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School Technology Action Report

Education's Guide to Mobile Devices: Everything You Need to Know About Mobile Tech and Your Schools

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Dear Reader,

Gone are the days of football-sized mobile phones, cassette tapes, and VCRs; and soon, it seems, even components such as buttons and technology that you have to flip open to use might become fixtures of the past, thanks to tablets and smart technology.

For schools and districts across the U.S., it's becoming tiresome to hear students describe how they have to "power down" in the classroom, and many schools are beginning to implement sound and effective mobile device policies and frameworks so that teachers, administrators, and—most importantly—students can have 24/7 access to resources and a 21st-century learning environment.

But it's not all fun and apps.

Before you embark on a mobile learning initiative, it's important to know what the benefits of mobile technologies are and why they've become a game-changer for education, whether or not laptops can still fit in the big picture, and the policies, infrastructure, and support needed to carry out a successful mobile learning implementation.

In this latest School Technology Action Report (**STAR**), "Education's Guide to Mobile Devices: Everything You Need to Know About Mobile Tech and Your Schools"—sponsored by Kaseya and part of a series of **STAR** documents from *eSchool Media*: timely collections of news stories, case studies, white papers, and industry reports and surveys on pressing issues and relevant topics in education technology—you'll find a collection of industry reports, in-depth case studies, and teacher-vetted apps and mobile technologies to help you and your schools understand what it takes to leverage mobile technology effectively. After reading this report, you'll be well on your way to finally telling your students: "Take out your device. It's time to power up."

Thank you for reading this report, and be sure to check back soon for another **STAR** on a new topic.

Sincerely,

The editors at *eSchool Media*

Dennis Pierce, *Laura Devaney,* *Meris Stansbury,* *Dennis Carter,* *Jenna Zwang*
Editor   Managing Editor   Associate Editor   Assistant Editor   Assistant Editor

A message from Kaseya:

Delivering IT services and support in a school or university is a constant challenge for CIOs, IT Managers, and Network Administrators because there's an inherent struggle of conflicting priorities. Ultimately, the goal is to deliver high-quality education by making strategic investments in people and technology, but there are cost constraints that challenge technology leaders to be creative with budgets…and to do more with less.

Adding to all of that is the explosive growth of mobile IT devices, so it's no wonder why the complexity of mobile management could potentially bring a school IT department—and possibly department morale or reputation—to its knees.

Based on our work with thousands of customers worldwide—including hundreds of schools—who manage millions of IT assets, we understand how technology can be an enabler and a differentiator. Simply put, we've learned how effective IT service management helps school leaders efficiently manage today's learning environment, as well as how IT helps school leaders attract new students by offering them the highest quality educational opportunities possible.

By providing enterprise IT systems management solutions that are exclusively built for schools, we truly believe that automated IT systems management as a best practice for managing ALL of IT is the ultimate facilitator to achieving these goals—and more.

Sincerely,

David Castro
Director, Marketing,
Public & Private Sectors, U.S.
Kaseya

Table of Contents

Poised for a Revolution

Technologies such as robot teachers and 3-D telepresence might be a few years, or decades, away from practical implementation—but if there's one thing ed-tech experts agree on, it's that mobile technology has arrived … and it's not going anywhere.

This section reveals why mobile learning is here to stay and why it now means much more than just laptops. In fact, the latest generation of mobile devices might finally deliver on the promise of *true* anytime, anywhere learning.

Annual report pegs mobile learning as imminent

An annual report reveals that mobile learning and cloud computing are poised to reach widespread adoption in schools in one year or less, with game-based learning and open educational content not far behind.

[The New Media Consortium Horizon Report: 2011 K-12 Edition](#) is the third annual report from the New Media Consortium (NMC) that focuses on emerging K-12 technologies. It is supported by a grant from HP's Office of Global Social Innovation.

The Consortium for School Networking, the International Society for Technology in Education, and the NMC collaborated on the research.

Each year, the NMC identifies a group of 40-45 people who are considered experts in technology and education. Then, collaborating on a wiki, those experts engage in a systematic conversation about what technologies are important to education over the coming five years. The experts also identify schools with projects or pilots that are real-world examples of how schools are using the technologies on the implementation list.

Larry Johnson, CEO of the NMC, encouraged those finding interesting or relevant articles to post links to the articles using the hashtag hzk12. Those who know of a school conducting a unique or interesting implementation also are encouraged to use the Horizon Report hashtag and call attention to that particular school or district.

At the end of the day, Johnson said, students must be adept at using technology. "And I don't mean they're able to use spreadsheets; I mean they really understand it and use technology like air," he added.

Cloud computing and mobile devices have a "time-to-adoption" period of one year or sooner.

"Mobile learning is an interesting category because it's so ever-present," Johnson said. "For the last several years conversations have focused on why we shouldn't have them," including the potential for students to become distracted or use the devices to cheat.

"As phones have become more capable and we have access to hundreds of thousands of applications, including cameras, audio recorders, accelerometers, gyroscopes, compasses, and GPS, they're starting to get too capable to ignore."

Coming in two to three years on the NMC's "time-to-adoption" horizon are game-based learning and open content.

Game-based learning still presents challenges, but they are mainly related to what it takes to produce good, high-quality games, said Johnson. The military uses and produces a large quantity of game-based learning.

Game-based learning blends well with a concept called challenge-based learning, he added. Challenge-based learning was initially designed for professionals to respond to global crises, but researchers have discovered that students worry about these sorts of problems as well.

"Those kind of games where you tackle real-world problems can be really, really interesting," he said.

Open content appears on the list for the first time in 2011, and is particularly prevalent in schools outside the United States.

"Open content is hugely interesting," Johnson said. They're a way to have access to quality, professionally-reviewed learning materials—that are remixable and modifiable–for free.

And reaching wider use in four to five years are learning analytics and personal learning environments.

Learning analytics "are not well-defined, but draw on what we've learned from data mining," Johnson said. If education leaders can examine enormous amounts of data and extra patterns, they can examine those patterns and discover real-time information to better inform teaching and learning.

Personal learning environments have always been a part of the Horizon Report expert committee's conversation, but now people are seeing the potential, Johnson said. Still, there is much work to be done before personal learning environments leave the conceptual phase and become more of a reality.

The report reveals five key trends:

-The abundance of resources and relationships made easily accessible via the internet is increasingly challenging educators to revisit their roles

-As IT support becomes more and more decentralized, the technologies we use are increasingly based not on school servers, but in the cloud

-People expect to be able to work, learn, and study whenever and wherever they want to

-The perceived value of innovation and creativity is increasing

-Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed

With the good comes the bad, Johnson said, and he discussed five significant challenges facing education technology:

-The demand for personalized learning is not adequately supported by current technology or practices

-Digital media literacy continues its rise in importance as a key skill in every discipline and profession

-Economic pressures and new models of education are presenting unprecedented competition to traditional models of schools

-A key challenge is the fundamental structure of the K-12 education establishment, or "the system"

-Many activities related to learning and education take place outside the walls of the classroom, and thus are not part of our learning metrics

A good example of the constraints of "the system" is textbooks, Johnson said. Electronic publications, along with eBooks and eReaders, are taking the marketplace by storm. However, "publishers' hands are often tied by the way that states make a decision about textbooks," he said.

A printed copy of the report will be released in June, but the report appears online here.

Not just laptops anymore

Not all that long ago, the term "mobile learning" implied laptop computers and mobile carts that were wheeled from classroom to classroom. Now, as a growing number of students carry smart phones, tablets, and other mobile devices that can connect to the internet wirelessly through a cellular as well as a Wi-Fi connection, the definition of "mobile learning" is expanding—and with it, the possibilities inherent in the term.

The rise of mobile technologies small enough to carry in one's pocket, and the increasing power and functionality of these devices, is causing a seismic shift in education technology.

Last fall, nearly 50 percent of middle and high school students said they carried some type of smart phone—a 47-percent increase from fall 2009, according to Project Tomorrow's annual Speak Up survey of students, parents, teachers, and administrators on their uses and views of school technology.

There are now five billion wireless subscribers in the world, and of those, 1 billion are 3G subscribers, according to Wireless Intelligence. By 2014, there will be 2.8 billion 3G subscribers. (3G refers to a third-generation cellular network, which is capable of streaming video and other bandwidth-intensive applications wirelessly. Already, some providers are rolling out 4G services that promise even faster download speeds and more capabilities.)

As mobile learning has come to mean something very different than it once did, the very definition of a mobile device may be changing. Mark Anderson of Strategic News Service, a predictive newsletter covering the computing and telecommunications industries, says there are three categories of today's popular computing devices: the laptop, the carry-along (which includes netbooks, iPads, and other slates), and the mobile.

"The 'mobile' is your phone; you never leave home without it," explains Cathie Norris, Regents Professor at the University of North Texas, who works with Elliot Soloway, founder and chief executive of GoKnow, an education consultancy. Soloway and Norris have been following education and technology for decades, and they work, via their consultancy, to get technology into the hands of every student.

"When you go out, you bring your keys, your wallet, and your mobile," Norris says. This, she explains, is different than other mobile devices like the iPad, which you have to "consciously carry."

As one educator said at a recent conference: Devices like laptops or iPads might never leave the classroom. How is that mobile? The promise of mobile learning, some believe, comes from the true capacity for anytime, anywhere learning—or, as Soloway puts it, "everywhere, all-the-time learning."

True anytime, anywhere learning

"Smart phones rival laptops and the computers of just a few years ago, and they're much more affordable," says Michael Flood, education solutions practice manager at AT&T. "The ultimate question, and goal, is how we can get devices—with computing power and access to the information that will help them learn more effectively—into the hands of students."

Laptops and netbooks, useful as they have been, are not with students all the time. "But as we move toward getting students engaged with other students and teachers outside the classroom, they need their devices with them anytime, anywhere," Flood says. "They won't have a netbook in the lunch line, but they will have a phone, and they will pop it open to seek an answer to a question."

Students with smart phones, 3G (or 4G) access, and a data plan can use the device on the school bus to look up information for a report on their way home in the afternoon. They can do their homework while waiting in the dentist's office. That's the real power of mobile learning, says Norris, who points to the Tom's River School District in New Jersey, which gave every fifth grader a mobile device and access to the internet.

"Every single child did every single piece of homework, on time," she says. "That's pretty unusual. The real power of mobile is just that: If a student has to go to his little sister's soccer practice after school, he's not going to carry his books, he's not going to carry his homework. But he's certainly not going to watch his little sister play soccer, either, so he'll pull out his smart phone and get it done."

It's not just the convenience of mobile devices that is driving an increased interest among educators; smart phones also have been shown to help improve student performance in the classroom.

In 2008, public high schools in North Carolina began a pilot program to see if they could improve Algebra I performance among low-income students who lacked wireless internet access at home. The program, called Project K-Nect, started with 150 ninth-grade students who were given smart phones equipped with Algebra I content. Project K-Nect chose tech-savvy teachers—those already using technology in their classrooms—to implement the course. Content

on the phones aligned with their current lesson plans, and students were encouraged to learn from each other both inside and outside the classroom. Students did so by using social networking applications on the smart phones, as well as other internet resources such as Algebra.com. By the end of the school year, the students' average math test scores had increased by 30 percent.

