Techno-Reformers and Classroom Teachers

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The president of the United States set as a goal in his last State of the Union Address that "[e]very classroom in America must be connected to the information highway." Six weeks later, he and Vice President Al Gore came to California to help wire schools for what locals called NetDay. This month, NetDay goes national, as states and localities across the country designate their own "days" and "weekends" to wire schoolhouses for the Internet. But as more and more schools become wired, are more teachers and students navigating the Net? Just a few.

If there is one institution that techno-reformers have sought again and again to revolutionize, it is the public schools. NetDay is simply the most recent effort to close the gap between high-tech workplaces and low-tech schools. Techno-reformers, mostly public officials, corporate leaders, and other noneducators far removed from classrooms, deeply believe in the power of technology to transform schools into productive workplaces.

This persistent dream of technology driving school and classroom changes has continually foundered in transforming teaching practices. Although teachers have slowly added a few technologies to their repertoires, techno-reformers have seldom been pleased with either the pace of classroom change or the ways that teachers have used new machines.

The search for increased school and classroom efficiency accelerated greatly at the turn of the last century, when European immigrants and rural migrants swelled urban schools. Techno-reformers then mechanized school operations to speed communication and reduce waste. By the end of the 1920s, telephones had appeared in the principal's office; classroom speaker-boxes permitted administrators to make schoolwide announcements; electric bells kept students and teachers to a daily schedule; and buses transported students to school from faraway locations.

By the early 1950s, the Federal Communications Commission had licensed educational-television stations to broadcast programs to schools. Here again, promoters were seldom bashful in their claims. One broadcaster called it the "21-inch classroom." Yet by the 1950s, patterns in teacher use of both film and radio, once billed as miraculous time-savers, had been set: a small number of serious teacher-users swimming in a sea of nonusers.

By the late 1960s, full-scale data automation in the military, corporations, and government operations was under way. For schools (and districts), administrative tasks commonly done by hand, such as paying employees, purchasing products, and making school schedules, became targets for automation. Moreover, with the advent of the personal computer, individual schools began purchasing software that dialed parents' homes to report that their children were not in school that day.

Teachers also embraced time-saving technologies. By the end of the 1930s, mimeograph machines had become available, making possible a wider variety of classroom materials, from worksheets to teacher-designed lessons. Similarly, the newly invented overhead projector could make, as one ad put it, "the teacher's work easier by permitting him to sit before the class, facing pupils with all notes and materials for the lesson ready at hand."

In the 1920s and 1930s, though, what entranced techno-reformers were radio and film. Thomas Edison, ecstatic about film, predicted that "books will soon be obsolete in the schools." Benjamin Darrow saw radios bringing the "world to the classroom." Yet by the 1950s, patterns in teacher use of both film and radio, once billed as miraculous time-savers, had been set: a small number of serious teacher-users swimming in a sea of nonusers.

Computers were also celebrated for their extraordinary power to enhance teaching and learning. The machines had already entered schools in the early 1960s with mainframes and terminals. But with the introduction of desktop computers in the late 1970s, virtual ecstasy over their power pumped up claims further. "There won't be schools in the future," Seymour Papert, the professor who invented Logo, said in 1984.

Certainly, annual statistics about the spread of desktop computers made techno-reformers glow. Virtually every school in the country has computers now. The national increase in machines is staggering: from 125 students for each computer in 1984 to nine students per computer last year. But questions of teacher and student use of these machines often get obscured. Here are some facts:

● Students from high-income families have far more access to computers in schools than peers from low-income families. Minority students and those whose native language is not English use computers in schools less than their classmates do.

The persistent dream is that technology can drive school and classroom change. But it doesn't happen that way.
 ● Low-achieving students are less likely to use machines to enhance reasoning and problem-solving and more likely to use them for drill.

 ● Uneven access means that individual students who use computers (and not all do) spend one to two hours a week on the machine (or about 5 percent of all instructional time).

 ● What students do with computers varies greatly. High school students, for example, seldom use computers in academic subject areas. Where they are used, the purpose is to teach about computers.

 ● Finally, one analyst estimates that 80 percent of the school hardware lacks hard drives and connections to local or national networks.

This less attractive picture of computer access and use stirs doubt about techno-reformer claims for a revolution. Although it is only 15 years after the first stand-alone machines appeared in classrooms, patterns of teacher use similar to those that accompanied earlier technologies billed as revolutionary seem to be recurring: a small cadre of determined users amid a large majority of casual and nonusers. While school administrators have automated most managerial tasks, classroom teachers have been selective in choosing which technologies to use. How come?

