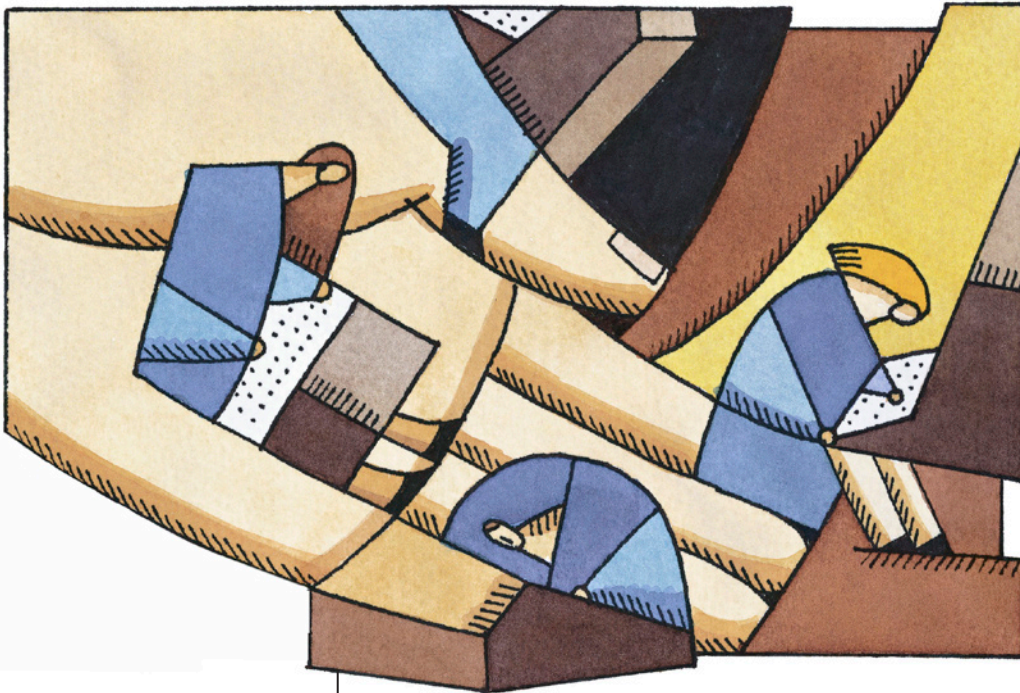


EDTECHNEXT

Emerging technology for K–12 education



3G and Beyond

Smart, Mobile Devices and e-Readers

Is it possible to make a giant leap forward in K–12 education with small devices that fit in the palm of a hand or a student’s lightweight backpack?

With smart, 3G mobile devices, it’s already beginning to happen. 3G refers to the third generation of mobile, or cellular, technology for wireless Internet access to voice, video and data services, which can be used simultaneously. 3G technology supports fast Internet access and data transmission speeds, real-time video and advanced network services. Together, these features and services are

known as the mobile Web.

There are five converging trends that could mean that more users will connect to the Internet via smart, mobile devices than on desktop computers within five years, according to the 2009 *Mobile Internet Report* by Morgan Stanley Research: rapid 3G adoption; the rising popularity of social networking, video and VoIP (Voice over Internet Protocol) services; and impressive mobile devices that offer something for everyone—social networking + music + video + games + books + commerce + voice + messaging + location-based services (GPS, or global

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Fast Facts

- More than **95 percent** of all Americans live within the coverage of one mobile broadband network.

—*Bringing Broadband to Rural America*,
Federal Communications
Commission, May 22, 2009

- In China, the world's largest mobile phone market, more than **20 million** people subscribe to Nokia's *Mobiledu*, a service that delivers English language learning materials from Pearson Education International and other educational content to mobile phones.

—Pearson, Feb. 1, 2010

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positioning system) and more.

These converging trends are manifested in new and emerging hybrid, “all-in-one” devices, including:

- **Smart phones** (such as Apple iPhone, flip phones and Nexus One, the new Android device from Google)
- **Smart devices** (such as Apple iPod touch and other media players, which offer just about every popular feature except phone service)
- **E-readers** (such as the Amazon Kindle, Barnes & Noble Nook and Sony Readers), which provide 3G, global wireless access to digital books, newspapers, magazines and blogs. E-readers support annotation, interactivity with a digital dictionary, embedding notes and questions, and read-to-me capability.