"These were students who were struggling in math … and now some of them are even thinking of pursuing careers in math. Some of the students originally in the program are seniors now, and they're taking calculus," says Kristin Atkins, director of wireless reach at Qualcomm Inc., which funded the Project K-Nect program.

Having a one-to-one ratio of mobile devices to students is a key to moving education forward, Soloway believes.

"Up to now, schools have spent billions of dollars on technology, and the result is zero," he says bluntly. The question is why. "First, we've used computers as supplements to existing curriculum. We've taken the existing pedagogy, the existing curriculum, and added some computers when we could. Teachers couldn't count on the devices because they didn't have enough of them, so the best they could do was supplemental. And supplemental use is just that. It's not enough to move the needle."

To really change student achievement, Soloway says, computers need to be used as essential tools, for up to 70 percent of the school day. When schools can supply a device for every student, the pedagogy and curriculum can change. Teachers stop "telling," and students start "finding," which moves teaching from a teacher-centric to a student-centric experience.

But is such student-centric learning really effective? Absolutely, says Tom Greaves, founder of education technology consulting firm The Greaves Group and co-author of a study called Project RED, a national effort to analyze what's working in technology-rich schools.

In a recently completed large-scale study of 1,000 schools, Greaves found that in schools where every student at a particular grade level was given a computing device, the students significantly outperformed those from schools where every student did not have his or her own device. This better performance was consistent across a variety of other factors, from teacher attendance to demographic characteristics.

Those same benefits are available with laptops as well, Atkins acknowledged, but she said students in the pilot projects funded by Qualcomm vastly preferred smart phones, even compared to laptops or netbooks.

Content, curriculum, and pedagogy

But if learning with mobile devices is really to take off, the challenges of finding good content and changing classroom pedagogy will need to be addressed.

To make the most of mobile technology, teachers must have proper training, and schools must go through a change management process, says Greaves.

Technology-rich schools whose principals "have formal training in change management far outperform the technology schools where [principals] don't have this formal training," he says. "At a lot of schools, they just provide the technology and think that, by itself, will carry the day. But if you don't actually give [educators] the training of what to do with it, nothing changes."

A change management leader looks at the students within a class and evaluates to what extent they are working on a fully personalized basis. "If 30 kids in class are all doing the same thing, that's a clear sign that you haven't changed anything," Greaves adds.

Greaves suggests not starting a mobile technology implementation without having a plan: "If you don't know what the right way is, don't start. You'll have a failed project, cost a lot of money, and set back the movement." Don't know how to begin? Go visit schools that are successfully implementing these projects, he says.

A strong curriculum must be built around the use of mobile devices, rather than the devices simply being integrated into an existing curriculum.

At the Katy Independent School District, where 1,500 smart phone devices were handed out to fifth graders, the district has a group of people whose sole responsibility is the integration of technology into the classroom, with three people dedicated to mobile learning devices. That group works with curriculum specialists, and together they are writing the curriculum for the district's mobile learning initiative. Meanwhile, the fifth grade science teachers who are having the students use the mobile devices in the classroom are sharing ways they're using the devices via Adobe Connect sessions online.

Qualcomm's Atkins acknowledges that the industry needs more instructional materials developed specifically for mobile devices.

"What we learned from Project K-Nect is that we need more content that fits on the small screen," she says.

But as mobile technology continues to advance, that's changing, too, and ed-tech companies are beginning to respond to this demand.

For example, the Houghton Mifflin Harcourt division SkillsTutor is about to release a version of its software that is tailored for use on iPhone and iPad devices. SkillsTutor provides cloud-based diagnostic and prescriptive software for building skills in reading, writing, language arts, math, and science.

The company's mobile version of SkillsTutor won't be just a scaled-down app, but a completely new platform and interface for using the software anytime, anywhere on an Apple mobile device, says company president Adam Hall. He describes the benefit of true mobile learning as "increasing the time students are learning without increasing the cost."

Not a panacea

Despite the excitement among many educators that smart phones and tablets could change the way students learn significantly, others warn that such mobile devices are not a panacea for education.

"You're not going to do your dissertation on a cell phone," says Eileen Lento, government and education strategist for Intel Corp. "A cell phone enhances a tiny piece of what we need to address. What we're really trying to do is move students up the learning curve. I certainly wouldn't go to a school and say, 'I think you should buy everybody a cell phone.' I don't think that would be the best use of their money."

School leaders need to pinpoint the results they want to achieve, Lento says, and then make smart buying decisions from there. And part of what will move education forward, she adds, are robust learning platforms that allow for rich content creation—something not easily done on a mobile device.

But the potential for mobile devices to deliver information to students' fingertips no matter where they are has many educators intrigued—and this could help students learn to take ownership of their education.

Teachers could begin encouraging students to find out information on their own, for example, and to incorporate what students are learning on their own in the classroom. If a student has a question, instead of raising his hand to ask the teacher, he might Google it and find the answer on his own. What's more, he might find out something the teacher didn't know, and raise his hand and share this newfound knowledge with the teacher and the rest of the class.

"The model of teaching where the teacher is the sole source of information is changing," says Norris. "Teaching is not telling, and learning is not listening—it's doing. So curriculum changes need to take place. And if we can pull it all together, the U.S. will no longer be 15th in the world."

Mobile learning at a tipping point

According to a recent national survey, access to mobile technology in the classroom has more than tripled among high schools students in the past three years—and even more interesting, parents say they are more likely to purchase a mobile technology device for their child if it's for classroom use.

The information comes from Project Tomorrow's annual Speak Up survey and was presented at a conference on mobile learning in Washington, D.C., Oct. 29, 2010.

Focusing on mobile technology in the classroom is important, said Julie Evans, CEO of Project Tomorrow, because of a confluence of positive factors: matured technology, teacher buy-in, and low price points.

"Mobile technology has been developing for years, to the point where there's now a wide variety at low prices, and each [type of mobile learning device] can provide anytime, anywhere access. Teachers are also using these devices in their everyday life and have been using technology in the classroom to the point where they feel comfortable with mobile technology for their students," Evans said.

She continued: "And we're also at the tipping point because most students already own a mobile device, meaning that administrators might not have to spend as much on initial hardware for tech initiatives."

Evans said administrators also are considering the implementation of mobile learning devices because of parent buy-in.

According to Speak Up survey results, 62 percent of responding parents report that if their child's school allowed mobile technology devices to be used for education purposes, they would likely purchase a mobile device for their child.

Even more encouraging, Evans said, is that Project Tomorrow staff found no demographic differentiation when sifting through parent responses, meaning that parents from urban, rural, and Title 1 districts all agreed that they would purchase mobile technology devices for their children's learning.

"This gives administrators a good idea at how to better invest resources in terms of instructional technology," said Evans. "It's also good for administrators, and for teachers, to know that if they decide to use mobile technology in the classroom, they'll get parental support."

Not surprisingly, students, too, support the use of mobile learning devices in school.

According to the survey, students no longer view their schools' internet filters as the primary barrier to using technology in the classroom, as they have in years past. Instead, when asked how schools could make it easier to use technology for school work, students' responses indicated that they want to use their own mobile learning devices.

Student in middle school (60 percent) and high school (64 percent) prefer using their own cell phone, smart phone, or MP3 player, compared to laptops or netbooks (46 percent).

Fifty-two percent of all middle and high school students said that in their "ultimate school," mobile technology would have the greatest positive impact on learning. Remarkably, even younger students in kindergarten through second grade indicated that they would include mobile learning devices such as cell phones or smart phones with internet access (42 percent), MP3 players or iPods (46 percent), or laptop computers for every student (52 percent) in their ultimate school.

Students said they would use their mobile learning devices mostly to look up information on the internet, take notes, record lectures, or access online textbooks.

Students also reported a desire to use mobile technology to receive reminders or alerts about homework and tests, and to communicate with their peers for collaborative work. For example, 48 percent of high school students and 34 percent of middle school students said they use Facebook and other social networking sites to collaborate with classmates on projects.

"Students are already using a variety of technologies as part of their regular school day or to complete their homework assignments, and the use of mobile technology is a perfectly logical 'next step' for them," the report notes.

One step at a time

Even though using mobile technology in the classroom might seem like a no-brainer to some, many classroom teachers (76 percent) continue to express high levels of concern that students will be distracted.

Another issue is digital equity, and making sure all students have access to a mobile learning device. The Project Tomorrow report details how some schools are tackling this issue—for example, some schools are "seeding" their programs by providing devices to students who might not have their own.

Infrastructure issues, such as 24/7 broadband access, also are critical for successful mobile learning programs and "will require educators to rethink a 'cookie cutter' approach to technology implementation," says the report. "Instead, educators might consider focusing on building a stable technology backbone with applications that can function reliably across many mobile devices."

Educators and administrators also must begin to think about which subjects are best suited for using mobile technology in the classroom, what kinds of applications will be best for mobile learning, and how theft, internet safety, and network security will be addressed.

The report acknowledges that, so far, there aren't many well-established models for success. However, there is "excitement, interest, and rapidly growing acceptance as the education community continues to explore a kaleidoscope of approaches and options" for mobile learning implementation, says the report.

"Innovation at this velocity can be what one educator described as 'messy.' In its early stages, teachers and administrators will need to develop comfort with ambiguity," the report continues. "Further, they'll need a clear understanding that because these devices can do many things … the process will be unlike any innovations that have come before."

To help educators implement mobile technology in the classroom, Project Tomorrow has included best practices from five different schools, called "Mobile Learning Explorers," that are on the leading edge of mobile technology implementation.

These schools are Xavier College Preparatory in Phoenix; Paradise Valley Unified School District in Phoenix; St. Mary's City School District in St. Mary's, Ohio; Jamestown Elementary School in Arlington, Va.; and Onslow County School District in Jacksonville, N.C. Project Tomorrow's report on mobile learning, which includes these best practices, is available [here].

While it's important to recognize and talk about these issues, students are already using mobile technology devices and "a whole host of other related applications and tools to implement their own vision for 21st-century learning, and they are not going to wait for the rest of use to catch up," the report concludes.

"Let's follow the lead of these Mobile Learning Explorers and pave a new path for 21st-century learning together," it recommends.

Evans said the 2010-11 Speak Up survey has been open for two weeks and will focus on digital content, such as eTextbooks, as well as how to determine the quality of digital resources and how

to evaluate these resources, how to evaluate high-quality online courses, and what technology parents have in their house for their child's education and how they evaluate these home resources.

'Bring Your Own Device' (BYOD) catching on in schools

Mobile devices are now found in the hands of most children, and school leaders are using that to their advantage by incorporating devices that students already own into classroom lessons and projects.

Concerns remain about students who are unable to purchase or borrow a device for use in the classroom, but districts might find creative ways—such as asking local businesses or community organizations for help—to provide devices in such instances, advocates of the trend say.

