

Integrating technology into teaching: a new paradigm shift?

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Introduction

Statistics show that computer based technology is now fairly available in K-12 schools, but it has largely yet to be infused into the curriculum. The panelists will argue that this is a natural outcome and consequence of the way in which technology was acquired and teachers were prepared rather than the fault of teachers, technology coordinators, or administrators. Panelists will suggest that K-12 education is at a happy juxtaposition of circumstances where changes in teacher preparation programs, an increasing cadre of technology savvy teachers, and access to technology present a real opportunity for widespread integration of technology into curriculum.

Teacher technology use

The infusion of computer technology into K-12 schools is unparalleled, never has so much money or effort been put into a technology for teaching and learning where students have personal access. Today the ratio between the numbers of students to computers in pre-college public schools has narrowed to 5 to 1. In 1994 thirty four percent of schools nationally had Internet access. By 2001 ninety nine percent of schools had Internet connections. With this tremendous change in access it is reasonable to expect a parallel increase in teacher use of technology in their practice. However this has not happened, teacher use of technology remains relatively modest. Teachers use computers mostly for making instructional materials (78%) and fewer still are using computers with students (38%) in multimedia presentations (NCES Table 39). The most common use of computers in the classroom is to have students use them for word processing or spreadsheets (61%). This is even after 100% of teachers report they have had workshops and professional development to help them learn new technology. Why has this happened and what might be done about it?

The acquisition of technology and training of teachers on technology use has been at times illogical and often chaotic. The myriad opportunities that sprung up almost overnight to acquire money for equipment and professional development were so opportunist schools often felt justified to ignore conventional methods for thoughtful purchasing or effective planning. Now that a measure of familiarity with technology has been achieved educators, administrators, and technology coordinators appear ready to analyze their progress and to more carefully plan the next stage of infusing technology into K-12 curriculum.

Where are we now?

Where are the computers?

Statistics show that the majority of the computers are in administrative offices, teachers' offices, computer labs, and libraries. The acquisition of individual classroom computers

is low on the priority list because computers have to be placed where students have the most egalitarian access. If there are computers in the classroom it is often one or two, rarely not a classroom set.

Teachers report not using computers with students in their classroom because teachers rarely know how to maximize the learning and instructional potential of a single computer. This has often resulted in the heavy use of computer laboratories where computers are used en-masse to simulate teaching in a regular classroom. This in turn has resulted in the longevity of computer labs even when teachers are questioning their general efficacy. Administrators and technology coordinators rarely resisted this stasis, as it was considered easier and cheaper to hook up 30 computers in one room than it was to hook up 30 computers to 30 rooms. Until numbers of computers were readily available in schools administrators, in the search for evenhanded treatment of their teachers, exacerbated the problem by ensuring equal teacher access through the formation and maintenance of computer labs. This well-intentioned notion might reasonably have led to a slowing of technology integration into curriculum.

Where are the classroom computers?

Slowly and steadily, computers are appearing in the classroom. Schools are accessing wireless networks or hardwiring individual classrooms for multiple computers. Teachers are becoming increasingly assertive in their technology requests and many now routinely take it upon themselves to seek out local and national grants to replenish or to provide a technology budget for their schools. These changes now set the climate for a new direction in technology acquisition and technology integration into curriculum.

However, this good news also places a burden on the classroom teacher that was not there previously. Administrators understandably must continue to place their priorities on acquiring equipment and placing it where the most students have access. Money for individual classroom computers may remain low on the priority list for a long time. Therefore, finding the money for classroom computers may continue to fall on individual teachers or departments. Teachers will have to become savvier on how to find funding and build skills to write competitive grants.

Who maintains computers?

Teachers have always been masters of their classrooms. They have been able to teach independently without relying on the resources and skills of others to provide tools or expertise. Computers have changed that. An NSF study of a technology rich curriculum *Biology: Exploring Life* showed the evaluation team that teachers who use technology regularly will have to know how to do basic troubleshooting, be aware of emerging technologies, and understand the facility limitations of equipment. This requires teamwork with technology coordinators for upgrades, daily troubleshooting, emergency repair, and regular maintenance.

What technologies are in the schools?