However, while e-readers are expected to become “an important platform for instructional resources” within five years, their functionality is still limited for educational purposes, according to a study of their use in higher education by the *Campus Computing Project*.

- **Netbooks**, which are small, lightweight computers with 3G access to Web resources and applications. Netbooks are less powerful and less expensive than laptops or notebooks. They include a keyboard and a display size of 10 inches or so and can come pre-loaded with digital textbooks and other content.

- **Tablets** are portable computers that have both a keyboard and a touch screen on a swivel hinge that flips and folds over the keyboard, so users can operate in either mode. Tablets come with a stylus pen for writing or drawing on the screen. Wireless tablets give users remote control of computers, software, interactive whiteboards and Web pages using wireless and radio frequency technology, so they can roam a room for teaching and presenting and still be connected. Wireless tablets also come with stylus pens for drawing, annotating and marking up content.

- **Smartbooks** combine the features of smart phones and laptops into a laptop-style device with a netbook-style screen size of five to 10 inches. They offer 3G connectivity, instant-on access and all-day battery life, built-in GPS, a keyboard and customizable interfaces.

- **Tablet e-readers**, such as the new Apple iPad tablet (also known as a slate, a tablet without a keyboard) and the Google working prototype of an Android-powered dual-screen tablet, the enTourage eDGe, that folds open and closed like a book and offers multifunctionality

4G technology is on the near horizon and eventually will replace 3G, offering even faster data transmissions and high-quality multimedia in real time. <



The Educational Potential of Smart, Mobile Devices

The potential of the mobile Web seem limitless—and transformational:

- **An “apps for everything,” immersive environment** with robust, easy-to-use development tools, which empower students and teachers to create, enhance, test and distribute their own content and applications. Centralized application marketplaces on the Web make free and low-cost applications and content instantly accessible.
- **Personalized but not solitary experiences** with customizable applications and devices that can be used to interact with others or connect to classroom technology, such as interactive white boards. People also can participate immediately, and *en masse*, in what’s happening around them locally and globally—as in the recent deluge of texted contributions to the Haiti earthquake relief effort from cell phones.
- **Differentiated learning** for English language learners, special needs students, students with different learning styles and preferences via podcasts, music, video, games and more. Plus, smart apps know students’ level of mastery and can adjust content for them; educators and students can customize content as well. Touch screens and stylus pens, meanwhile, make it easy for young children and others who have difficulty with keyboarding skills to access and manipulate Web content. With voice recognition and even eye movement technologies, which continue to advance, these and other interfaces might in time supplant real and simulated keyboards.
- **Location- (or context-) aware computing**, including GPS and apps that offer rich-media sounds, sites and data associated with the places users happen to be. These apps can bring learning hotspots, such as museums, art galleries and historic places, to life. Smart devices could even track students’ whereabouts. Coming soon, devices will be able to call up documents, e-mails and other records associated with people with whom users collaborate most often.
- **Extended time for research, collaboration, learning and creativity**, with anytime, anywhere access to curriculum resources and learning tools, online assessments, real-time visualization of student progress, and cloud computing resources.

Happening Now: 3G Learning

Without being tethered to a computer, students and teachers are finding innovative ways to use the mobile Web for educational purposes. For example, as part of their *Digital Arts Alliance*, Nokia, the world’s leader in mobile communications, and the Pearson Foundation sponsor the Mobile Learning Institute, which delivers engaging, personalized, project-based learning right to classrooms and community centers across the United States.

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Here are a few other examples:

“People can participate immediately, and *en masse*, in what’s happening around them locally and globally.”