With access issues in mind, allowing students to bring their own devices from home can offer educational benefits, as well as some surprisingly positive results when it comes to creative thinking and classroom behavior.

While there has not been a large amount of research on mobile learning devices in the classroom, research on one-to-one computing is a type of presage to some of the current research on mobile technology, said Richard Hezel of Hezel Associates, during an International Association for K-12 Online Learning (iNACOL) webinar that focused on mobile learning.

Studies of Maine's one-to-one laptop program, for instance, revealed that laptops were used for math and science, organizing and sharing information, and playing educational games.

"In Maine, findings indicate that teacher knowledge and practices and use of technology increased," Hezel said. Math and reading scores increased, and all involved learned lessons about technology, learning, and assessment.

"The studies give a sense of what happened when students had a device that they controlled in the classroom and could carry around with them. … We're beginning to get some understanding of how students use technology," Hezel said.

It is especially important to understand how students use mobile devices for learning, and how educators can encourage that use, so that technology is not incorporated without a positive impact.

"One thing that we're always going to come back to is that technology is just a tool—it may help to amplify learning, but it's not the panacea, and we're always making statements about the appropriateness of technology," Hezel said.

Research-based benefits of one-to-one mobile learning initiatives might include:

-Improvements in attendance and discipline

-Broader array of learning resources and experiences

-Increased frequency and quality of supportive individual and group interactions

-Improvements in student and parent attitudes toward the school

-Increases in student achievement

U.S. Department of Education (ED) data from May 2010 indicate that about half of all public schools in the U.S. are giving handheld devices to administrators, teachers, or students.

But most of those handheld devices go to administrators, Hezel said. "A few teachers get mobile phones, and very few schools actually give those mobile devices to the students," he added.

Still, a growing percentage of students with cell phones or smart phones makes it possible for teachers to incorporate mobile devices in their classrooms without targeted device donations or distributions. April 2010 data from the Pew Research Center indicated that 75 percent of students ages 12-17 own a cell phone or a smart phone.

"How do mobile devices change the scene for all of us?" asked Rick Angelone, a board member with the Catholic Schools K12 Virtual. "We're looking to the students to drive that process, because they have the tools, and it will cost districts less if parents are buying the hardware."

Angelone said some challenges that surround incorporating mobile devices into classrooms include the speed with which technology changes and ways in which educators might differentiate between what is good for teaching and learning and what is simply technology for technology's sake.

And while some are concerned about how much time students spend on task with internet-enabled devices that offer potential distractions, Angelone said it is not a huge issue.

"The novelty wears off and they move from using Facebook" to using the device for academic purposes, he said. "Smartphones really are becoming the resource tool and the communication tool of the future," and networks such as Facebook have grown because more students have access to social learning, collaboration, and immediate gratification.

Virtual learning and the availability of digital content have changed to offer more methods of student engagement, increased customization of learning objects, open resources, and personalized education, Angelone said.

[Forsyth County Schools](#) in Georgia embarked on a "Bring Your Own Technology" (BYOT) initiative that includes seven schools and 40 teachers. Teachers received face-to-face and web-based professional development that included modeled examples of what BYOT activities might look like in a classroom.

Managing a classroom when students bring different devices can be a challenge, said Jill Hobson, the district's instructional technology director. The district's IT team boosted its wireless access points to support the pilot, and it maintains a separate wireless network for students to avoid placing students on the same network as administrators accessing sensitive student information, such as that contained in a student information system.

No one was required to adopt BYOT for their schools, said instructional technology specialist Tim Clark, but as word spread "it took off in a viral fashion among our school leadership and among our community."

Clark said anecdotal evidence indicates that theft and discipline issues regarding technology have gone down. Devices include iPads, netbooks, laptops, and gaming devices.

"BYOT isn't about the devices themselves—kids bring in a variety of technology—it's about creating constructive change in teaching practices," Clark said. "Just like kids bring pencils to school … they bring their technology to help them whenever it's appropriate."

"Students become information producers rather than information consumers," Hobson said. "They're engaged in higher-order thinking."

Instead of wondering what students can do with their devices, Hobson said district educators ask students to create or brainstorm ways they might use their devices for learning purposes.

IT operations aren't burdened with a BYOT initiative because students handle maintenance and updates for their own devices, Clark said.

The district started a small iPod Touch initiative with 10 devices in three classrooms. "Although they're great, and the kids love them, it's very difficult for us to manage synching and all the technical aspects," he said. "It's easier when kids bring their own devices."

Virtual Virginia, the Virginia Department of Education's official online course provider, is running an iPad pilot through its "Beyond Textbooks" initiative. Students use a custom app to learn about the historic Jamestown settlement and supplement that digital content with face-to-face instruction.

Virtual Virginia also operates a pilot in which an Advanced Placement (AP) biology textbook is delivered entirely through student-owned iPads.

Tara Farr, an AP biology and environmental science instructor with Virtual Virginia, said one-fourth to one-third of her AP biology students enrolled in the iPad program, which is in a pilot phase this year. Students who registered for a full year of AP biology chose whether they wanted to use a textbook, or whether they wanted to buy the app for their iPads.

Farr said the app offers portability in addition to note-taking and social sharing features, and that students "don't want to carry those backpacks with 50 pounds of books in them."

As an instructor, Farr is able to see what her iPad students highlight and focus on, and is better able to communicate with them through the social sharing feature.

A final assessment comparing the iPad biology app with students who used the traditional textbook will be conducted at the end of the school year.

Where are we going? A look at the future of mobile learning

The movement toward a one-to-one computing environment—that is, one device for every child—soon will be moot, says Phil Emer, director of technology planning and policy for The Friday Institute, which is housed within North Carolina State University. "The truth is, we're going to blow through one-to-one. Right now, we might have four kids to one machine, but two years from now, we'll have one-to-four. That is, one kid to four devices."

That might not seem possible for schools to manage or support—but to remove some of the burden, schools should considering stopping the practice of doing certain things locally and do them online instead, Emer says.

"Why run your own eMail service now?" he says. "Have Microsoft or Google run it, [and] save a bunch of money. Get out of the business of running eMail servers and domain control servers and servers that run your finance systems. There are services available now that do that very well, very inexpensively—and big enterprises use them. So why don't [schools] use them and free up time and money, and invest that money in devices?"

Another key shift is that telecommunications companies are no longer in the business of selling and managing wireline or even wireless telephone service. They're in the business of wireless data networks. "We can talk about my iPhone being a phone, but it's really an eMail device, a phone device, an internet device," Emer says.

Along those lines, Emer believes that eventually the telecom companies will be "involved in the whole solution: not just the 3G wireless solution, but how do you provision the end devices? How do you engineer, manage, and monitor the wireless networks? How do you ensure that the students have data access outside of school? There's an AT&T answer" to all of these questions.

A third thing that will have to change, according to Emer, is the Federal Communications Commission's e-Rate program, which currently helps schools connect to the internet. "What we need to be doing is having the e-Rate discount the cost of the data plan," he says. "So, fix the e-Rate, which the telecomm companies can help us to do, so that it addresses the data connection to users."

The FCC is already funding a study to look at the merits and challenges of funding wireless off-premises connectivity for mobile learning devices. The pilot program will help the FCC decide whether—and how—those services should be eligible for e-Rate support. As part of the pilot program, the FCC authorized up to $10 million for funding year 2011 to support a small number

of innovative, interactive off-premise wireless connectivity projects for schools and libraries. As of the December 2010 due date, the FCC had received 85 "seemingly valid" applications.

Mobile Learning Best Practices

Sure, implementing mobile technology can increase student engagement, but can it really increase achievement in diverse subjects? And besides devices, what else should schools and districts invest in to make sure the technology is effective?

This section explores how teachers, schools, districts, and even states have successfully implemented mobile technology in the classroom and on campus for students and administrators.

Using smart phones to increase math scores

Two years ago, public high schools in North Carolina began an education technology pilot to determine whether smart phones, in conjunction with curriculum resources, could be leveraged to increase student math comprehension. Now, teachers are saying that not only have math test scores increased, but student achievement has increased in other subject areas as well.

The program, called Project K-Nect, was designed to create a supplemental resource for secondary at-risk students to focus on increasing their math skills with the help of mobile smart phones. Ninth graders in several public schools in North Carolina received smart phones to access supplemental Algebra I content aligned with their teachers' lesson plans and course objectives. The phones and service are free of charge to the students and their schools, thanks to a grant provided by Qualcomm as part of its Wireless Reach initiative.

Student smart phones have 24/7 internet access, which students can use at home or at school, and they have full access to both the K-Nect curriculum, as well as features such as instant messaging (IM), video and chat capabilities, and calculators.

"Everyone thought this program might just last a semester," said Suzette Kliewer, a math teacher at Southwest High School, one of two high schools in Onslow County, N.C., participating in K-Nect, "but it's lasted for three [school] years now. It's been approved for this upcoming year (2010-2011), too."

Project Tomorrow, a national education nonprofit organization that provides consulting and research support to school districts, government agencies, and businesses about key trends in education, was asked by Digital Millennial Consulting (developer of K-Nect) to assess the program's efficacy.

Project Tomorrow released a report of its findings earlier this month. The report presents the views of 78 students and four teachers who participated in the program between August 2009 and January 2010.

Project Tomorrow found that by using smart phones as part of the program, students are more successful on their North Carolina End of Course assessments, along with many other positive effects. Data were collected through on-site classroom observations, focus groups with students (pre- and post-semester), interviews with teachers (pre- and post-semester), and interviews with principals and technology coordinators.

K-Nect students are "more likely to achieve proficiency in Algebra and Algebra II than [other] students in their school, district, or state," says the report.

Overall, a greater number of K-Nect students at Southwest High School demonstrated proficiency on the End of Course exams in Algebra (91 percent), Geometry (90 percent), and Algebra II (81 percent).

Likewise, the report says more Dixon High School students achieved proficiency in Algebra (93 percent) and Algebra II (81 percent) than in the district or state as a whole.

Geometry K-Nect students at Dixon (65 percent) also were more likely to demonstrate proficiency on their End-Course-Assessments than students in a comparable class without smart phones (40 percent).

End-of-course assessment data and AP Calculus results for the 2009-2010 school year will be available later this summer.

"We're extremely optimistic about the findings and what they mean for the future of smart phones in the classroom," said Julie Evans, chief executive officer for Project Tomorrow. "Students improved their scores in math by an average of 20 percent, and this technology and wireless internet access ensures the equitable delivery of engaging instruction, bridging the persistent digital and achievement divides."

She continued, "Project K-Nect and this report have significant new implication on how, when, and where we engage students in a learning process."

A day in K-Nect

According to Kliewer, who's been working with K-Nect since its inception at Southwest High School, the report by Project Tomorrow is not a glowing review of technology simply for technology's sake: K-Nect has helped students discover their interest in learning—including her own son.

