

# Online Professional

By Jim Vanides



# Development that Works

How would you like to teach the Science of Sound online?”

Little did I know that this question, and my affirmative response, would be the beginning of an adventure that would change my view of teaching and cultivate new skills as an instructor. I had already been delivering a Science of Sound workshop for elementary teachers as part of an NSF-funded project in the Silicon Valley region of California (currently called the Partnership for Student Success in Science, or PS<sup>3</sup>). How different could it be to teach the same material online, and reach teachers across the country? The answer, it turns out, was, “*very* different.” The interest in online learning has been growing at a rapid pace, especially for professionals who find it inconvenient to attend face-to-face workshops or courses. This is particularly true for educators pursuing inservice professional development, as there is precious little time to be away from their classrooms. This need, combined with the growing demand for science content courses for teachers, resulted in the NSF-funded National Teacher Enhancement Network, a series of online science courses offered by Montana State University for teachers across the United States. George Tuthill, co-director of the NTEN project, was the one who popped the question—and the adventure began.

My assignment was to create an online, one-unit masters-level course on the Science of Sound, designed specifically for elementary teachers. The course would be instructor-led, be offered to 15 to 50 teachers at a time, and last six weeks. The experience would be scheduled and asynchronous, which is to say no one had to be online at the same moment, but the assignments had deadlines and the course had a beginning and an end.

So how is that different from a face-to-face course? In more ways than I had anticipated!

## What Is the Same?

Just like any other course offered at Montana State, NTEN courses are taken by a cohort of students who, in this case, consist of practicing elementary and middle school teachers. Like my previous face-to-face workshops, my Science of Sound NTEN course is designed to encourage and model science inquiry. As such, in addition to reading reference material and texts, my students are provided hands-on materials for conducting experiments. They each create a Science Notebook to capture their personal reflections, observations, and data, and they work on projects together, talk with each other, and all have deadlines to meet.

The learning objectives have also not changed. Students enrolled in this course (or my workshop) will leave with a stronger conceptual understanding of the physics of sound, and will be more prepared to face the misconceptions their students may express. The content that is covered is the same as well. The Science of Sound doesn't change depending on the location of my classroom (though the acoustics of my virtual “classroom” are notably anechoic). Yet the experience, both for the teachers who are enrolled, and for me as an instructor, is remarkably different—and has forced me to rethink the way I teach.

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## Thinking Differently About Lesson Plans

The practical constraints surrounding online learning, especially delivered in a WebCT course management environment, create a creative instructional design challenge. The content to be learned is identical, but the experience is entirely different. To maintain the integrity and importance of a hands-on, inquiry-focused science course, *doing* science, not just reading about it, remains paramount. Thanks to the NTEN team, we are able to mail to each participant a kit of materials that includes inexpensive items around which the activities are designed. This way, busy teachers do not have to shop and hunt for supplies, and everyone in the class has a somewhat common experience to talk about. However, this doesn't stop the participants from extending the experiments using materials they find on their own—it simply provides a common starting point.

The experiences themselves, however, needed to be reviewed, redesigned, and sometimes replaced. Obvious activities, such as field trips to visit professionals whose jobs relate to the science of sound, had to be reconsidered. For example, how could I ensure that everyone would be able to find an audiologist willing to be interviewed? As an alternative, my audiologist friend agreed to be interviewed and filmed, allowing me to create a virtual field trip on CD. Click on objects in her office, and she explains how they work. More significantly, she kindly



participates in my actual course as a guest speaker, so teachers can still ask their own questions and learn how important the science of sound is in practical, life-changing ways.

Another key element of the workshop that needed to be redesigned was the use of science notebooks. Not only do teachers need to “do science like scientists,” but keeping a science notebook provides a venue for metacognition—thinking about what they’re thinking is critical to all student learning. Equally important, the science notebook is a personal reflection venue that is separate from the public discussions. To replicate this in a WebCT environment, I simply created a private discussion topic for each participant and labeled it “<name>’s Science Notebook (private).” The only people with access to this discussion topic and the included attachments were the owner, the teaching assistant, and the instructor—and it worked. We have very rich and important interchanges in this private space, encouraging the timid and cheering for the great examples of scientific thinking.

### Thinking Differently About Assessment

Another constraint of online interaction that I initially found disconcerting is that I can’t be there in person, using my eyes and ears to sense the grumbles, frustrations, and breakthroughs of my students. As a result, the need for frequent, formative assessment became even more critical. This is not to be confused with testing, but rather a constant gauging what my students know while the learning is underway. How can I know what they know, when all I have is text postings in a threaded discussion or answers to multiple-choice questions?

The WebCT quiz tool is limited to multiple choice and open text responses. This is helpful, but not nearly as satisfying to me as observing students doing science. I wanted to know how I could get inside their heads. As

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a result, I am currently using three forms of assessment that are complementary to multiple-choice tests:

- An open-ended concept mapping activity that reveals how students are constructing their understanding and what they see as meaningful connections between ideas (<http://www.vanides2.com/conceptmaps/>)
- A weekly self assessment, which includes an open-ended question that reveals any “ah-ha’s”: “What I found to be most interesting in this week’s discussion was... (Describe what aspect of the discussion was most memorable or meaningful...)”
- The science notebook itself, which is scored using a rubric provided to the students

In retrospect, what is notable to me is that all of these forms of assessment can be used to great advantage in a face-to-face setting. However, it was the shift to an online environment that prompted me to use them. I could no longer rely on face-to-face cues and interactions for my real-time, formative view of student learning as it unfolded.