Technology departments, administrators, or committees are often now the main decision makers for what gets purchased. Equipment purchases have been simple – one size fits

all. Because the computers are in shared areas, it is logical that they be flexible for multipurpose use. This means the bigger and faster the better. The more computers that were purchased, to run efficiently, the technology departments needed equipment to be networked. This enables technology departments to quickly upgrade computers, install software, and conduct routine maintenance. Recently emerging technologies like handheld PDA's and small single purpose computers (AlphaSmart Computers) are just beginning to enter the educational market. Also auxiliary technologies like electronic bulleting boards, LCD projectors, and large screens have increased the effectiveness of classrooms that have a handful of computers. A broader choice of equipment has made purchasing equipment more challenging, potentially risky, and interesting.

Where is the software?

In industry software led the purchase of equipment. Schools took a different direction. They acquired equipment first. Teachers are now trained on the mechanics of using computers and have a working knowledge of standard operational software such as power point, word processing, and graphic packages. Teachers are piecing together various resources on their own to fit their curriculum. For example they might find a website with a hands-on activity, a CD Rom with a printable handout, and scan a graphic from a magazine to show the students. This is all very rewarding for the students but time consuming for the teacher.

The panelists will present a rationale and argument to support the following:

- Teachers will have a pivotal role in the design and structure of educational software as it is developed. In general software development has lagged behind hardware acquisition except for word processing applications. In order to infuse technology into the curriculum software needs to be discipline specific and more task orientated. Much of this software will be unique and conceived in the classroom.
- Teachers, increasingly familiar with computer-based technology, will demand many new products. With time previously spent learning technology skills teachers might now have time available and interest in learning how technology enhances teaching and learning. This suggests a move away from an instructional focus to a student-oriented focus.
- Teachers will be more discriminatory on the quality of software and hardware. Technology savvy teachers will no longer be impressed with any software product; they have more skill and experience to judge between products that educate and products that entertain. Software developers will begin to use teachers as developers.
- Discipline specific software used in the classroom will allow teachers to purchase less expensive computers congruent to teachers needs. Schools will cease to seek out purchasing computers using the one computer fits all needs model.
- Information technology department trainers will be first educators and second information technology staff. Teachers and technology coordinators will be working

closely in teams and have increased regular contact.

- Departments will have more control on the acquisition of hardware and software than districts or schools. Department needs will dictate what is purchased and in what order. They will also control the technology budgets.
- Teacher education programs will require education majors to be proficient in computer use before they can take methods classes. Methods classes will routinely emphasize pedagogy that can be readily enhanced by integrating technology into curriculum.
- Teachers will spend more time with students individually and in small groups than in whole group activities or lectures. This will require teachers becoming more involved in how facilities are designed for teaching. The classroom will take on a new look.

Panelists

The panel will draw upon their experiences in research and in K-12 and college classrooms. Additionally data used presented will come from K-12 teacher observations; interviews with teachers, principals and technology coordinators; trend analysis; and a literature review. Panelists include David Stokes, Ph.D., the Director of the Master of Education Program at Westminster College and the instructional technology specialist for the school of education. He has directed a Preparing Tomorrow's Teachers to use Technology (PT3) Capacity Building Grant and currently directs a PT3 Implementation Grant focused upon improving the technology integration skills of college faculty and K-12 teacher partners. J. Russett has taught technology to education majors for 10 years. His current research is on the history and trends of technology in education. Betsy Price is the Director of the Associate Instructor Program at Westminster College and an educational consultant. She is currently working on a NSF funded evaluation team for a high school biology program under development that requires students to use computers daily. Other panelists and a chair may yet be invited to participate.

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http://nces.ed.gov/programs/coe/2001/section4/tables/t39_1.asp Table 39-1 Percentage of public school teachers who reported using computers and the Internet for various activities at school, by how well prepared they felt to use computers or the

Internet for instruction: 1999

Author, (1999). *Teacher's readiness to use computers*. Table 11 - Percent of public schools with Internet access, by school characteristics: 1994-2001. <http://nces.ed.gov/pubs2002/internet/Tables.asp>

Author, (1999). *Teacher's readiness to use computers*. Table 39-3 Percentage distribution of public schoolteachers who reported participating in professional development activities related to using computers or the Internet according to how well prepared they felt and according to hours of professional development, by level of preparedness: 1999 <http://nces.ed.gov/programs/coe/2001/section4/tables/t39-3.asp>

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