Kliewer teaches a majority of the K-Nect classes, and her husband teaches honors classes. This past fall, she taught geometry honors, which looped into Algebra II honors in the spring.

Students in the 2009-10 classes were mostly in 10th grade, with about six to seven freshman and the rest sophomores, for totals of around 25 to 26 students per class. These students will now loop into fall pre-calc and spring AP calculus (continuing with K-Nect) for the 2010-11 year.

Each class is 90 minutes long, and each class is a semester-length class.

According to Kliewer, students who come in the K-Nect program are "average" in math, and many are not on the college track. The high school is also near a military base, so students come and go.

"Students are chosen to participate in the program if they're struggling," said Kliewer, "and because K-Nect pushes them to achieve more, we try to put them in the program. But since many of the entry-level classes develop into honors or higher levels in second semester, students can opt in or opt out."

The curriculum—developed in conjunction with Drexel University and the University of Florida—mainly consists of problem sets based on real-world examples.

"The first class taught was Algebra I, and we really wrote the curriculum as we went along," said Kliewer. "Now we have established problem sets for each class; however, we're still in the development process for Algebra II and Geometry."

A typical day for Kliewer begins with her teaching a concept and then asking the class to complete three to four warm-up exercises. Sometimes students collaborate on the solution, and sometimes they work independently; all students then IM Kliewer their answers.

"When class first begins in the semester, it takes a few tries for students to catch on for the problem sets. I walk them through a few, but they catch on quickly and don't require much assistance by the end of the semester," she said.

Kliewer explained that some days students might be asked to go outside to record video examples of a concept and then explain it to the class.

"At first, the videos and explanations weren't detailed," said Kliewer, "so part of the learning process in K-Nect is learning through teaching. Students have to understand a concept in every way to be able to teach their peers. This is a large part of what contributes to the positive effects we've seen in the program."

Because students are allowed to keep their smart phones at all times, K-Nect included MobiControl, a device management solution, to keep tabs on what students were messaging with the phones.

According to Kliewer, students are told that their phones can be monitored.

"They're only allowed to use their phones for school-related conversations. IM is also restricted to students and teachers that are part of K-Nect. At any time, K-Nect teachers, school administrators, and even Shawn Gross [who manages the project] can look and see what a student is doing. Because students know this, they tend not to disobey the rules."

Kliewer said there have only been a few minor infractions.

"The students consider it quite a privilege to be part of this project and are very respectful of the opportunity," explained Evans. "They know that most kids don't have the ability to use a smart phone within instruction in this way, and they don't want to go back to classroom instruction the 'old way.' The learning environment facilitated by the devices—engaging, interactive, and self-directed—is therefore a very strong motivator for appropriate use; maybe the best motivator."

Even though phone truancy is minimal, Kliewer's school does not allow students to access their personal cell phones on campus.

"At first this was daunting to me, because I didn't know how other teachers not part of K-Nect would react to students having smart phones," said Kliewer. "But the other teachers and administrators have seen what the students can do as part of K-Nect and the educational benefits of phones, and they've been very receptive."

In fact, Kliewer says that some teachers now use the K-Nect program model and let students use their personal phones to record videos and text answers, and more, during class as part of their classroom exercises.

Kliewer also has begun to allow students to use their personal phones as part of her non-K-Nect classes.

"If students don't have video capability, or data plans, I just work around it," she said. "Cell phones are infectious; they're not going away, so we might as well use them."

Kliewer's school has just approved K-Nect for the upcoming school year, where Kliewer will teach Algebra I in the fall and AP calculus in the spring.

As the program continues through the years, more and more classes are being added as part of K-Nect to both high schools.

Great extras

Kliewer says it's not just better scores that K-Nect has had an effect on; it's teaching, too.

Project Tomorrow found that teachers rely "more on facilitation and less on direct instruction, encourage students to talk with and teach each other, and create relevance for students by creating assignments that help them see math in their world outside of the classroom."

Teachers also use more internet-based tools to manage their classes, and they transfer their newfound skills to other devices.

For students, not only are they more proficient in math, but they feel more successful as well (85 percent).

"K-Nect tools and environment help students gain confidence in their math abilities, as they become more comfortable learning math (94 percent), talking about math (82 percent), and explaining their solutions (85 percent)," said the Project Tomorrow report.

When compared with other students, the report found that K-Nect students (61 percent) also have a greater self-perception that they are succeeding academically then their peers (39 percent) and believe that they are being better prepared for success (55 percent) than other students (45 percent).

Nearly 75 percent of the K-Nect students report taking additional math courses, and more than half say they are thinking about careers that require math.

Project Tomorrow plans to track the progress of these students as they enter post-secondary schooling as well.

"If I had to give one reason why this program is working, it's because of the expectations placed on students," said Kliewer. "When kids know we expect them to work hard, to do their best, and to succeed, they want to—and they do. We just have to give them the tools and encouragement to do so."

Five ways readers are using iPads in the classroom

Whether you think it's hot stuff or just fluff, the iPad has caught the eye of many educators. Here's a list of five ways that eSchool News readers say they're using iPads in the classroom.

How are you using iPads in your own schools or classrooms? We'd love to hear from you. Tell us your own experience in the comments section of this story.

1. For intervention.

Gabrielle Smith from Etna Elementary has been using her iPad 2 in her fifth-grade classroom for roughly two months. Smith purchased the iPad with her own money and without reimbursement to test the device as a model for delivering Response to Intervention (RtI).

"I found an app called Math Drills, to help students with their math facts. After a school-wide math fact program, there were a certain number of students that still didn't know their addition facts. Essentially, they had trouble with 'at a snap' recall of facts," she explained.

"I put those few students on the iPad app, which gave them the opportunity to practice and then to test themselves. It kept track of their scores and showed their improvement. I've had students BEG me to allow them to practice their facts—under normal circumstances, what fifth-grader do you know [who] WANTS to practice their facts? I'll take it! Each student has showed improvement in the quick recall of facts, and they want to. It can't get much better than that."

2. For enrichment.

Smith also wanted to use her iPad for students identified as "gifted," as well as to enrich her own life.

"There are several apps out there for the 'smart kids.' I found one for the iPhone, which I use on the iPad, called Miss Spell's Class," she said. "It gives students a series of challenging vocabulary words, and they need to decide if it's spelled correctly or incorrectly. I've seen my gifted kids get so frustrated (it shows them that they're not always No. 1), and consequently, so proud of themselves because they've finally conquered it. The success is made much sweeter when you have to work for it."

She continued, "Apps like Penultimate keep track of notes that I take on students. In my RtI groups, I take pictures of the work kids have done and put it into a file with their name on it, and notes for future teaching. The 2Do app helps me organize groups that I'm working with during class, and what we're doing that day. I assign due dates and stay on track. Then, I know if

someone is absent because they're shown as overdue. TeacherPal helps me make my seating chart without erasing every quarter. Teacher's Assistant allows my students on behavior plans to mark their own progress as they meet (or don't meet) their goals. They are responsible for it, and are eager to earn points during the day simply so that they can enter it on the iPad. Regardless of the motivation, I'll take it, since I've seen an improvement in behavior, especially … of fifth-grade [students]."

3. For assistive technology.

One reader, Eva, said she uses the iPad to help a boy in her classroom who has autism. Supposedly, the iPad was the only tool that could engage him for any length of time with his speech therapist.

"Upon first seeing it, he stared at it for a few seconds then reached for it," she explained. "We gave him the iPad and he immediately started mimicking us by pushing all the right buttons to see the interactive app. We love it so much that his mother, with the help of a therapist, wrote a mini-grant to one of the local organizations so that he could have one of his own."

4. For digital literacy.

A reader identified as "drthomasho" noted how every one of the 270 students at the Master's Academy in Oviedo, Fla., will receive a school-issued iPad next school year.

The Christian school is paying for the iPads, because school officials hope to teach students to "engage the digital world productively," said Mitchell Salerno, the high school's principal, in an interview with the Orlando Sentinel. School officials hope to give students the skills expected of them both in college and in the workplace.

The iPads will not replace all textbooks, but they will allow students to do much of their school work online, reduce reliance on paper, and give teenagers access to resources not available in class.

"Kids have grown up their whole lives with computers, but they need to be taught how to harness the technology for education," Salerno said.

It's important to note that before making the iPad decision, Salerno visited a private school in California that had purchased iPads for all its students to learn how the devices might improve education. The staff then spent a year working on the project.

5. For organizing resources—and for reading.

Beau Barrett, a teacher at Crestview Elementary School, writes on his blog how to organize the iPad's various resources for classroom use with students, and the teacher, in mind. (You can see screenshots and read more about Barrett's iPad use on his blog.)

"The way I create folders on my classroom iPad is by organizing them with a student focus in mind. For example, I created folders labeled 'Free Write' and 'Free Math' so students know what they are allowed to use when they are finished with their writing or math assignment," he explains. "I also create specific folders for lessons or units of study. The folder labeled 'Earth' on our classroom iPad was created for small group work. Students had the task of answering the question, 'Why are we able to live on Earth?' The apps in the 'Earth' folder were the only apps they could use to find an answer."

He continued, "However, the most important folder I have is my personal folder. Naming this folder 'Personal' tells my students 'hands off!'… None of my personal apps give any personal information away to the students. If an app does have personal information, it is password-protected."

Barrett also notes that sometimes folders are not necessary.

"I placed iBooks, Kindle, and USA Today on the bottom bar of my iPad, not in a folder. I put these apps here [because] reading on our iPad is one of the most popular things the students use the iPad for. This way, students are able to easily locate the reading apps with no searching necessary. In a nutshell, I organize our classroom iPad for the convenience of student use and somewhat my own. This way, the students feels more like the iPad belongs to them, rather than something the teacher lets them use."

District plans iPad-only algebra course

New Jersey's Edison Township School District will be the first in the state to implement an entirely iPad-based Algebra 1 curriculum.

The program will pilot the Houghton Mifflin Harcourt (HMH) Fuse: Algebra 1 application with 60 students this fall (2011), said Richard O'Malley, Edison Township School District's superintendent.

O'Malley has only been the district's superintendent for about four months, but he said the addition of iPads in the classroom helps him get closer to his personal targets.

"I really wanted to bring as much technology into the curriculum as possible; that's one of my goals for the district," O'Malley said. "I really believe that this type of technology integration is the future of teaching and learning."

HMH Fuse is currently being piloted in California as well, where teachers are reporting dramatic gains in student engagement, Houghton Mifflin Harcourt says.

The iPad application gives students step-by-step animated instruction, instant feedback on practice questions, the ability to write, record, and save notes, and access to more than 400 video tutorials. Teachers can monitor performance via Wi-Fi, with real-time, student-specific feedback.

"We're downloading this application, which is the equivalent of the 950-page book that we would've given students, and what we're trying to do is offer this Algebra 1 course in a digital media teaching environment and compare it to the traditional method where we just use a textbook," said O'Malley.

Edison Township School District plans to evaluate the program's success through a variety of baseline tests and formative assessments, as well as analyzing the results of New Jersey's state standardized tests and scores on the High School Proficiency Assessment (HSPA).

