



4-1-2007

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Becky Pasco
University of Nebraska at Omaha

Phyllis G. Adcock
University of Nebraska at Omaha

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Recommended Citation

Pasco, Becky and Adcock, Phyllis G. (2007) "New Rules, New Roles: Technology Standards and Teacher Education," *Educational Considerations*: Vol. 34: No. 2. <https://doi.org/10.4148/0146-9282.1209>

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Commentary

New Rules, New Roles: Technology Standards and Teacher Education

Becky Pasco and Phyllis G. Adcock

The digital age is infiltrating colleges of education around the country, but while some faculty are jumping on the bandwagon and working hard to improve their own technological literacy and that of their students, other faculty are resistant, afraid that technology may “dehumanize” education. School districts around the country are investing millions of dollars in technology, but “...these investments are of little value unless the schools can employ teachers who are capable of making sound judgments about the use of technology and are able to employ it skillfully.”¹ Therefore, the technological literacy of faculty in teacher preparation programs is of high interest to administrators and teachers in K-12 schools who want to be able to assure parents that their children will receive relevant and meaningful instruction in a variety of innovative formats including technology. This article discusses two national initiatives which encourage or require colleges of education to increase teacher candidates’ technological literacy followed by a discussion of the impact of technology integration on teacher practice.

National Initiatives: Expectations for Colleges of Education

Students in today’s K-12 schools are growing up in a rapidly changing world and need to develop a multitude of literacies, including technological literacy, to function effectively in their dynamic personal and academic environments. If students are to attain these literacies, colleges of education need to produce teacher candidates who know how to use technology effectively as a classroom tool to enhance learning.

Since 1993, the International Society for Technology in Education (ISTE) has produced a list of standards that outlines what prospective teachers should know about and be able to do with technology, and has urged faculty in teacher preparation programs to provide opportunities for teacher candidates to meet these standards. The 2002 ISTE National Educational Technology Standards for Teachers (NETS•T) are composed of 23 indicators for teacher candidates in the following six categories: (1) Technology operations and concepts; (2) planning and designing learning environments and experiences; (3) teaching, learning, and curriculum; (4) assessment and evaluation; (5) productivity and professional practice; and (6) social, ethical, legal, and human issues.

Becky Pasco is Associate Professor in the Teacher Education Department at the University of Nebraska at Omaha. Phyllis G. Adcock is Associate Professor in the Teacher Education Department at the University of Nebraska at Omaha.

In 2002, National Council for Accreditation of Teacher Education (NCATE) developed professional standards for the accreditation of schools, colleges, and departments of education which include a more rigorous focus on technology. NCATE requires evidence that they are producing candidates who “know and understand information technology in order to use it in working effectively with students and professional colleagues in the (1) delivery, development, prescription, and assessment of instruction; (2) problem solving; (3) school and classroom administration; (4) educational research; (5) electronic information access and exchange; and (6) personal and professional productivity.”²

Standards such as these play a significant role in establishing program priorities, but the use of technology by teacher preparation faculty has been found to vary significantly among programs. Grabe and Grabe pose three reasons for the variation:

First, colleges of education frequently have no better equipment than K-12 institutions do and only a limited inventory of the types of instructional software used in K-12 classrooms. Second, a large number of college faculty members are unable to make appropriate use of technology in their own classrooms or are unwilling to try because of their own lack of preparations, anxiety, or disinterest. And third, the teacher preparation curriculum typically confines experiences with technology to a single course, and one that concentrates on learning to use the technology rather than how to facilitate learning with technology.³

Furthermore, according to a survey conducted by Grabe and Grabe, only one third of teacher candidates felt either “very well prepared” or “well prepared” to integrate technology in their classrooms.⁴

Discussion: New Roles for Teachers and Teacher Preparation Faculty

As teachers and teacher preparation faculty search for ways to integrate technology successfully into the curriculum, they have found themselves in a position of re-examining their roles and identity.⁵ How teachers use computers is usually based on their beliefs about how students learn and the roles of teachers and the students in a learning environment.⁶ Faculty are used to being in control of their environments and course content. The traditional nature of the classroom where the teacher is the “leader of learning,” makes the teacher the center of the learning activity. This traditional approach makes the learners passive and therefore the “follower of the leader.”⁷ In classrooms that integrate technology successfully, the teacher is often not the center of learning but a facilitator of the learning activities. The teacher takes on a role, similar to a coach, as he or she moves from student to student to assist in the student-centered learning that is going on.⁸

There are currently many types of technology that afford faculty members new instructional opportunities. These technologies support active learning systems with hardware, software and networks that enable “anytime, anywhere” access to resources and asynchronous instruction where students can engage in content and with colleagues at different times and in different sites. Faculty who successfully integrate these types of technology into their coursework are less often concerned as to whether students get the “right” answer than they are in “how they got the answer.” According to Chickering and Ehrmann:

Learning is not a spectator sport. Students do not learn much just sitting in classes listening to teachers, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write reflectively about it, relate it to past experiences, and apply it to their daily lives. They must make what they learn part of themselves.⁹

The use of technology provides another way for faculty to engage students in active learning and discussions where information is "...not presented to the students in a final, distilled form" but where students "...pull together bits and pieces of information from several sources, gather data, generate personal interpretations and summaries and make decisions."¹⁰ These types of learning activities are designed to make learning more authentic and to be an interactive exchange of ideas where the learning environment moves from a traditional subject-centered approach, to a more student-centered approach. This transition is often facilitated by a cooperative learning strategy which involves more complex tasks and materials that are now being incorporated into learning by computers.

