



## Hot Technologies for Education: What's Happening Now and Later?

*By the Consortium for School Networking*

**A**s technology companies introduce innovative products and services for the education market, school districts have the opportunity to invest in technologies designed to improve instruction and operations—from teaching, learning, and assessments to organizational efficiency.

Perhaps the greatest promise of anticipated technologies is their potential to transform schools through innovation. Students themselves are driving innovation. They are willing to experiment, collaborate, and immerse themselves in new ways of communicating, learning, and getting things done. Their boldness and flexibility position them well to discover cutting-edge ways to apply technology creatively to the educational enterprise. Educators, armed with increasingly powerful tools that will help them truly make a difference in the lives of students, will be able to approach their work with renewed purpose and passion as well.

The Consortium for School Networking's report *Hot Technologies for K–12 Schools: The 2005 Guide for Technology Decision Makers* discusses some of the technologies that are likely to be tomorrow's "must-have" tools in schools. We look here at emerging technologies in the areas of instruction and assessment.

### Galvanizing the Instructional Process:

#### **Hot Technology: MP3 Players Plus**

What happens when you cross a trendy entertainment product with the school classroom? A remarkable array of innovative learning activities, according to early reports from pilot studies.

MP3 players such as the Apple iPod, which fits in a pocket, are marketed now for the sheer fun of downloading and listening to a personal, portable playlist of music. However, they are transforming learning in K–12 schools as well. Apple is converting the iPod from a music player into an active highly portable large storage device, and with its success, other companies will soon follow.

These portable devices have a storage capacity of between 20 and 50 gigabytes. But they can do much more than store music. They're also "active," which means they can be used to create and manipulate digital files, not just store them.

**Storing and transferring files and images.** Portable hard drives enable students to store their classroom assignments, portfolios, digital photos and other images, and sounds and take them anywhere. They can back up schoolwork, then transfer this work to a desktop computer and continue works-in-progress elsewhere.

Portable hard drives also afford teachers a way to collect assignments and access them at home or share student work with other staff members, which can be a powerful way for teachers to learn from one another.

**Recording classroom lectures, discussions, and notes.** With a microphone accessory, students and teachers can record classroom talk or take oral notes on a science experiment in the field, then play these back at any time to study or share with others. With a camera attachment, students can create images or videos as they explore and learn. Students also can record interviews and practice oral presentations. Teachers can record lectures or assignments and post them on a Web site for students to download.

**Listening to audio books and music.** Students and teachers can take advantage of the increasing variety of audio books available in the marketplace—from Shakespeare’s plays to Robert Frost’s poetry. Reading and listening to books simultaneously improves comprehension for some students and increases time for learning in transit or simply enjoying a good book.

**Creating multimedia presentations.** Students can use their files to put together multimedia presentations with text, images, and sounds by using a variety of digital photo, video, and other presentation software. Students also can store, transport, and share digital portfolios.

### Trends to Watch

Right now, the iPod is being piloted in K–12 and higher education settings with favorable reviews from teachers and students.

These users will define the educational uses of these devices.

Here are some trends that are likely to emerge:

- **Continued expansion of mass storage capacity** and all-in-one functionality, including phone, Web, computer, and calculator applications.
- **Increased portability and accessibility advances**, which will allow people to work on different computers in different places while minimizing the number of high-end machines needed for high-powered projects such as video production.
- **Revival of portfolio assessment**, made possible with the file storage, creation, and manipulation possibilities of this technology.

## Improving Assessment and Evaluation

Hot Technologies

- **Digital Assessments**
- **Intelligent Essay Graders**
- **Intelligent Pattern Analysis and Performance Projections**

These technologies can transform education by making assessments more valuable and less burdensome to educators and by culling existing data for new insights, which educators can use to make better decisions. Three new digital technologies on the horizon will make it faster and easier for educators to collect,



assess, and evaluate student performance data.