"We're going to look at all the data to see if there was any dramatic increase in student achievement by offering this curriculum in a digital format," O'Malley said.

If there seems to be a positive correlation between the use of HMH Fuse and test scores—which O'Malley is fairly certain there will be—Edison Township plans on expanding the program.

"We'd want to expand it throughout both of our high schools, if not our middle schools as well," said O'Malley. Houghton Mifflin Harcourt is also exploring adding to its own course offerings.

O'Malley is enthusiastic about the possibility of bringing iPads and HMH Fuse into the classroom. "This kind of cutting-edge technology has the ability to really personalize teaching," he said.

HMH earlier this year launched a year-long pilot project with 400 eighth grade students in the San Francisco, Long Beach, Riverside, and Fresno school districts in California. One group of students used the HMH Fuse app, while the other group was taught traditionally. Each teacher in the pilot project randomly selected one class section to use the app and another to be taught via textbook. The test results from that pilot should be available in fall 2011, but early results are encouraging.

Jay McPhail, Riverside Unified's director of instructional technology, said 90.5 percent of students using iPads are testing as proficient or above on benchmark tests, compared with 60 percent in other classes.

In Fresno Unified School District, where 100 students at Kings Canyon and Sequoia middle schools are part of a four-district pilot program, the results appear promising, spokeswoman Susan Bedi said.

"The iPads have created excitement about learning algebra, which indicates that students are more engaged in the classroom," she said, "and that will equate to higher achievement."

Schools see rising scores with iPads

Want to improve student academic performance? There's an app for that.

Hundreds of middle school students in the central San Joaquin Valley, Calif., and across the state—each with a school-issued iPad—are using curriculum apps for their classwork and homework.

Educators say students who use the touch-screen devices for class appear to be more engaged in their studies. Students can view their school work anywhere and eMail their teachers anytime.

It seems to be making a difference: Test scores of iPad-using students are climbing.

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"The iPads have created excitement about learning algebra, which indicates that students are more engaged in the classroom," she said, "and that will equate to higher achievement."

School is cool

Teachers say students are more interested in learning because it's happening where they want to be—on the cutting edge of technology.

This year, each sixth-grader at Corcoran Unified's John Muir Middle School got an iPad from the district, one of the few in the nation to hand them out to an entire grade level.

Sitting cross-legged on the floor of her classroom last week, sixth-grader Dominique Hunt glided her finger over her iPad screen to display several of Pablo Picasso's paintings in full color. Within seconds she transferred them to a presentation about the Spanish painter for her English class.

The iPad comes to students with hundreds of lessons, games, and learning applications already loaded in by teachers, and students can add their own.

When they're not using iPads for school work, students can eMail friends, add new applications, surf the internet, or go to Facebook. Filters keep students from inappropriate websites.

Sixth-grader Savannah Smart said she and her classmates caught on quickly to the notebook-sized computer.

Savannah showed how she can draw with her finger on the iPad screen or circle an answer on a quiz.

It's so convenient and fun to use, she said, that "I can study while I'm helping my mom make dinner."

If there's a downside to having an iPad, it will be having to live without one during the summer break, the girls said. The iPads will be collected from students after school ends.

Said Dominique, "I will feel so empty."

Test scores rising

More districts across California and elsewhere are putting in orders for iPads.

Four hundred students in the Fresno, Long Beach, San Francisco, and Riverside Unified School Districts are in a pilot program sponsored by textbook publisher Houghton Mifflin Harcourt and Apple to teach algebra with iPads.

In one video application, a well-known math expert who is regarded as algebra's equivalent of "Bill Nye the Science Guy" introduces sometimes tedious and difficult concepts with a dose of humor. He uses props to make a math problem come to life, wearing multiple hats to demonstrate the number of combinations a person can wear.

If students don't understand the lesson the first time, they can watch it repeatedly until they've learned it, said John Sipe, national retail sales manager for Houghton Mifflin Harcourt in San Diego.

"They could watch the video 15 times, and no one has to know, and it takes away the stigma of not getting it," he said. "This is a move toward personalized and individualized instruction so the students take more of a role in their learning."

That might help explain some of the results schools are reporting.

Jay McPhail, Riverside Unified's director of instructional technology, said 90.5 percent of students using iPads are testing as proficient or above on benchmark tests, compared with 60 percent in other classes.

Benchmark tests are given to mark progress during the school year. Results from the California Standardized Tests, which students are taking this month, won't be known until August.

"What we are hearing over and over from the students using iPads is the ease of having all the resources in one place," he said.

Shellie Escobedo, a sixth-grade teacher at Corcoran Unified's John Muir Middle, said her language arts students' scores jumped 11 percent compared with benchmarks from last year.

"This is the most confident I have felt going into state testing in my 10 years as a teacher," she said. "I don't know how we will not have an increase."

A growing number

Joining the iPad experiment was a no-brainer for districts that got theirs for free by joining pilot programs or using grant funds.

Madera Unified used $140,000 in grant money to buy 120 iPads and other equipment for math classes at Desmond Middle School.

But Corcoran Unified spent $200,000 in district funds to lease iPads and to provide wireless access to the kids. For many families, it marked the first time they had home access to the internet.

The John Muir Middle students use iPads for math, language arts, science, and social studies. They only have one book in the four core subjects: a language arts workbook.

The district is leasing 250 more iPads next school year (2011-2012) for college-bound high school students and eventually, all students in grades 6 through 12 will have them, said Kathi Felder, the district's academic technology coach.

Students with iPads are doing a better job on their schoolwork and homework, said Steve Brown, Corcoran's director of educational services: "Some students who were barely turning their assignments in through December are now turning in their homework."

And discipline issues have almost disappeared since iPads were introduced to students, who risk losing theirs if they misbehave, Escobedo said.

iPads replace textbooks

Could the iPad spell the death knell for heavy backpacks?

Textbook companies are scrambling to develop applications to replace textbooks.

"The iPad gave us our first opportunity to reimagine how we deliver content," said Sipe of Houghton Mifflin Harcourt. "Instead of toting a 700-page, 8-pound algebra book, you have the iPad with video examples and guided answers."

But it's up to software developers to keep pace with tech-savvy kids, said Susan Einhorn, executive director of the Anytime Anywhere Learning Foundation based in Washington state.

Just putting flash cards into applications will not be enough to keep students engaged, she said. And iPads aren't suited for word-processing or lengthy writing assignments.

"The main question is, what are you going to do with it?" she asked. "We want all kids to have a laptop, and I don't know if this will replace the laptop."

Printed textbooks are definitely on their way out, said Otto Benavides, who teaches technology integration courses for teachers at the Kremen School of Education at Fresno State.

In four or five years, most textbooks will come on devices like the iPad, he said.

The iPad might not always have a monopoly in classrooms, said Warren Buckleitner, the New Jersey-based editor of Children's Technology Review. Competition for classroom dollars will spur manufacturers to design new products that likely will be cheaper, he said.

But the iPad, Buckleitner said, will always represent the "launch of a new renaissance" in education.

Maine laptop program offers lessons in implementation

Nine years after it became the first state in the nation to initiate a 1-to-1 laptop program in its schools, Maine continues to innovate with technology and has hired technology integrators to help its schools move forward. Jeff Mao, director of learning technology for the state's education department, recently reflected on the groundbreaking program and its lessons learned with eSchool News.

"What we are doing [is] relatively bleeding edge. … There isn't a book to read, there isn't really a manual that says this is how you do it … but you are kind of creating it on the fly, and from that perspective there's a lot of invention," said Mao.

Mao said the biggest adjustment for the state and its school districts, which began the program in 2002, was not the machines themselves but the human element.

"I think some of the greatest challenges we've seen are really kind of on the human side of it, meaning teacher training, leadership—just the simple notions of change. Anything that has such a significant change in the way you can do business, I think that's just hard for any large organization," Mao said.

He said teachers usually put the most pressure on themselves when trying to adjust to a new teaching process.

"Schools are relatively risk-averse, particularly because innovation and change in education is a very difficult thing to measure and to quantify and to bottle," Mao said. "Anytime you introduce a change, there's a risk the change won't go well."

To try and adapt to the quick pace of new developments, many schools in Maine have added ed-tech "integrators" who help incorporate new technology into classrooms.

Mao said Maine teachers not only distribute technology to their students, but also benefit from its use.

"A lot of our trainings now occur over webinar, so right now every Thursday we have webinars for teachers," Mao said.

While the program has seen some evidence of success so far, Mao said that in hindsight, he might have executed it a bit differently.

"If a state is looking at this from a state's perspective, I think it's important to make sure to define your own terms for success," Mao said. "This is one of the things that we didn't really do clearly at the beginning, and we've been playing a little bit of catch-up ever since. … We didn't clearly define what we thought success would look like."

He said it's important for proponents of a one-to-one laptop program to know their educational goals, in order to explain to their constituents why such a program is worth the funding.

Maine's program began in 2002 when all 7th graders receiving Apple laptops, and it has continuously expanded until students from grades 7-12 all had laptops.

Mao said it takes a great deal of leadership to make 1-to-1 laptop programs successful, but it can be done.

"The leaders in your system, from the highest levels of government and departments of education all the way down into schools, are the drivers of change. If a principal doesn't see the necessity for the change or doesn't provide the pressure for the change, the change won't occur. Just because you've introduced the technology doesn't mean anyone will do anything significant with it, if the leaders aren't applying the pressure to do that," he said.

He cautioned that a great deal of assistance and cooperation is necessary to make a smooth transition to a 1-to-1 laptop program.

"The leaders won't be successful with pressure if they don't provide support. You can't just tell someone to do something differently but then not give them any support in trying to do that. So there's a balance between pressure and support, but those things are very important—and you've got to have both," Mao said.

He said this kind of support ranges from professional development, to arranging schedules so that teachers can have planning periods together.

"It's the little, simple details that can sometimes go a very long way, [and] that might not even cost you any money," he said.

Device Management

Security, identity management, wireless access, software maintenance, BYOD policies, and financing are all areas that need special attention and plenty of thought when considering mobile device implementation.

In this section, leaders in mobile learning share their best strategies and solutions for managing the machines.

Before going mobile, make sure you can manage the devices

"Having mobile devices in your schools is inevitable," said David Mendez, information systems coordinator at Life Schools in southern Dallas.

It's a statement echoing around schools across the country: You can't have a 21st-century education without giving students and staff access to mobile technology. The problem is, though mobile devices ultimately make learning easier, they can be hard to manage.

"It's certainly something you have to carefully plan," said Mendez, "because though you want your kids to have access to the technology before the technology becomes outdated, you have to make sure it will work first."

One way Mendez and Life School are making it work is by using Kaseya, IT systems management software that allows monitoring from just one central location, with no third-party involvement necessary.

Who they are

Life Schools, a public charter school system with five campuses and more than 4,000 students, was approved in 1998 thanks to Tom Wilson, a former pastor who saw too many kids go by the wayside.

