

TECHNOLOGY

*What's It
Good For?*



By Steven E. Miller

Subject: Any

Audience: Technology coordinators,
library/media specialists

Grade Level: K-12 (Ages 5-18)

Technology: All

Standards: *NETS-T* I-VI. (Read more about the NETS Project at www.iste.org—select Standards Projects.)

Technology infusion can transform the education process, facilitate incremental improvements in learning, be a vital tool for educator's professional growth, and prepare students for life in a high-tech world. Successful integration strategies combine these aspects of technology, drawing support from the unique contribution of technology to instruction, professional development, and administration.

Tools have costs. There is the purchase price, the learning curve, the time not spent doing something else, the changes in practice and organizational structure required to get full value from the tool, the long-term maintenance and upgrading costs, and the cost of the uncertainty that accompanies any change. Even if a new tool will eventually increase productivity, allow for new activities, transform the organization, or save money, there is always an "adoption hump"—a rocky mountain of investment, work, trouble, and time—that has to be scaled before you can slide into the warm valley of realized benefits.

Technology is a very expensive tool, though it is a lot cheaper than it used to be. It is particularly expensive when the goal is to provide the tool set for every educator and student—the total bill for even the cheapest technology becomes prohibitive when the quantities are large. Therefore, so long as the use of technology is seen as a tool for the accomplishment of other goals—rather than a goal in itself—it will have to prove itself effective not only at old and new tasks but also significantly more effective than less costly alternatives. Given that high bar, why should we push to integrate technology into our schools?

Four Rationales

Educators seem to be motivated by four different and sometimes conflicting

rationales. Two rationales see technology as directly affecting the process of teaching and learning: one focuses on radical change in schools (I. Institutional Transformation), another on incremental adaptation (II. Individual Growth). A third rationale focuses on the value of technology as a tool to promote educators' professional growth, which will indirectly affect student learning outcomes (III. Professional Support). The fourth starts from outside the education system entirely, taking its energy from developments in the general economic and cultural environment (IV. Societal Inevitability).

I. Institutional Transformation. The most vocal technology advocates in a school system tend to be the visionaries. They feel that schools need radical change in context, process, and goals. For them, technology is a tool to transform the education system, a catalyst for systemic change. Technology facilitates new learning styles and objectives. The desired "new paradigm" can be cooperative project-based learning or anytime-anywhere self-paced learning, standards-based academically defined study or competency-based school-to-career pathways. Visionaries support technology exactly because it allows—perhaps even requires if its full potential is to be realized—a break from the past and the creation of new types of relationships among all the stakeholders.

To realize this break, technology-influenced visionaries call for major

changes in classroom pedagogy because technology, by itself, can facilitate change but doesn't create it. As research has shown,

technologies by themselves have little scaleable or sustained impact on learning in schools. In order to be effective, innovative and robust technology resources [require] ... simultaneous changes in administrative procedures, curriculum, time and space constraints, school-community relationships, and a range of other logistical and social factors. (Honey, Culp, & Carrigg, 1999)

But, as Silicon Valley (California) guru Geoffrey Moore points out in his book *Crossing the Chasm* (1999), revolutionaries are always a minority and exactly what excites them about a product—including all the unfinished, do-it-yourself rough edges of constructing the future—is likely to turn off everyone else. Transformation is not a sufficient motivation for widespread technology infusion, even if its pioneers blaze the trails that the rest of us will eventually follow.

II. Individual Growth. Most educators are not interested in overthrowing the school system. Explicitly or implicitly, they still support the view that curriculum should be based on age-appropriate mastery of academic disciplines. This assumption is particularly strong at the high school and

middle school levels, but there is increasing pressure to also downplay the traditional nurturing and socialization aspects of elementary programs in favor of testable skills. This perspective is supported by the curriculum standards and the standardized tests most states are adopting.

Pressured to dramatically increase student scores, most teachers are still agnostic about technology, feeling that it has not yet been proved to provide a more effective way of accomplishing these objectives. To the extent these teachers are willing to use technology, it is usually as an add-on to their regular activity or as an optional tool to support individual progress. These teachers oppose the “fads” and “chaos” that seem to surround the technology strategies pushed by the visionaries. Instead, they favor incremental change and lots of handholding. Because it is looking for big results without wanting to make big changes, this reason for technology integration is the most difficult to substantiate. And, to visionaries, this kind of gradual approach leads to no change at all.

III. Professional Support. Drawing on the business world’s use of computers for increased personal productivity and communication, some people hold that technology is most useful as a tool for professional preparation. Even if students never directly put their hands on the technology, it is a vital tool for educators’ own work—dealing with administrative tasks, class preparation, professional development, communication and collaboration with others—that research has already shown will indirectly have significant positive effects on student learning experiences. Advocates of this goal emphasize the use of software office suites, Web-based research tools, aides for curriculum development, and back-end information management systems. However, the growing emphasis on test-score accountability means that technology

expenditures usually need to be justified by measurable effects on student learning. For all the rhetoric about the importance of professional development, a teacher-centric technology deployment strategy is not likely to gain much support. Still, it is unlikely that technology will ever become fully infused into the education system unless it serves teachers’ personal and professional needs as well as students’.

