HERE TO STAY

Using Digital Tools to Help Transform Schools

By Andrew A. Zucker, Ed.D.

The world changes amazingly quickly and schools need to change, too. Among ourselves, we educators and policymakers discuss the transformation of schools, recognizing how great the changes in these institutions need to be. Unfortunately the public does not like the term "transformation," probably for the same reason many people dislike the idea of transforming the health care system. The public fears that something familiar and important will be lost as institutions are transformed. In fact, we know that the United States faces greater risks if our schools fail to improve fast enough than if they change too slowly.

Computers, the Internet, online courses, smart phones, cameras, interactive whiteboards, and other digital tools play an important role in improving and, yes, transforming schools. The role of technology in schools will increase, and as we use these new tools wisely, they help make schools more effective and engaging.

Still, no one should pretend that today's technology is like a magic cloak that turns an ordinary person into a super hero. With or without technology, schools need more first-rate teachers, communities need new ways of organizing schools and related services, and funding must better reflect the higher costs of educating America's neediest students. Flawed assumptions in the No Child Left Behind Act should be replaced with a smarter set of incentives and a vision that incorporates broader goals for schools than performing well on multiple-choice tests. It might be easier if technology could accomplish these changes—but it cannot.

Integrating Technology Wisely

Imagining the future of technology in schools is difficult, but science fiction author William Gibson, who coined the term cyberspace, once said "The future is already here; it's just not evenly distributed." One school that does a beautiful job of incorporating technology in ways that seem futuristic to some visitors is the Denver School of Science and Technology, a public charter high school serving large numbers of students from poor and minority families. The school provides laptops to all students, and teachers integrate digital media into all the core academic subjects. Teachers and students value the technology highly, yet the school's mission statement does not mention technology, focusing instead on preparing all students for success in college and the 21st century while also aiming to graduate students "with character and a sense of civic responsibility." When the school rapidly became one of the best in Colorado, Denver asked for more schools just like it.

One lesson to learn from the Denver school is that digital tools serve as a means, not as an end. Another lesson is that teacher leadership is as important as administrative leadership; many instructional software applications at the school were first used by teachers, who then spread the innovation. Formal and informal learning communities for teachers are vitally important to support productive changes in schools.

Although they once seemed futuristic, online courses and online schools have been around for more than 15 years and are now common. Used in the right way, by the right students, online courses have become a useful, well-accepted approach.

Surprising ways to use digital tools sometimes appear suddenly. A few months ago almost no one had heard of Massive Open Online Courses (MOOCs); now they are serving large numbers of learners. At Stanford University, for example, 160,000 students last year enrolled in one online course about Artificial Intelligence. Homework problems were machine-graded automatically. Although the students do not gain University credit for taking this course, its popularity, and the technology behind it, is astonishing.

A significant innovation for elementary and secondary schools is that Apple and several publishers recently announced the release of school textbooks designed especially for iPads. Last year, for the first time, the sale of trade e-books (electronic books) exceeded the sale of printed books in almost all categories, and experts believe it is only a matter of time before the same is true of textbooks.

Electronic textbooks delivered on a computer, or other device, can be interactive, including exercises for students that are automatically graded so students and teachers quickly know areas of strength and weakness. E-textbooks can include movies, animations, simulations, spreadsheets, and other ways to learn and to solve problems that are not feasible in print. Students can highlight e-textbooks, or write marginal notes, without damaging school property. In the not-distant future, the cost of buying electronic devices and the e-texts will be low enough that many schools will see the cost benefit of abandoning printed textbooks. Henrico County, Virginia, and Mooresville, North Carolina, are among the school systems that have already eliminated some or all printed textbooks.

The mathematics education community, among others, has realized for decades that technology not only makes it possible to teach and learn in new ways, it also changes what should be taught, such as how to solve problems. Slide rules are out; symbolic computer algebra systems and other tools, often available inexpensively, are in. In many school subjects, searching the Internet and vetting Web sources carefully are among the new basic skills for students, supplementing traditional library skills taught in pre-Internet days. Administrators need to ask themselves how well teachers and students in their schools are using computer-based tools (some of which are free) to learn, to create, and to solve problems.

In science, computers make it possible for students to conduct experiments that would be too dangerous, expensive, or challenging for a school laboratory. Simulations can make invisible phenomena, like atoms or heat, visible to students. For example, the Concord Consortium's free Molecular Workbench software

Using Technology to Support Multiple Education Goals

It is impossible to list the thousands of ways that schools use digital tools. It is easier to consider the purposes served by using technology. Used wisely, technology can help:

1. make schools more relevant and engaging;
2. increase student achievement (for example, using word processors helps students to write better prose);
3. provide a high-quality education for all students (e.g., by providing individualized practice to students who need it, or by automatically reading text on the screen aloud, if need be);
4. attract, prepare, and retain high-quality teachers, many of whom feel empowered by the use of high-quality digital tools;
5. increase links between home and school; and
6. help provide accountability for results.

These six goals are recognized as important in virtually every state and school system in the nation. Technology also can support other noteworthy goals, such as enabling students to become creators and generators of knowledge.

Educators, policymakers, and the public should think first about education goals, and then about using technology to help meet those goals. For instance, is it important for your students to learn about the institutions that support a democratic society and to become thoughtful citizens? If so, how can the Internet and other digital tools help your school meet this goal (which, sadly, is not part of many states' education standards)?

includes lessons about diffusion, osmosis, protein folding, and dozens of other phenomena. Students can change temperature, the concentration of chemicals in a solution, or other variables, and then watch representations of atoms and molecules respond accurately, obeying laws of physics and chemistry. Such simulations deepen students' understanding of concepts that are difficult to learn.

Use Technology to Help Meet the Challenge

Since humans mastered the use of fire, which according to myth was stolen from the gods; technology has always been a two-edged sword, creating problems as well as opportunities. Today's students may have shorter attention spans in school, multi-task too often without regard for the impact of doing so much at once, and read fewer books than their parents and grandparents did. Schools must pay information technology (IT) staff and address a variety of new technological problems, from fighting computer viruses to keeping private information truly private.

Nonetheless, like it or not, the genie is not going back into the bottle. Schools should learn to harness the best applications of technology while minimizing and mitigating the costs and risks. Unquestionably the benefits are great.

One notable risk is that the most important function of technology in schools will be to reduce costs. It would be sad to become a more stratified society, with students from low-income families receiving an inexpensive computer-based education focusing on drills, while those from more affluent families were taught to think by live teachers.

In recent years we have experienced several economic "bubbles," including the dot com boom-and-bust of the late 1990s, and the more recent mortgage debacle. Education has more than its share of "bubbles," with gurus suggesting computer games are "the answer" or that online courses or some other idea will soon, and inevitably, result in huge benefits for the education system. These bubbles pop and evaporate— but the Internet and digital tools are here to stay. The challenge is to use them wisely to transform schools in ways that help students and thus our whole society. ✳

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