Wilson wanted parents to have the option of enrolling their students in a public school system that—while having the same accountability standards set by the Texas Education Agency (TEA)—allows for innovative teaching practices and curriculum to help keep kids in school.

Life Schools takes pride not only in its innovative curriculum, but in its focus on what it calls "character development" and "parental involvement."

Mendez said character development means developing solid values through extracurricular activities and teachable moments. For example, if a teacher saw a student do something dishonest, that teacher might make "honesty" the "character word of the day."

For parental involvement, it's a bit more than attending parent-teacher conferences.

"Parents have to earn 'parent points' throughout the year, and have to have a certain amount by the end of the year," Mendez said. "For instance, the school will say, 'Come sit in on a class your child attends and earn some points,' or 'Attend the parent night and participate in discussion and earn your points.'"

It's no wonder that with a school system devoted to developing the whole child, allowing for 24/7 access to information is an imperative.

Mendez said the system, run more like a large district than a company like other charter systems, has a superintendent devoted to technology integration, even in the struggling economy.

"We know how important education technology is for students, so they can get the most out of their learning, get engaged, and have access on-the-go. We don't want students to have a large transition from home to school—we want it to be seamless," he said.

Mendez described how his system incorporates SMART boards, Discovery Education streaming, and soon Microsoft's Live@edu—a suite of mobile, desktop, and web-based applications that allows students, staff, faculty, and alumni to collaborate on campuses and create a community.

Look before you leap

But before Life Schools can allow all students and faculty to have access to mobile devices, it's important to have the infrastructure in place, says Mendez.

"We need to test things like how the network responds to multiple systems, how to get everyone the latest patches, and what filter systems keep our environment safe while allowing for unhindered access, and so we're in beta at the moment," he explained.

Currently, about 50 percent of administrators (roughly 150 to 200) are using their own mobile devices while connected to Life Schools' resources and software, such as grade books, portals, eMail, and more—meaning that the IT department, which currently uses Aruba for wireless, needed a bigger pipeline, as well as a way to set policy and procedure updates more easily.

Mendez says it's easy to get excited about allowing students and educators to bring their own mobile devices and start getting access, but if the connections don't work or the system gets hacked, then the cons outweigh the pros.

To help speed up the beta testing and allow the IT systems team to take a proactive approach to implementation, Life Schools chose Kaseya to ease the burdens.

Using its allotted technology funding, the charter system is using Kaseya to help manage mobile devices.

"Since our five schools are spread out, it's good to have everything managed from one central location, which means our staff doesn't have to physically be there to monitor each device," enthused Mendez.

According to Mendez, Kaseya automates the entire management process, by providing reports, monitoring the health of each machine, applying patches, and monitoring security—and all of this from any location through a web-based interface.

Kaseya also handles all software, meaning no third, fourth, or fifth party is needed.

But it's not just easier for the IT team; it's less burdensome for teachers as well.

"We don't have to walk into class, interrupt, and get the kids off-task by asking the teacher when a good time to fix the device will be and what the problem is. All staff has to do is file an online ticket and it's done. Teachers get more instructional time," he explained.

A closer finish line

Thanks to Kaseya and an overachieving IT team, Mendez says that the beta testing will go faster and smoother.

He hopes that by next spring, students will have their digital lockers, or secure online file storage systems. After that, it's time for mobile student devices.

Mendez says it's Life Schools' policy to roll out software and technology to grades or classes that can provide the most feedback and benefit the most, such as high schoolers, before trickling down to lower grades. Therefore, it probably will be these students who are in beta first, and a "bring your own device" (BYOD) policy is the most probable implementation strategy.

"It's our hope that by implementing these devices and tools, our students will continue to experience the high quality of education that makes Life Schools so special," he concluded.

School leaders eye mobile support 2.0

A growing number of school leaders agree that mobile devices—including students' personal devices—can, and should, be used in the classroom to promote 21st-century learning and student engagement. But supporting such a diverse array of devices is proving to be a challenge for school IT officials, many of whom say it's time to revisit mobile device management and security practices in K-12 education.

According to the New Media Consortium's 2011 Horizon report for K-12 education, mobile learning has a "time-to-adoption horizon" of one year or less.

"Mobile learning is fast becoming a reality and has really skyrocketed from last year's report," said Laurence Johnson, CEO of the New Media Consortium, "in large part because of how useful mobile tech is in emergency preparedness on campuses." (Read "CoSN's crystal ball: Get ready for mobile learning, cloud computing.")

And at the Consortium for School Networking's 2011 conference in New Orleans, not only did most attendees carry their iPads and smart phones from meeting to meeting; the annual conference also featured its main discussions around the topic of mobile learning.

Supporting the Horizon report's prediction about mobile learning, CoSN launched an initiative to help school leaders understand how to lead mobile learning programs successfully in their districts. The organization also invited notable school district, state, and national leaders, as well as private-sector experts, to discuss strategies for mobile learning implementation. (Read "Experts give advice on mobile learning.")

As teacher and administrators create new policies for the use of mobile devices in classrooms, IT leaders are also calling for updated mobile device management practices.

According to an independent study, titled "Building an Effective Mobile Device Management Strategy for Education" and commissioned by Forrester Consulting on behalf of MaaS360 by Fiberlink, a provider of mobile device management solutions and cloud-based Mobility-as-a-Service (MaaS), the number of smart phones in use at educational institutions already has eclipsed that of traditional PC devices.

What's more, three out of four IT decision-makers say they invest more than 20 hours every week in supporting mobile devices, according to the study.

Released in February 2011, the study stated that "IT managers no longer have the authority to veto the use of mobile devices or limit use to a specific brand or operating system. As a result, more than 80 percent of IT decision-makers within the education industry have already implemented or are planning on implementing mobile device management solutions that can scale across all devices, regardless of who actually owns the hardware."

Another key area of concern for school IT leaders is mobile device security.

The study found that 95 percent of security decision-makers in education say that data security is a top priority in 2011, especially because sensitive student, medical, and financial information can be stored on these mobile devices, and educational institutions are at risk of costly data security breaches.

"Traditionally, IT managers have had to cobble together behind-the-firewall management solutions—many of which have found to be too complex and expensive, required significant backend infrastructure investments, or needed professional services assistance to install and configure—that all too frequently lacked support of key mobile devices that students, teachers, and administrative staff really desired," the report says.

As a result of these needs, Forrester found that schools increasingly are turning to cloud-hosted MaaS solutions that are quicker to deploy and that "deliver on key functionality … across all types of mobile devices, including laptops, smart phones, netbooks, and slates and tablets."

The report describes these key functionalities as:

-Strong password policies

-Full disk encryption

-Remote lock/wipe

-Asset and activity visibility and management

-Application control

"While mobile devices are being used in many school districts across the country, full-scale adoption still has a way to go, owing to complications regarding privacy and policy practices, as well as having networks to support high-speed data," said Johnson.

He continued: "Although these technologies continue to improve K-12 achievement and productivity, that doesn't mean there aren't still challenges to be considered."

For the full report, go to: http://trials.maas360.com/forms/register_service_m.php?id=135.

'Identity management' a key to successful mobile learning

While the potential for mobile learning with smart phones or other portable devices is huge, many challenges remain before everywhere, all-the-time learning becomes a reality.

One such challenge is how to police the devices to make certain students are using them only for tasks that have to do with learning and are not accessing inappropriate content.

A simple way to do this is via identity management, says Phil Emer, director of technology planning and policy at The Friday Institute, which is housed within North Carolina State University.

Emer says it's inevitable that students eventually will be allowed to bring their mobile devices into school, and identity management can help make this happen. Each child should have an account, and any time students use a wireless device, they should be required to log into the school's wireless network, just as enterprise users do, where they can be monitored. "You can even put it all together on a website for parents," he says. If a student is doing something inappropriate, either the parent or the school sees it and can put consequences into place.

"People over-interpret CIPA [the Child Internet Protection Act]. They do little or no monitoring, they just filter the whole internet," Emer says. Instead, he suggests, schools should filter the "clearly unsavory stuff" and leave the rest flexible.

Still, students will always look for ways around security. "It's almost like an ongoing arms race between students and administrators," says Michael Flood, education solutions practice manager at AT&T. But there are solutions, such as "middleware" software that AT&T and other companies provide.

In a mobile device environment, "you can force all traffic from mobile devices to route back through the district, so you have some assurance that access is as good as it is on campus. You can also implement a filtering system through the mobile network, through the carrier," he says. Mobile device management (MDM) software also can help solve the problem. "Some districts require that MDM be installed on any student- or faculty-owned device if they want to use it at school," Flood says.

He adds that some school leaders look at the issue simply from an "acceptable use" perspective, addressing it purely from a policy standpoint and not a technological one.

That viewpoint is similar to what Eric Williams, superintendent of the York County School Division in Virginia, believes. Dealing with mobile devices in the classroom, he says, is a classroom management issue.

"Teachers have always dealt with classroom management issues like off-task behavior, cheating, and inappropriate materials," he says. Technology simply offers new versions of these same issues. "They exist separate from technology, and they exist with technology. It's a challenge for teachers regardless of whether cell phones are allowed in the classroom or not."

Tom Greaves, founder of education technology consulting firm The Greaves Group and co-author of a study called Project RED, a national effort to analyze what's working in technology-rich schools, says there are two camps: advocates of "lock and block" solutions, who want to lock everything down and block all inappropriate content, and advocates of giving students some responsibility. The latter camp is gaining in popularity, largely because students will, eventually, have to learn how to use discretion and make smart decisions regarding their online use. Besides, says Greaves, "if a student has done his homework, is finished with what he needs to be doing, and is watching ESPN SportsCenter for five minutes, is that the end of the world? I think the issue is going to resolve itself."

Another challenge is whether to allow children to bring their own device to school—or whether they should be given school-issued devices. If students bring in their own, there could be equity issues: Some students will have a device, while others may not. And not all devices are created equal.

For now, schools that are encouraging the use of a child's own device in the classroom for learning purposes are taking a laid-back approach. For example, next school year, the Katy Independent School District, in a suburb of Houston, will allow students to bring their own personal devices; the district is installing public Wi-Fi at every campus.

"Public Wi-Fi does not address the equity issue, of every kid having a device, but it does leverage the personal investment parents have made," says Lenny Schad, the district's chief information officer. "If not every student has a device, we have mobile carts, so teachers can supplement that way. [Or,] they can pair up with students who do have a device."

The York County School Division also allows students to bring in their own devices and use them for instructional purposes. Recently, a middle school forensics science teacher had students taking photos of mock crime scenes using their cell phones. Students sent the photos to the teacher, who displayed them on a screen in the classroom for use in analyzing the crime scenes. When a student doesn't have a device, he or she simply works with a student who does.

At this point in time, at the high school level, a very high percentage of students do have their own mobile devices, says Schad.

Additionally, Project Tomorrow's Speak Up survey indicated that 67 percent of parents said they would be willing to provide their child with a smart phone if the school allowed it to be used for education. That number was pretty stable across urban and rural districts, says Julie Evans, CEO of Project Tomorrow.