To techno-reformers the answer is simple: Teachers lack the access, knowledge, and skills to use these machines properly. When teachers are thus blamed, solutions also become obvious: Provide teachers with sufficient computer hardware and software, technical assistance in using the machines, and better preparation programs. Technology-leaning policymakers, corporate leaders, and other influential noneducators, with their access to media, have framed both the problem and the solution. Teachers, then and now, remain voiceless in setting the reform agenda.

Just suppose, though, that the techno-reformers have it backward. Maybe the limited classroom use of new technologies is rooted in how reformers have framed the problem. Maybe their exaggerated claims for what the technology can do, their disregard for the social organization of schools, their ignorance of classroom realities, and their power to frame both the problem and the solution are all parts of why there are so few serious users of these new technologies. Let me elaborate.

First, techno-reformers' claims for what new machines can do are so inflated that public expectations continually get disappointed. Overselling has been (and continues to be) part of a familiar American cycle of creating a crisis, naming schools or teachers as a problem, and putting forward new machines (film, television, computers) as the best solution. Yet each technological innovation has had, at best, an uneven record in entering schools and classrooms. Why?

Reformers ignore that teachers, facing 30 students a day, are expected to implement conflicting purposes. Teachers have to maintain order for many students while creating personal relationships with each one; they have to cover academic content and teach skills while cultivating depth of understanding in each student; they have to socialize students to abide by community values while nurturing independent thought. Teachers, not corporate leaders or elected officials, are asked to carry out these cross-cutting goals daily for masses of diverse children within a social organization that has made them the gatekeepers determining which machines enter classrooms.

By social organization, I mean the century-old, age-graded school with its self-contained classrooms where groups of from 25 to 35 students work with a teacher for short periods of time. Maintaining classroom order becomes the essential condition for any learning to occur. Frequent assignments and tests are means of determining whether students will pass to the next grade or repeat the year in the same grade or subject. Generally, teaching is done with the "whole group," except in elementary grades, where more individual and small-group instruction occurs. Teacher-talk dominates instruction in the form of giving directions, asking questions, explaining content, and going over the text. Teaching practices, then, reflect both the conflicting purposes of schooling and the social organization of the school.

This connection between routine teaching practices and the social organization of the school presents a puzzle, however. Why have school administrators embraced efficiency-driven technologies and teachers much less so?

Decisions to adopt bell-driven schedules, buses, and public-address systems were made by school boards, not teachers. When business leaders or public officials, for example, expressed deep concern over schools being out of step with technological innovations, school managers responded to these pressures by making every dollar count. They purchased buses, telephones, film projectors, radios, overhead projectors, and computers without consulting teachers. Buying machines was an administrative decision; but using them has always been a teacher decision.

Even if teachers are (and have been) gatekeepers to using new technologies, what continues to be puzzling is the variation among teachers in machine use. Why did most teachers end up using some machines (like the overhead projector, the mimeograph and photocopy machine, and the videocassette player) with only a fraction turning to others (like film, radio, television, and computer)?

Much as policymakers and administrators, teachers are very concerned about efficiency. But their criteria for efficiency are anchored in classrooms. In coping with conflicting goals in an age-graded organization, teachers use criteria forged out of their experiences to decide which electronic tools they should use routinely. Teachers ask: Is the machine simple enough for me to learn quickly? Can it be used in more than one situation? Is it reliable or does it break down often? If it breaks down, do I have to fix it or will someone else repair it? How much time and energy do I have to invest in learning to use the machine vs. the return it will have for my students? When students use the machine, will there be disruption? Will it maintain or compromise my authority to maintain order and cultivate learning?
For most teachers, the overhead projector, videocassette recorder, and copy machine (as well as the textbook) fit these efficiency questions nicely. Only a small fraction of them, however, find the efficiency criteria embracing new hardware and software.

Were we to redefine the technological gap between schools and society as a political-power issue—that is, recognize what it means to have techno-reformers, not teachers, frame the problem and use nonclassroom criteria to determine efficiency—and as a structural problem—that is, that teachers are faced with a need to achieve conflicting goals within age-graded schools—then new solutions would become available.

Such a reframing of the problem demands that techno-reformers understand the school as a workplace, teachers’ efforts to finesse conflicting goals, and their notions of efficiency. To view the problem of technology implementation with this kind of understanding would result in very different advice from what reformers offer teachers now, such as getting better machines, availing themselves of more technical assistance, and investing in large doses of teacher training. Such sensible "solutions" miss the deeper problems rooted in the system of schooling that historically have limited teacher use of certain technologies.

Thus, as long as techno-reformers see teachers as the main problem, the struggle over moving the latest technologies into classrooms will continue. Expect more NetDays. In light of this history of teachers' being asked again and again to use new technologies in their classrooms, isn't it about time for reformers to reframe the problem of using technology in schools?

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For more information about NetDay, see the NetDay 96 Website.