Not everyone is convinced that technology enhances teaching and learning. Cuban et al. suggest that computers have made a smaller impact than what is claimed because teachers are using computers for lower level skills, such as word processing and email communications... and "...that these changes maintain rather than alter existing classroom practices."¹¹ In these situations, the naysayers are correct, and faculty need to carefully choose the technology that will support and improve specific instructional strategies. "For any given instruction strategy, some technologies are better than others: Better to turn in a screw with a screwdriver than a hammer – a dime may also do the trick, but the screwdriver is usually better."¹²

Conclusion

Over the last 20 years, school districts around the country have made major strides in increasing student access to computers and the Internet.¹³ As a consequence, most of today's teacher candidates will find themselves in K-12 classrooms where technology is present. Faculty in colleges of education must model the integration of technology into the curriculum to effectively prepare teacher candidates to do so in K-12 classrooms.¹⁴ However, one cannot assume if schools are wired and have the necessary hardware and software, that a widespread use of technology by teachers will occur. By the same token, just because a faculty member acquires technology skills, it does not mean she or he can integrate technology into classroom instruction effectively. In many cases, faculty are learning right along with their students about the opportunities of computer-based learning, and this requires a great deal of commitment and energy. Not surprisingly, teachers (and especially teacher candidates) find it difficult to prepare to learn and teach new content while also learning new methodology in computer-based learning.¹⁵

Faculty need support for the use of technology in learning, and more opportunities to view colleagues who use technology effectively to encourage teacher candidates to use and experiment with computers as tools for learning.¹⁶ Studies have shown that preservice teachers' confidence in their technology skills is directly related to how well they feel they were prepared to use technology in their teaching.¹⁷ It is apparent therefore that teacher preparation programs have a responsibility in helping preservice, novice, and inservice teachers to learn to integrate technology into the curriculum effectively.

If colleges of education do not prepare teachers who can use technology to enhance K-12 students' personal and academic lives, they do so at their students' expense. According to Mehlinger and Powers, "Not to know what technology is available to assist children educationally, and not to use it thoughtfully, is evidence of instructional malpractice."¹⁸ Faculty and teachers need to take advantage of all tools that enhance instruction and thus better prepare their students to deal with the complex world in which we live.

Endnotes

¹ Howard D. Mehlinger and Susan Powers, *Technology and Teacher Education: A Guide for Educators and Policymakers* (Boston, MA: Houghton Mifflin, 2002), ix.

² NCATE, *Glossary of NCATE Terms* (1997-2004), <http://www.ncate.org/search/glossary.htm>, 57.

³ Mike Grabe and Cindy Grabe, *Integrating Technology for Meaningful Learning* (Boston, MA: Houghton Mifflin, 2001), 22.

⁴ *Ibid.*, 1.

⁵ Mark Windschitl and Kurt Sahl, "Tracing Teachers' Use of Technology in a Laptop Computer School: The Interplay of Teacher Beliefs, Social Dynamics, and Institutional Culture," *American Educational Research Journal* 39 (Spring 2002): 168.

⁶ *Ibid.*, 195.

⁷ *Ibid.*, 168.

⁸ Larry Cuban, Heather Kirkpatrick, and Craig Peck, "High Access and Low Use of Technologies in High School Classrooms: Explaining an Apparent Paradox," *American Educational Research Journal* 38 (Winter 2001): 824; Windschitl and Sahl, "Tracing Teachers' Use," 169.

⁹ Arthur Chickering and Stephan Ehrmann, "Implementing the Seven Principles: Technology as Lever," <http://www.aahe.org/technology/ehtmann.htm>.

¹⁰ Grabe and Grabe, 12.

¹¹ Cuban et al., 815, 817.

¹² Chickering and Ehrmann, "Implementing the Seven Principles."

¹³ See, for example, Yiping Lou, Philip C. Abrami, and Sylvia d'Apollonia, "Small Group and Individual Learning with Technology: A Meta-Analysis," *Review of Educational Research* 71 (Fall 2001): 449-521. Yiping et al. found the ratio of students to computers had dropped from 125 students per computer in 1984, to a ratio of 10 students per computer in 2001. See also, Cuban, et al. 813-834. While in 1994, only 35% of high schools were connected to the internet, by 1999, it had increased to 90%.

¹⁴ While this article has cited a number of research studies, we caution readers that the utilization of the results of studies concerning the use of technology in teaching and learning environments is made difficult by continual changes and innovations in hardware and software landscapes; increasingly diverse student bodies; and wide disparities in educational funding.

¹⁵ Joy Wallace, "The Digital Equity Toolkit: A Guide for Educators Who Want to Integrate Email and the Internet Into Their Classroom or Project," http://www.nici-mc2.org/de_toolkit.

¹⁶ Windschitl and Sahl, 200.

¹⁷ Heidi Stevenson-Bagnall and David Pratt. "Crossing the Chasm from Technology Training to Integration: How Do We Reach the Other Side?" Proceedings of the 13th International SITE Conference, Nashville, Tennessee (Spring 2001), 1421.

¹⁸ Mehlinger and Powers, 12.