- **Foreign language learning.** A Spanish teacher at *Wiregrass Ranch High School* in suburban Tampa, FL, sends text messages in Spanish to students on their cell phones: “Find something green.” “Go to the cafeteria.” “Take a picture with the school secretary.” After class, she texts homework reminders to students. A Spanish teacher in Pulaski, WI, has students use cell phones to record themselves speaking in Spanish for tests.
- **Math learning.** At-risk students in algebra I and II classes at *Dixon High School* in Holly Ridge, NC, use smart phones to solve video-based algebraic problems—and to create videos that show and describe their work to teach other students. *Project K-Nect*, a Qualcomm-funded initiative, provided the smart phones to students, who have limited Internet access at home, qualify for free or reduced lunches, and were below average in math proficiency. A hearing-impaired student, and others who never used to speak up in class, started using their smart phones for instant messaging to ask others for help, to provide help, and to make their own videos.
- **Personalized practice.** Elementary students at *Somerset Elementary School* in Mendota Heights, MN, are riveted by the learning apps on their iPod Touches. Teachers there guide fourth graders to apps targeted at their specific needs, such as WordSalad, a vocabulary app; TanZen, a geometry app; and States and Capitals, a geography app.
- **“A library in your pocket.”** Huge repositories of content are available for students to conduct research and learn. *Encyclopedia.com* aggregates content from encyclopedias, dictionaries, journals, magazines and newspapers. *iTunes University* features free podcasts, lectures, films and other digital content from more than 600 universities, museums, libraries and more. K–12 education is getting in on this act as well, as state education departments in Arizona, Florida, Maine, Michigan, Nebraska, Tennessee, Utah and Virginia offer iTunes content for students and teachers. Colleges and universities are creating mobile apps for their libraries. *North Carolina State University Libraries Mobile*, for example, features an online database, news and campus webcams.

To learn more about educational applications of 3G technologies, educators might want to pay particular attention to the international scene. A good place to start: the *Spinning the Globe* blog by CoSN CEO Keith Krueger.

Many countries have leapfrogged past land lines and are moving aggressively toward cellular technology. In India, for example, the *Indira Gandhi National Open University* in New Dehli is partnering with Ericsson to build a 3G environment for its more than 2 million distance-learning students to access course content and video clips and get text alerts. ◀

Educational, Technical and Funding Considerations

Smart, mobile devices bring their own set of issues for chief technology officers to handle, including:

- **Acceptable use policies.** Many districts and schools still limit or ban use of personal devices during the school day. Acceptable use policies might need to be revisited for students to access the mobile Web on school grounds.

- **A systematic plan for adoption.** Schools that do allow students to use cell phones and other devices are wisely piloting them in select classrooms, with many positive results. Scaling up access requires a plan for purchasing, managing and servicing devices. Servicing and updating devices with

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Considerations *continued from page 5*

school-generated applications or access to learning management systems, for example, could be a major challenge when students have different devices, tied to different carriers and platforms, that they take with them all the time. Eventually, open platforms and greater choice of carriers might mitigate these challenges—but we're not there yet.

- **Professional development.** The ubiquitous presence of 3G devices does not automatically translate into learning. Professional development is a must for educators to fulfill their role of integrating these devices effectively into instruction.
 - **Equitable access.** Not all students own their own cell phones or other smart devices. As learning experiences extend beyond the school day on the mobile Web, schools will need to think carefully about creating a level playing field for all students.
 - **Cost.** Most smart devices are much less expensive than desktop computers or notebooks, making one-to-one learning much more affordable for schools. But there could be monthly service fees for phone or wi-fi services. However, many students, especially at the secondary level, do have their own devices.
 - **Reliable Internet access.** Bandwidth does not seem to be a problem with 3G use in schools—at least not yet, according to an informal survey of Wisconsin school technology professionals
- by Mark Evans, Director of Technology Services in the Madison Metropolitan School District. But it could be a problem if everyone were using smart devices at the same time. Already, some schools are creating wireless hotspots and guest access to school computing resources for personal devices. Home and community bandwidth matter as well if students are expected use their devices outside of school.
- **Functionality.** Devices offer different features that schools should consider and match to their needs. E-readers, for example, are currently single-purpose devices for reading digital content. As with all technology, however, features change quickly.
 - **Battery life.** Expanding the use of smart devices to might require schools to install charging stations and/or increase electrical capacity.
 - **Device security.** Schools that do purchase devices for students—classroom sets of iPods, for example—need to consider how to safeguard the equipment.
 - **Students' privacy, safety and security.** Mobile devices could raise new legal issues. Smart devices that have the capacity to track students' whereabouts with location-aware software, for example, could be a plus in terms of keeping students safe, but a minus in terms of students' privacy. <