### Digital Assessments

Wireless or online classroom assessment systems can be used for standards-based formative and summative assessments. Teachers, schools, or districts develop questions that reflect classroom teaching and learning. Students answer or respond electronically, using infrared devices similar to a television remote control, handheld devices, personal digital assistants, or graphing calculators to communicate via a wireless network.

Teachers access the results immediately on a desktop computer and can share them with students on a classroom television or digital projector. With digital assessments, teachers gain immediate insight into “knowing what the students know.” They can quickly determine next steps for a class or with individuals. Students, too, can see their strengths and weaknesses immediately, which may motivate them to participate more effectively in their learning.

### Intelligent Essay Graders

Intelligent essay graders are automated systems that assess students’ essays on content, structure, and writing mechanics. At a time when student writing is increasingly important, this technology has a clear potential to make it more feasible for teachers to assign essay writing and for states to require

essays on tests.

Grading essays takes time—more time than most teachers now have to assign them regularly. With this technology, students submit essays electronically on specific writing prompts, then receive instant feedback and diagnostic analysis on their writing skills. The essays are graded against pre-graded samples on the same topic, which are part of the software program. The software for intelligent essay graders maintains students' essays and diagnostic data, so teachers and students can track progress over time. Typically, the software also allows teachers to provide their own comments on students' writing.

Intelligent essay graders have been available for some time, but they are only beginning to enter the K–12 education market. Intelligent essay graders provide nonjudgmental, consistent, and timely feedback to students about their progress over time, so they may increase student motivation to strengthen their writing skills.

### **Intelligent Pattern Analysis and Performance Projections**

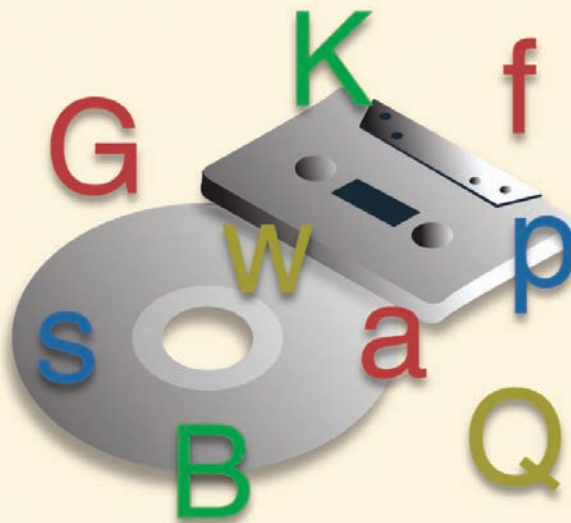
This technology helps teachers and administrators make sense of the increasing volume of data that schools are collecting and storing. School data warehouses integrate existing information on student demographics, attendance, discipline, grades, and standardized test scores, as well as digital assessments. Some districts also integrate data on teachers, school climate, bus schedules, finances, and other measures of organizational efficiency. The technology to enable schools to make smart use of this mountain of information works in three ways:

- Analyzing data to find novel patterns or relationships between points or types of data that would not be readily apparent to educators. For example, software may show that there is a negative outcome on student test results for afternoon math courses compared with morning courses.
- Projecting how students will perform on future tests based on interim test results—in time for educators to adjust instruction mid-course. For example, if third grade students perform poorly on math questions involving multiplication on classroom assessments, they are likely to have trouble with similar questions when they take the fourth grade state test. With intensive instruction, however, educators can change this predictive pattern, as long as the standards, curriculum, and assessments are aligned.
- Providing the visual display of information in charts and graphs, which can help people understand and use data more effectively.

The technology will help administrators and classroom teachers identify such problems as low performance of at-risk students in specific subjects. Administrators will be able to look at district and school trends using aggregated and disaggregated data. Teachers can retrieve an instant snapshot of their students'

progress from a variety of longitudinal data.

In effect, teachers can become “classroom researchers” who have a wealth of data at their fingertips. They will thus



have much better insights into their students' performance.