IV. Societal Inevitability. Many parents, business people, and teachers support technology infusion because they see it as inevitable and necessary for adult life. Regardless of its effects on academic learning, they believe the world is increasingly shaped by high technology and that we have to prepare students to be successful in that new job market, as citizens, and in the pursuit of individual growth. Young people are already walking around with pagers, cell phones, and Game Boy® systems, then going home to video games, programmable DVD players, and computers. As one superintendent told me, “we have no choice; there is a whole new alphabet that we will soon be speaking.”

Because they see technology as a given, some people believe that all teachers should simply be expected to gain the required technology competencies or, like other employees whose skill set no longer fits their work requirements, lose their jobs. But this kind of prescriptive strategy will quickly sink in the loose hierarchy of schools. Still the emphasis on technology as a goal in itself can push implementation use over the “adoption hump” of start-up costs and difficulty to the point where its benefits become widely available.

Toward Solutions

How do we reconcile these conflicting perspectives and motivations? The trick, however difficult, is to embrace all four rationales. An excellent strategic technology plan unites the different

campus by understanding that we get to the future by a combination of giant leaps and small steps, and there must be a way for everyone to move forward that makes sense to them.

We need to give permission for visionary teachers with adventurous classes, if not entire schools (or at least “schools within schools”), to create “21st Century Classrooms” that model new ways to meet the challenge of raising student learning outcomes in an increasingly complex environment. For example, our technology plans should have a “mini-grant” program that provides small sums for pilot projects and their subsequent adoption by others. It is important, as former superintendent Dr. Richard Thompson of Ipswich, Massachusetts, used to say, to “feed the rabbits.”

We also need to recognize that the vast majority of teachers and students will continue to meet face-to-face in traditional classrooms and are in desperate need of specific software applications that enhance these interactions. Our technology plans should also include provisions for software packages that focus on helping students—whether remedial or advanced—to grapple with subject-specific knowledge, skills, and exploration.

We need to find ways to help teachers cope with the overwhelming demands on their time and skill. One component of every technology plan should be training people to use generic productivity tools to ease their administrative and professional loads.

And we need to admit that technology will increasingly saturate our existence and seep into the education system whether we like it or not, making it necessary to deal with it as a reality in its own right. Schools should explicitly describe the technology skills students will gain by various grade levels, but evaluate progress through the application of those skills to classroom projects.

But is the cost of infusing technology into the K–12 environment worth the results? Long-term, non-anecdotal research about the effects of technology on student learning and lifetime satisfaction outcomes is not yet available. This is not surprising because the technology is rapidly changing, and the more we succeed in infusing technology into the curriculum, the harder it becomes to distinguish the effects of technology from everything else. However, one way to begin examining the value of this investment is to catalogue some of the areas in which technology can make an important and unique contribution that is either unlikely or impossible to achieve in other ways. The list can be divided into three major areas: learning, professional activity, and administration.

Technology expands the learning environment by allowing students to:

- access primary source material they couldn't otherwise see,
- access information they couldn't otherwise find,
- visit places they couldn't otherwise go,
- meet people they wouldn't otherwise encounter,
- participate in activities they wouldn't otherwise experience,
- have diverse opportunities for collaboration and team learning,
- use tutorials attuned to their individual learning styles,
- get recognition and feedback from a wide audience,
- not be excluded because of special needs,
- not be excluded because of location, and
- bring portfolios of previous work to new teachers and towns.

Technology can facilitate the professional growth and instructional preparation of educators by facilitating:

- professional connections and collegial collaboration,



- access to subject-area content for curriculum and activity plans,
- differentiated instructional planning,
- connection to students beyond class hours, and
- communication with parents or guardians.

Finally, technology can positively affect education by relieving us of some of the more time-consuming administrative tasks and letting us gain more insight from the enormous amounts of data we routinely collect, facilitating:

- data collection and reporting,
- data analysis and use,
- accountability and supervision,
- recruitment and hiring, and
- public outreach and announcements.

We have come a long way since the days when the appearance of a single computer in a classroom was an event to be celebrated. There are moments when the introduction of digital technology into education seems like a hurricane sweeping across the hills and valleys of the education landscape, overturning everything from PK through adult education. At other times, the infusion of technology seems to be a mere zephyr, occasionally touch-

ing down without much impact and likely to disappear eventually. It will serve as a helpful wind at our backs as we struggle over the adoption hump only if we find ways to unite a wide range of motivations, devise coherent implementation strategies that take diverse uses into account, and carefully monitor the effects of our actions.

References

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