the SmartBoard with other software

Some of the most interesting uses of the SmartBoard in music theory pedagogy involve using it with other types of music software. For example, notation editors like Finale can be projected onto the board, allowing you to compose music at the board that can be heard and played back easily. [Video 26](#) provides an example of spontaneous composition at the SmartBoard using Finale. This is something that you can do together as a class. [Video 27](#) demonstrates how I might use the SmartBoard in an orchestration class, by experimenting with the instrumentation in a full orchestral score.

The Variations Audio Timeliner (<http://variations.sourceforge.net/vat/>) can be used to display interactive formal diagrams on the SmartBoard, helping students to better visualize musical form and allowing you as the instructor to easily navigate between different sections of a work by tapping on the bubbles in the diagram, as illustrated in [Video 28](#) (using Stravinsky's "Russian Dance"). The timeliner enables students to more easily make aural comparisons between different sections of a work, such as the principal sections of the exposition in Beethoven's "Appassionata" Sonata, as shown in [Video 29](#). Sometimes I will put a timeline diagram up on one screen and the score on the other, so that students can see both representations simultaneously (see [Video 30](#)). It is also possible to create a timeline diagram at the SmartBoard (ideally with input from your students), as illustrated in [Video 31](#). Using the timeliner on the SmartBoard makes it feel like you are *physically* interacting with music's form.

Even boring PowerPoint presentations can become more appealing when paired with the SmartBoard. [Video 32](#) demonstrates how PowerPoint can be used to play Jeopardy—a favorite review activity in my theory classes.

## 9. Online resources

Online resources can be used effectively with the SmartBoard as well. For example, online keyboards are “playable” on the SmartBoard, allowing your students to watch you play scales and arpeggios on the piano (see [Video 33](#)). In my music fundamentals classes, I often project music theory drills such as those found at [www.musictheory.net](http://www.musictheory.net) on the board, and call on students to come up and “click on” the board to identify intervals and key signatures (see [Video 34](#)). And in my world music classes, I like to pull up Google Maps or Google Earth and explore the areas that we’ll be talking about (see [Video 35](#)). In essence, anything that you can find online can become an interactive SmartBoard activity.

## 10. Summary

Although learning how to use the SmartBoard and preparing new lesson content requires an investment of time, it can pay off enormously in subsequent semesters, since your content will be all ready for you the next time around. Preparing content more effectively and motivating students to interact more directly with this content in class are just a few of the ways that we can get smarter in the classroom.