### **Trends to Watch**

With powerful, capable new technologies on the horizon, more schools will adopt digital assessments to monitor student progress and improve results. Here are a few trends that are expected in the coming years:

- **Closer ties among teaching, learning, and assessments.** Digital assessments make it possible for districts, schools, and teachers to know immediately which topics pose difficulties for particular students, thus making it possible to address problems as they arise.
- **More classroom writing.** Intelligent essay graders make it possible for schools to require students to write more often.
- **More frequent use of data for decision making.** Visual displays of data give more people access to the information by making it easier to understand.
- **Better dissemination of best practices.** These tools give districts a perspective on what is working where. They can identify practices that are working with a particular group of students.

### **Trends for Tomorrow's Technologies**

With technologies evolving rapidly, it's difficult to predict which ones will be the must-haves and exactly how they will be used. But administrators, teachers, parents, and students will be

on the front line of figuring out effective, productive, and engaging ways of using technology innovations.

It is an exhilarating prospect. What it will take for this to happen are educators who embrace technology to help them solve problems coupled with parents and community members who support technology investments. It will also take federal, state, and local funding commitments and less burdensome regulations that serve as barriers to innovative use of technology.

On the horizon are educational technologies that are: **Convenient.** Tomorrow's technologies will be smaller, more portable, and more accessible than today's. Wireless, take-it-anywhere, use-it-anytime designs will make it easier to incorporate technology into the educational enterprise. Also, an ever-growing number of wireless "hot spots" in communities will make it increasingly easier to access and use technologies. **Capable.** Tomorrow's technologies will feature more powerful processing, transmitting, storage, and interactive capacities, which will enable educators and students to rely on them to do more complex and interesting work with real-time immediacy.

**Customized and Content-Rich.** Tomorrow's technologies will allow schools to tailor information to suit their needs, which will enable districts to better collect and manage data, for example, and individual teachers to provide specific, standards-based content to students.

**Convergent.** Tomorrow's technologies will allow people to work on different hardware platforms, brand-name devices, and software applications with fewer barriers to transferring from one to another and sharing work with others.

**Collaborative.** Tomorrow's technologies will be designed with features that enable people to work together in real time, over great distances, with technical tools at their fingertips.

**Creative.** Tomorrow's technologies will take advantage of the tools people like and use most today—phones, e-mail, the Web, and portable electronic devices, for example—and build in more creative uses and more flexibility.

**Compliant.** Tomorrow's technologies will help schools meet the requirements of the federal No Child Left Behind law and other federal and state legislation. Technology decision makers will want to make note of these characteristics of new technologies as they consider future investments.

## Recommendations for Technology Decision Makers

**Think before banning.** If you want to take advantage of compelling new learning opportunities, embrace technologies

that students like and use in their daily lives rather than banning them from school.

**Consider how technology can help you meet your educational goals.** Look for technologies that fit with district or school priorities—not just now, but five years forward. This will help you narrow your focus from the many technologies available to the technologies that could be most beneficial.

**Consider all the ramifications of new technologies.**

Consider the instructional, legal, security, privacy, technical, and cost issues associated with new technologies, as well as the anticipated benefits. The time to bring up these issues is before purchasing, not after problems arise. But approach



these issues positively, as challenges that can be solved rather than as barriers to moving forward.

**Look for technologies that will engage, empower, and motivate students and teachers.** These technologies may stand the best chance of profoundly transforming teaching and learning. Explore how other districts, schools, classrooms, teachers, and students are using the technology.

**Get all constituencies involved up front.** Bring together administrators, teachers, parents, community members, and students, as appropriate, as well as the technical team, to discuss and plan how new technology can be used.

This article is excerpted with permission from *Hot Technologies for K–12 Schools: The 2005 Guide for Technology Decision Makers*, published by the Consortium for School Networking (CoSN). For the full report, additional resources from CoSN,