### Thinking Differently About Discourse

To me, the most striking difference about teaching online versus in the classroom is that the focus has shifted away from preparing what I’m going to say (I’ve already uploaded all of that!), to what the students are saying. The delivery of content is clearly not my primary task. Instead, the facilitation of rich and thoughtful discourse between participants becomes my principal endeavor. Ignoring the fact that this is a sad commentary on my previous practice of teaching, the freedom to focus on the students, encouraging conversations and questions that lead to better understanding, is in the end what makes teaching so rewarding.

This focus on discussion is exciting, but comes with a challenge. Because most of the asynchronous forms of communication, such as the threaded discussions in my WebCT classroom, are limited to text, much can be lost:

- Inflection is lost—unless you ADD inflection in your typing.
- Nuance is lost—and subtle humor becomes almost impossible without the risk of confusing your students or embarrassing yourself.
- I can’t just pick up my guitar and get everyone to sing a science song, which I have been known to do in my workshops.
- The need for clear and concise writing increases dramatically. After all, the only thing they “hear” is what you write. I had no idea how often I compensated for my writing by speaking.

In spite of all these challenges, I have observed that online conversations can be better than face to face. It’s not simply that we all now have a Delete key to catch an errant phrase before it leaves our “mouths.” Fellow online instructors concur that students in an asynchronous conversation environment write differently than they speak (or chat in a synchronous online space). Perhaps because there is more time to collect their thoughts, or perhaps because they have previously reflected in a private space before reporting publicly, the science discourse in my online course far surpasses the quality of science conversation in my face-to-face workshop—even when they are engaged in the same activity.

A notable example is the Cocoa Mystery activity, an introductory “discrepant event” that I’ve shared with the participants both online and face to face. After pouring some hot water into a ceramic mug filled with instant

cocoa powder, you stir the cocoa and begin tapping on the inside bottom of the mug. The “pitch” of the tapping begins to increase in frequency. Stir again, and the pitch drops—but begins to rise again. (If you have never experienced this, I highly recommend it!)

In my face-to-face workshop, we experience the Cocoa Mystery together and have a brief conversation about what might be happening. Then we are off and running in many other directions. Online, the conversations have continued for four to six weeks! Not only is there more prolonged conversation, but reports about extensions to the experiment begin to pour in, as teachers attempt to unravel the mystery. This response may be possible in a face-to-face setting, but certainly not without reflection time and opportunity to write (asynchronously) inserted in between, which rarely is structured into a face-to-face course design.

The other effect on me personally has been how I “speak” (i.e., write) in my online course. With constant reference to the book *Facilitating Online Learning: Effective Strategies for Moderators*, I am now keenly aware that what I am trying to say to the students may not be how I “sound” when they read it. I find that it is more important than ever to try to proofread what I write from their perspectives, anticipating how the words could be interpreted differently than I intended. For example, a short reply such as “No. Try again...” could sound terse and exasperated. It might be better to elaborate somewhat, and say, “That is not quite what I had in mind—I suggest you give it another try... and let us know what happens!” (ending with a smile or exclamation).

Finding my “voice” has another aspect that I had not initially considered. The “direction” of my voice, that is to whom I am speaking, can increase or shut down conversation. My personal replies to participants when we are communicating in their private sci-

ence notebook area are written as personal notes (e.g., “Sally, nice job! Have you also thought about...?”). This is in contrast to postings in the public threads, which I tell the participants to treat as the equivalent to “speaking to the whole class.” As such, if Sally

reports an interesting result, I might in that space say, “Sally has reported a very interesting finding! What do the rest of you think about this?”

Wait time is also different in an online setting compared to face to face. According to the research done



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by Mary Budd Rowe, instructors typically only wait tenths of a second between asking a question and calling on a student to respond. Counting silently to 10 while more students think and raise their hands greatly increases engagement and reflection. My rule of thumb online is that “wait time” (between my posting a question and then opening my “mouth” again) is about 2–3 days! Any sooner, and I shut down the opportunity for other students to think and respond.

Careful attention to rethinking discourse can result in some very rich and plentiful conversations. With a class of 20 students, for example, we generated more than 2,000 postings in only six weeks.

### My Lessons Learned—So Far

In addition to now thinking differently about lesson plans, assessment, and discourse, I leave with a few final thoughts for my colleagues who are considering the use of online tools for teacher professional development.

**Redesign takes time.** If you are starting with an existing workshop or face-to-face course, be prepared to invest about the same amount of time it took to create the workshop/course in the first place.

**Online teaching takes time.** Moving the learning and teaching to an asynchronous online venue does not save time—it merely shifts time and makes time zones and travel irrelevant. In my six-week online course, where students are spending 8–10 hours per week, I am spending 10–15 hours per week teaching/facilitating.

**Online teaching takes new skills.** Once your “lectures” become Web media, your discourse facilitation skills become critical. Learning to ask students thoughtful questions, finding new ways to “see” what your students know, and experiencing how to write

with a new “voice” all become part of your new toolkit.

**Online professional development does work.** Thoughtfully designed and facilitated online experiences can work. Teachers participating in NTEN courses give high scores to the value of the experience, and in many cases report that they would not have been able to take such a class if it were face to face. Even teachers who have never participated in a course online before report a high level of satisfaction.

**It isn't perfect. Yet.** I still can't spontaneously pick up my guitar and get my participants to sing—but perhaps some day this too will be possible!

### The Adventure Continues

With another semester drawing near, the opportunity to add some more mileage to my keyboard is fast approaching. I can't wait to meet my new students and join them in exploring the Science of Sound. With each online course, my view of teaching is once again challenged and my optimism about online professional development increases.

### Resources

*Facilitating Online Learning: Effective Strategies for Moderators* - George Collison, Bonnie Elbaum, Sarah Haavind, and Robert Tinker; Atwood Pub, 2000; ISBN 1891859331  
National Technology Educators Network:  
<http://www.scienceteacher.org>  
PS<sup>3</sup>: <http://www.pscubed.org>



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