

What Technology Do Tomorrow's Science Teachers Need to Know? Commentary: A Response to Henriques

JULIE THOMAS
Texas Tech University

...the few technologies that have had lasting impacts on the classroom include such high-tech wizardry as the printed textbook, the chalkboard, and the overhead projector. More complex technologies—film, radio, and television, never realized their imagined potential in education....On the whole, glittering technology has had little influence in the classroom (Kent & McNergney, 1999, p. 2).

In 1985, my superintendent was among the most reluctant when it came to introducing new teaching technologies. He was about to retire, but he had been “around the block” several times with new teaching ideas. I was a front-running innovator with one of only a few district computers in my classroom—an Apple II. My fifth graders and I were learning Basic programming, creating Print Shop graphics, and exploring sensors with toy robots. Once I learned we could program robots on the computers (with LogoTC Logo), I wanted to assemble a computer lab. Of course, I had to convince the superintendent, and he thought of classroom computers as an expensive, new-fangled novelty. “You mark my words,” he shook his finger at me, “Someday all these computers will be stacked up in a storage closet with the overhead projectors.” Well, we got our lab—and now those Apple IIs are stored away, just as he predicted, but newer computer models and other electronic teaching tools have taken their place. We are in, after all, the Information Age. Now, as a science teacher educator, I wonder about what technologies my future-teacher students need to know.

Henriques (2002) proposed a practical approach for introducing science teaching technologies—arguing that students will learn better when teaching technologies are infused into a science methods class. Citing a California credential-crunch (and assuredly others are experiencing a similar urgency), she also alluded to an important need to determine essential program requirements of students on a *fast track*. Her ideas and suggestions for proficient use of software and hardware—high budget and low budget—are well taken. Certainly the spectrum of classroom technologies includes VCRs and overhead projectors (old stuff), as well as probeware, and the Internet (new stuff). Henriques wants her future-teacher students to see “technology seamlessly incorporated into lessons” and to analyze effective and ineffective teaching strategies with technology.

These concerns are not specific to science teaching. The International Society for Technology in Education and the National Council for the Accreditation of Teacher Education have proposed standards focused on improved technology experiences for preservice teachers and opportunities for university faculty to integrate technology into their teaching and scholarship. Advances in the availability and possibilities of educational technology in K-12 schools compel colleges of education to review ways technology might be integrated into teacher preparation programs (Pellegrino & Altman, 1997). However, many teachers graduate from teacher preparation institutions with limited knowledge of the ways technology might be used in the classroom (Brush, 1998). The Milken Exchange on Education Technology (1999) suggested that student teachers may be initially resistant but can become powerful advocates for the integration of technology throughout the curriculum. While it may seem unrealistic to expect any teacher to exchange newer technological models for traditional instructional models, many university faculty members themselves have never observed others teach effectively using information technology (Gilbert, 1996).

My own attempts at integrating technology in science methods instruction have not been entirely successful. A mathematics education colleague and I have used the Computer Anxiety Scale (Cohen & Waugh, 1989) to measure decreased anxiety and improved understanding of the computer in terms of efficacy (to save time and improve products) and communication (to keep in touch; Thomas & Cooper, 2000). In the same research effort, we learned how difficult it is to prepare students for the specific technologies available in local schools. Many students expressed frustration in their attempts to integrate technology in their field teaching lessons (during four weeks of the

semester in an elementary classroom). Limited time spent in the building did not allow adequate time for students to become comfortable with site-specific software and generated undesirable lesson models (e.g., gathering two primary classes for an Internet lesson in the library to follow district-imposed Internet regulations). his same colleague and I have led our own college faculty in a U.S. Department of Education Grant to Prepare Tomorrow's Teachers for Teaching with Technology (PT³). We named our project *TechLinks*, hoping to connect university faculty and classroom teachers in shared professional development and better align our campus teaching with classroom possibilities in the local district classrooms. Now in our third year, some faculty (though not all) have learned new teaching skills and become increasingly confident about the possibilities of modeling technology applications within their courses. We are still missing, the link with our school partners, though they, too, have significant technology infrastructures. We have learned to work side-by-side—but we have not yet found a way to work-forward-together. As Dede (1997) insisted, without simultaneous innovations in pedagogy, curriculum, assessment, and school organization, our effort in instructional technology will bring few improvements in educational outcomes. In our work of preparing teachers for tomorrow, we depend on cooperation and collaboration with our local school districts in exploring and modeling appropriate technology tools. Together we can help our students develop skill in learning new technologies throughout their careers. This is just the beginning of the 21st century, and you can be sure we will continue to move old stuff into a closet down the hall...Mark my words.

References

- Brush, T.A. (1998). Teaching preservice teachers to use technology in the classroom. *Journal of Technology and Teacher Education*, 6(4), 423-258.
- Cohen, B.A., & Waugh, G.W. (1989). Assessing computer anxiety. *Psychological Reports*, 65, 735-738.
- Dede, C. (1997). Rethinking how to invest in technology. *Educational Leadership*, 55(3), 12 – 16.
- Gilbert, S.W. (1996). Making the most of a slow revolution. *Change*, 28(2), 10-23.
- Henriques, L. (2002). Preparing tomorrow's science teachers to use technology: An example from the field. *Contemporary Issues in Technology and Teacher Education* [Online serial], 2(1). Available: www.citejournal.org/vol2/iss4/currentissues/science

- Kent, T.W., & McNergney, R.F. (1999). *Will technology really change education?* Thousand Oaks, CA: Corwin Press.
- Milken Exchange on Education Technology. (1999). *Reflecting and acting on research and practice* [Online]. Available: http://milkenexchange.org/research/iste_article.htm
- Office of Technology Assessment (1995). *Teachers and technologies: Making the connection*. Washington, DC: U.S. Government Printing Office.
- Pellegrino, J.W., & Altman, E.A. (1997). Information technology and teacher preparation: Some critical issues and illustrative solutions. *Peabody Journal of Education*, 72(1), 92-93.
- Thomas, J.A., & Cooper, S.B. (2000). Teaching technology: A new opportunity for pioneers in teacher education. *Journal of Computing in Teacher Education*, 17(1), 13-19.

Contact Information:

JULIE THOMAS
Texas Tech University
College of Education
Box 41071
Lubbock, TX 79409-1071
julie.thomas@ttu.edu