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Are We Ready to Embrace the Power That Technology Has to Offer in Education?

Commentary: Response to Henriques

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The article"Preparing Tomorrow's Science Teachers to Use Technology: an Example from the Field" (Henriques, 2002) provided us with several good examples and strategies. Since I teach both secondary science methods and applied instructional technology, I found myself often saying while reading the paper, "I do that" or "Maybe I should do that."

Most of us probably agree that we need to include more technology into our education courses. Organizations such as National Council for the Accreditation of Teacher Education—in their report, *Technology and the New Professional Teacher: Preparing for the 21st Century Classroom* (http://www.ncate.org/accred/projects/tech/tech-pressrel.htm)—and the International Society for Technology in Education (ISTE; http://www.iste.org/index.html) are promoting increased use of technology. School districts are spending enormous amounts of money on technology and many states are providing grants so that districts can begin using technology in the school.

According to a 2001 report by *Education Week*, "The New Divide" (http://www.edweek.org/sreports/tc01/tc2001_default.html), the digital divide still

exists in the classroom but those inequities involve not so much access to computers, but the way computers are used to educate children. Even some of the poorer districts in our state have high-speed Internet connections in their library and classrooms. Many classrooms today have computers in them, but to have the computer fully used, we need to improve the training, support structure and resources available to teachers. Henriques's article provided many good examples that illustrate the effective uses of technology for teacher educators and teachers in the field.

My intention in this response is to add comments about technology innovations classroom examples mentioned by Henriques, make references to educational technology standards, and provide additional comments on the future of educational technology. Let us start with the classroom example, the overhead. All preservice and existing teachers need to know how to properly use this simple but effective technology. Using presentation software enables the teacher to project text along with images or pictures on a large screen in a very cost effective way. I remember my excitement when I first saw Hubert Alyea (Princeton; http://jchemed.chem.wisc.edu/Journal/Issues/1997/Jan/abs20.html) do his chemistry experiments on an overhead projector. The Tested Overhead Projection Series (TOPS), successfully enables both teachers and students to see vivid chemical transformations on the large screen. The power of imagery is amazing and to use it effectively may greatly enhance student learning. Henriques's example in giving directions for a lab procedure illustrates the importance of images. With the increasing availability of digital cameras, incorporating real images into an overhead or multimedia presentation will become more commonplace.

Many of you may remember time consuming data collection techniques, but now with the use of probeware and data collection devices attached to a computer, data can be collected and analyzed quickly and effectively. I recall several years ago in my high school chemistry classroom using wet analytical techniques to measure dissolved oxygen (DO) levels. We were trying to determine what factors affected DO levels (http://www.sciteched.org/curriculum/Samples/inquiry.htm), but the concept was lost due to the intricate analysis portion. It was not until I used a DO probe attached to a computer that I was able to design a new activity that truly illustrated the concepts that I wanted the students to know.

It was pointed out that "Technology should address worthwhile science with appropriate pedagogy." Appropriate pedagogy is the key. We need to

provide meaningful instructional strategies in which technology is used to enhance the lesson. I recall a recent situation in which a student teacher presented a 45-minute lecture using *PowerPoint* presentation software. The student felt that the lesson was successful because of the high use of technology, meeting the school's "incorporating technology into the lesson" requirement. I tactfully tried to explain that the slides were all text based, and the presentation was similar to a chalk and talk lecture. In this case, it appeared that the use of technology had become more important than the pedagogy.

Henriques's article also pointed out that one of the largest changes that technology provides is in the area of communication. From listservs to discussion boards, communications from student to student and student to teacher are changing. The success of online course authoring programs such as WebCT® and Blackboard ® (just to mention two) illustrate the desire for this type of communication among faculty and teachers. I have found myself on call almost 24 hours a day with my students through electronic mail. Through web pages containing my assignments, activities, rubrics, and grades, I am changing the way I communicate with my students.

To have our preservice teachers move forward in using technology, we need to move beyond having just educational technology courses, we need to begin having more instructors giving examples by using technology in their courses (Colburn, 2000). I expect my students to log on to my websites, participate in listserv type activities, and download files and to stay regularly updated on class information that is posted on the web site. On the university level, if students do not have Internet available at home, they are always able to go to the school computer labs or library. But on the precollege level, not having a home computer can reduce teacher effectiveness in communicating with all of their students. However, according to the 2001 U.S. Department of Commerce report, *A Nation Online: How Americans Are Expanding Their Use of the Internet*, an increasing number of Americans have integrated the Internet into their daily lives and more people are acquiring Internet access at home.

Henriques pointed out that technology is not the "silver bullet" for educational woes, and a reference was made to the unfulfilled promises of TV/VCR. While I agree that technology will not be the solution for all our education problems, I do believe that it offers educators unprecedented teaching opportunities. In the literature, there are numerous articles supporting

the use of technology in education, to list just a few: simulation programs (Akpan, 2001), microcomputer-based laboratory activities (Svec, 1999), and online support for student teachers (Bodzin & Part, 1998). In addition, the National Educational Technology Standards for Students (ISTE, 1999) are providing directions on how technology should be used in the classroom. As a result of my reading, conferences and experiences in the classroom, I get a glimpse of what technology will bring to education, and I believe that technology provides us with a tool that can promote real educational changes. If used properly, it can help education shift from didactic, passive instruction to more interactive, learner-centered and learner-directed instruction. The power of technology is within our grasp—are we ready and willing to embrace it?

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