"Parents are thinking of smart phones as different from a laptop. It's like paying for violin lessons, paying for a field trip or a calculator," Evans says. "It's a whole different category."

In fact, Elliot Soloway, founder and chief executive of GoKnow, an education consultancy, predicts that by 2016, nearly every K-12 student in the U.S. will be using a mobile handheld device as an important part of his or her education. Greaves agrees: "I think the issue of whether it's a student-owned device or a school-owned device is in migration. I think in five years or so, it will shift to student-owned devices. It's like calculators: bringing a calculator to school is your own responsibility."

Pricing is another major hurdle. The devices themselves often are subsidized by wireless providers; second-generation devices can be given or sold cheaply to schools once a new generation of device is released to the market. And besides, the devices are significantly less expensive than PCs or laptops. But the data plans that enable students to access the internet anytime, anywhere—that is, via a 3G or 4G network, allowing students to go online even when they are not connected to the school's wireless network—can cost as much as $35 per student, per month.

Part of the challenge for schools is that the federal e-Rate program, which provides telecommunications discounts to eligible schools and libraries, does not discount the cost of the data plan—although there is an e-Rate pilot program for wireless internet services for off-campus student use planned for next year.

Cost might not be an issue for long, Cathie Norris, Regents Professor at the University of North Texas, who works with Soloway, believes. "Eventually, you'll get to the point where every student will be able to use [his or her] own device" at school, she says—the implication being that parents will be paying for the data plans themselves.

Schools piloting secure mobile devices

A company that manufacturers secure personal cell phones for children is making a move to education, where it has introduced secure, internet-enabled mobile handheld devices for classroom use. School teachers or administrators can program the devices to allow (or disallow) calling or texting during certain times of the day, making them ideal for educational use, the company says.

Kajeet's newest initiative, Kajeet for Education, aims to offer districts affordable access to mobile devices in an effort to expand students' learning opportunities and develop their technology skills.

The initiative intends to support many mobile learning devices, including laptops, netbooks, tablets, and smart phones. Michael Flood, the company's vice president for education markets, said Kajeet hopes to sell some of those devices directly to districts—most likely smart phones and tablets.

"There is recognition that we can leverage capabilities and technologies … by providing mobile learning devices for students with controls for schools," said Flood, a former AT&T executive.

The company's move comes at a time when support for mobile devices is taking classrooms by storm.

Data from Project Tomorrow's 2010 Speak Up Survey indicate that 67 percent of parents support their child using mobile devices in the classroom for school work, although 65 percent of school administrators in the same survey strongly objected to letting students use their own mobile devices in school.

More than half (53 percent) of middle and high school students said the largest obstacle they face in using educational technology today is not being able to use their own cell phone, smart phone, or MP3 player for mobile learning in school.

Many forward-thinking districts have completed mobile device pilots or currently support mobile device initiatives that involve both school-supplied devices and student-owned devices.

The Plano, Texas, Independent School District previously has piloted mobile device initiatives for students, and Associate Superintendent for Academic and Technology Services Jim Hirsch said the district now has more than 10,000 K-12 students connecting to the district's network each day with a personal mobile device.

"Discipline referrals for inappropriate use of devices have fallen now that our students are allowed and encouraged to use their devices during school," he said. "As always, the students meet our expectations, and the use now is educational, not subversive or secretive."

Kajeet-powered devices will feature network-based controls that can be applied to both the available features on the devices as well as the interactions the devices have with the school or district network.

School leaders will be able to control the student devices based on individual users or groups of users, with different settings for different times of the day, Flood said.

For instance, network administrators might turn off the devices' ability to send or receive phone calls or text messages during school hours, and they might choose to block all streaming video access except for pre-approved educational streaming services. Certain groups of students might have access to different applications or features than other groups on a case-by-case basis, or depending on the needs of a teacher or his or her lessons.

Access to other features might be turned on during weekends—text messaging, for example, so that students can communicate with one another while working on homework assignments.

"We work with districts to tailor exactly what they need for educational purposes, rather than just [restricting] them to consumer or traditional data plans," Flood said.

Kajeet for Education employs what it calls a "multiple walleting technology," through which different services on student devices can be billed to separate accounts.

Suppose a school gives its students a smart phone for mobile learning. The school maintains filtered data connectivity but prohibits calling or texting capabilities. However, if a student's parents would like their child to have access to calling and texting after school hours, that student's parents would be able to pay only for those calling and texting features.

"Or, if a school allocates a certain amount of data usage to a student, we can allow a parent to add more data capability to that device," Flood said.

The company also will alert schools and districts when students' devices are nearing data usage limits.

Kajeet for Education will pilot the secured mobile devices with a handful of confidential schools over the summer before moving to full-scale operations.

Flood is a founding member of the Georgia Gwinnett College Technology Advisory Council and guest lectures on educational technology at Georgia Perimeter College. He is also a member of the Emerging Technologies Committee for the Consortium on School Networking.

As head of Kajeet's mobile learning division, Flood also will focus on developing business models that are compliant with e-Rate standards and the Children's Internet Protection Act, while addressing school budget requirements.

Experts give advice on mobile learning

At this year's Consortium for School Networking (CoSN) conference in New Orleans, not only did most attendees carry their iPads and smart phones from meeting to meeting; the annual conference also featured its main discussions around the topic of mobile learning.

Supporting national research that [predicted mobile learning will become prevalent in one year or less](#), CoSN [launched an initiative](#) to help school leaders understand how to lead mobile learning programs successfully in their districts. The organization also hosted notable school district, state, and national leaders, as well as private-sector experts, to discuss strategies for mobile learning implementation.

eSchool News, with the help of [JDL Horizons' EduVision](#), was on the scene to interview these leaders about their thoughts on mobile technology in education:

Karen Cator, director of the Office of Educational Technology at the U.S. Department of Education, has devoted her career to creating the best possible learning environments for this generation of students. Cator discusses the crisis in the American educational system and how mobile devices can support every student's 21st-century learning.

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7TGOPxHkbm3CA%253d%253d

Lucy Gray, director of the Project for Mobile Learning, explains how she views technology and new media as essentials in facilitating educational and societal change.

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7Qpm2c4uK141g%253d%253d

William Rankin, director of Innovative Education at Abilene Christian University, has been active in exploring the ways that converged mobile technology—and especially Apple's iPhone—can transform teaching and learning in the 21st-century classroom. Rankin also summarizes his keynote speech, which delved into how culture has adapted to new learning technologies throughout the ages.

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7Q2vVso1jWOkQ%253d%253d

Shawn Gross, managing director for [Digital Millennial Consulting](#) and executive director of the Institute for Personalized Learning, discusses mobile computing; specifically, how districts can

implement mobile technology in the classroom with step-by-step guidance on everything from how to manage school boards to how curriculum can adapt to mobile technologies.

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7Qcg09i18smgw%253d%253d

Michael Flood, AT&T's Education Solutions practice manager, provides expertise on mobile learning from a K-20 perspective. Flood also discusses the pros and cons of various mobile device implementation strategies, including BYOD (Bring Your Own Device).

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7RITcQ2nsIZeQ%253d%253d

Becky Fisher, director of educational technology and professional development for Albermarle Public Schools in Charlottesville, Va., discusses how policy infrastructure and professional development need to adapt to mobile technologies. Fisher gives specific examples of policy frameworks to support mobile learning from her work with CoSN's new Mobile Learning Initiative.

See the video interview:
https://eschoolmedia.eduvision.tv/Default.aspx?q=3SfVi13wT7TZjEVr7FnKWw%253d%253d

New Mobile Apps and Technologies

With implementation challenges out of the way, it's also critical to know how best to leverage mobile devices for teaching and learning—and what better way to do that than by reviewing some of the most innovative and effective technologies and applications?

From Sony to Google, and from word games to online grade books, this section previews some of ed tech's hottest mobile gadgets and teacher-vetted apps.

PD app helps schools personalize training

With budget cuts slashing districts' ability to provide intensive professional development for their educators, PD 360 and its mobile component Observation 360 are offering schools a way to access learning resources quickly and easily.

"[PD 360] is basically an on-demand professional development system, so it has a series of video segments that cut across a huge array of topics for teachers, stemming from teaching reading, to classroom management, to differentiated instruction," said Mary Esselmann, assistant superintendent of professional development, assessment, and accountability in the Kansas City, Mo. school district. "It pretty much runs the whole gamut," she said.

PD 360 offers more than 200 hours of research-based video content, as well as tools for follow-up, tracking, reflection, and group training. Observation 360 is tightly integrated with PD 360 and allows for effective classroom observation and walkthroughs.

"We use it on our iPad, and you can also use the web-based version," Esselmann said. "When schools are using peer-to-peer, they can [use it to] input the observations directly," she said.

Esselmann said that the programs' custom template ability was a major bonus for her district.

"We actually have a standard observation template that's aligned to our teacher evaluation…and all of our teachers and schools are built into it," she said. "It's just a matter of touch, touch, touch. You touch the school, you touch the teacher, you bring up the template you need, go through the walkthrough, and it allows for comments you can immediately upload or save for later," Esselmann said, adding that the data then provides for an immediate district read of how well teachers are performing in terms of key standards.

PD 360 is currently used by more than 600,000 educators, and some schools, like South Garland High School in Garland, Texas, note that teacher retention increased after the introduction of the professional development software. Teachers can access the video components during collaborative sessions or at home.

"A lot of teachers use it in areas that they want to grow in personally or they just want to know more about, so it's been a pretty good tool for us," said Esselmann.

The flexibility of use has proved a boon for Esselmann's district.

"Given the limited time we have for professional development as a group, whether it's at the school level or across content areas, it provides a really good way for us to individualize

professional development at the level of the individual teacher as well as at the school level in terms of goals," Esselmann said.

She said originally, school leaders expressed concern over whether the new technology would catch on, but during the first year, more than 45,000 segments were viewed.

"I'd say almost 85-95 percent of teachers in any building have accessed the system, so we're quite pleased with the use," Esselmann said.

The mobile software also lets teachers and administrators upload their own videos.

"It actually has that flexibility, so we're not only able to access the full library of PD 360, but we can also access our own custom video bank," Esselmann said.

Observation 360 currently works on the Apple iPad, iPhone, or iPod Touch.

10 of the best Apple apps for education

As iPhones, iPads, and iPod touches become more integrated in classrooms, educators and students are looking for new ways to apply them to the learning process. Applications on all of these devices can help automate current classroom processes or present new ways to learn that previously had been unexplored.

eSchool News has assembled a list of education "apps" for Apple devices that we think are noteworthy. Five are free, and the other five range in price from $0.99 to $9.99.

(In no particular order)

1.Name: Word Lens
Best for: Language Classes
Cost: Free
Features: Instantly translates signage from one language to another through the camera application
How to Use: Language teachers can use this program for scavenger hunts

2.Name: Molecules
Best for: Science Classes
Cost: Free
Features: Allows users to view and manipulate three-dimensional models of different molecules
How to Use: Visual learners can see how protein molecules are composed and can download new molecules from the RCSB Protein Data Bank

3.Name: Blackboard Mobile Learn
Best for: Students and teachers whose campuses already use Blackboard
Cost: Free
Features: Course listings, organizations users are involved in as well as access to any readings
How to Use: Users can enroll in any classes or organizations that they have registered for and download any assignments their instructors have posted

4.Name: Today in History
Best for: History Classes
Cost: Free
Features: Lists notable events in history as well as important figures who were born or died on a specific date
How to Use: Use for trivia quizzes or facts of the day

5.Name: [Math Ref Free](#)
Best for: Math Classes
Cost: Free
Features: A free version of Math Ref, this app offers 600 out of over 1,300 formulas, figures, tips, and examples
How to Use: Use as a formula study guide or to view graphs of different equations

6.Name: [PI83 Graphing Calculator](#)
Best for: Math Classes
Cost: $0.99
Features: With over 100 math functions, the graphing calculator is a clone of the TI-83 without the $70 price tag
How to Use: Use in place of any calculator to input data, make graphs or matrices

7.Name: [Star Walk](#)
Best for: Astronomy Classes
Cost: $2.99
Features: An astral telescope; Star Walk adapts its view to wherever the user holds it up to, highlighting constellations and planets
How to Use: Use for guided tours of the night sky or to find the location of any specific astral objects

8.Name: [Cram](#)
Best for: Anyone in need of test prep
Cost: $3.99
Features: Both teachers and students can create flashcards and tests and import and share them with others
How to Use: Use to study for standardized tests or exams, or create study materials for students

9.Name: [Essay Grader](#)
Best for: Teachers pressed for time
Cost: $5.99
Features: Essay grader comes with a bank of pre-written comments and helps teachers cut down on grading time without writing the same comments over and over again by hand
How to Use: After assigning a grade, teachers can then eMail the grade sheet directly to the student or export it to the computer for editing and printing

10.Name: [eClicker](#)
Best for: Teachers looking for classroom feedback

Cost: $9.99

Features: Providing instant results, eClicker charts the class responses, showing which areas are understood and which need more work

How to Use: Students select a response to a question composed by the instructor and are then able to participate without fear of being wrong, since only the teacher views the results

Ten of the best Droid apps for education

After we published a report on "10 of the best apps for education" for iPhone, iPad, and iPod touch devices, many *eSchool News* readers wondered when we would produce a similar list for those with Google Android-based mobile devices. So, here are 10 of our favorite Droid apps for education.

1.Name: Chemical Equation Balancer Pro
Cost: $1.00
Features: Enter the reactants and products and then press balance, and this app instantly delivers results.
Best For: Science teachers looking to demonstrate problem examples to their students.

2.Name: CoursePro
Cost: $2.99
Features: Using a to-do style list, CoursePro allows users to define assignment types and keep track of weighted grades.
Best For: Students looking for a way to organize their homework assignments, school projects, and grades.

3.Name: Flash Card Maker Pro
Cost: $2.95
Features: With text-to-speech capability and advanced gesturing functions, Flash Card Maker Pro uses multi-sensory learning techniques to help improve memory. Shake to hide memorized cards, look at multiple decks at one time, or time how long it takes you to complete a deck.
Best For: Students or educators exploring new ways to retain information. Teachers can use this program and create flash cards to help their students prepare for large exams, or put lesson planning notes on them.

4.Name: Google Sky Map
Cost: Free
Features: With the ability to turn your Android device into a "window to the night sky," Sky Map shows the stars, planets, and other celestial objects in view when you point your device towards the sky.
Best For: Teachers trying to use more compelling visuals during their astronomy units.

5.Name: Gutenberg eReader
Cost: $2.99
Features: This app gives the user access to the entire Project Gutenberg eBook library, allowing

users to search by author, subject, and titles to find the book they need quickly.
Best For: Teachers looking for an easy way to share passages with their classroom, or students who want to research a topic without purchasing a book.

6.Name: Grade Book for Professors PRO
Cost: $4.99
Features: Use the primary grade book on Google spreadsheets and sync it to all of your devices. Easily eMail grades to students and PIN-protect grades against accidental loss.
Best For: Teachers who want a new way to streamline the grading process and a way to consistently backup their grades.

7.Name: Grade Book for Professors PRO
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Features: Use the primary grade book on Google spreadsheets and sync it to all of your devices. Easily eMail grades to students and PIN-protect grades against accidental loss.
Best For: Teachers who want a new way to streamline the grading process and a way to consistently backup their grades.

8.Name: Tick!
Cost: Free
Features: A timer with an easy interface.
Best For: Educators looking for a way to count down the time left in a task for students to complete.

9.Name: Trippo Mondo
Cost: Free
Features: A language translator, Trippo Mondo translates any phrase and speaks it out loud in the language chosen.
Best For: Foreign language instructors looking to increase students' knowledge of common phrases. Encourage students to translate different common phrases they hear during the day to increase knowledge of colloquial terms.

10.Name: Where's My Droid?
Cost: Free
Features: After hooking up your eMail account, this app allows you to locate any lost Android devices within a 30-foot area, complete with a Google Maps display of the location.
Best For: Teachers who want to be able to monitor the location of their electronic devices.

New devices allow for mobile wireless broadband

This year, the big national wireless carriers raced to stake their claims in the latest frontier of service: ultra-fast data access through a cellular connection for smart phones and laptops, as well as for gadgets like tablet computers.

The companies are boosting their mobile wireless broadband speeds and revving up the marketing hype. They're moving away from talking about call quality and coverage, and focusing instead on data speeds: megabits in place of minutes.

For consumers, there are benefits in the form of faster service and cooler gadgets. Yet some of the marketing campaigns seem designed to confuse consumers about the gadgets' speed.

For education, the new high-speed mobile wireless broadband services could mean always-available broadband access, fast enough to allow for video streaming even outside the range of a Wi-Fi network—enabling true anytime, anywhere learning. But these benefits can be realized only by paying for a cellular data plan, which could prove costly for schools.

At the International Consumer Electronics Show (CES) in Las Vegas in January 2011, Verizon Wireless revealed the 10 gadgets with built-in access to its new high-speed 4G wireless data network, including smart phones, tablets, and laptops. Some launched in March.

Along with Sprint Nextel Corp.'s subsidiary Clearwire Corp., Verizon is at the forefront of the move to a new network technology, designed to relay data rather than calls. Verizon's fourth-generation, or "4G," network went live for laptop modems.

The new mobile wireless broadband network is the nation's fastest. Verizon is hoping to cash in on that advantage by selling tablets and smart phones that devour data.

One of the devices, Motorola Mobility Inc.'s Xoom tablet, comes with a 10.1-inch screen and two cameras: one for video chatting, the other for high-definition videos. The Xoom initially worked with Verizon's 3G network but was upgradeable to work on the speedier 4G wireless network.

Motorola's Droid Bionic smart phone also has two cameras, to help with video conferencing, a data-hungry task. It was one of the first phones with a so-called "dual-core processor" that roughly doubled its computing capacity. That should help with video processing.

LG Electronics Inc., Samsung Electronics Co., and HTC Corp. brought out similar phones for the network. And Hewlett-Packard Co. added 4G wireless capability to a laptop and a netbook.

There are also two "mobile hotspot" devices for the network: small battery-powered bricks that act as Wi-Fi access points, connecting Wi-Fi-equipped computers to the 4G network.

Verizon's size—by number of subscribers, it's the largest U.S. wireless carrier—and the quality of its network are helping it gain traction with manufacturers.

"By deciding to go early and go first to [4G wireless], we sent a signal to the entire consumer electronics market that this technology would develop very quickly," said Lowell McAdam, Verizon's president and chief operating officer, in a keynote address at the trade show Jan. 6.

Verizon was also able to sell a version of Apple Inc.'s iPhone this year. That helped break AT&T Inc.'s exclusive hold on the most popular smart phone. But there was no talk of an iPhone from Verizon at CES.

With or without the iPhone, Verizon's new mobile wireless broadband network is pressuring its competitors to step up their offerings. AT&T Inc. on Jan. 5 said it was on track to launch its own 4G wireless network in the summer. Also, it said it will start calling its current 3G network "4G," because it's been upgraded to be capable of nearly 4G speeds.

T-Mobile USA said it will upgrade its 3G network to double the possible download speeds in two-thirds of its coverage area. It started calling the network "4G" in ads last fall. It, too, revealed two tablets for its network.

Sprint and Clearwire have chosen a slightly different route to 4G wireless service. They've picked a 4G technology called WiMax that was ready before Long Term Evolution, or LTE, which Verizon is using.

Now, however, WiMax looks set to be a niche technology, while the rest of the industry adopts LTE. That will hamper Sprint's efforts to get competitive devices for the network. Still, it was able to launch its first 4G phone last summer, ahead of the competition. On Jan. 5, Sprint announced it would be the first to carry a 4G tablet computer from Research In Motion Ltd., the maker of the BlackBerry.

The most distinctive feature of 4G wireless technologies like LTE and WiMax is that they're designed to carry data rather than phone calls. That makes them more efficient at serving today's smart phones, tablets, and other gadgets that need data access on the go. It also makes the networks cheaper to build out and manage.

They're faster than today's 3G networks, though not by much, which makes T-Mobile and AT&T feel justified in calling their upgraded 3G networks "4G." After all, they say, speed is what really matters to users.

Aside from the bump in speed, the main reason the LTE buildouts of Verizon Wireless and AT&T are significant is that they add fresh spectrum to the nation's wireless networks. That means more capacity for the growing number of mobile gadgets.

Also, both companies are using spectrum that was previously used for UHF television channels, a prime piece of the airwaves. It can cover wide areas easily and penetrate deep into buildings. (Clearwire's WiMax network uses a frequency that has shorter range and more difficulty penetrating buildings.)

Future upgrades can further boost the speed of mobile wireless broadband networks. But at some point, they will run out of room for improvement. There's a theoretical limit for how much information a certain slice of the airwaves can carry. When that happens, there will still be two ways to add capacity to mobile wireless broadband.

The government can assign more spectrum, perhaps by taking it from TV stations. But spectrum, too, will run out. The carriers can add more cell towers, but that's expensive and difficult. They can't put cell towers everywhere they'd like.

Given these limiting factors, mobile wireless broadband isn't likely to ever replace wireline connections for home and school broadband access, except possibly in rural areas where it's expensive to draw cables for high-speed connections to homes and schools.

Another reason Verizon has been aggressive about LTE is that its 3G network used a technology that isn't upgradable to higher speeds, as AT&T's and T-Mobile's are. That left it with a burning need for the next network technology.

Verizon Wireless is a joint venture of Verizon Communications Inc. and Vodafone Group PLC of Britain. Motorola Mobility Inc. was formed this week as Motorola Inc. split into two parts. The Mobility unit consists of Motorola's cell-phone business.

Sony unveils tablets to rival the iPad

Sony is planning an Android-based tablet computer with a touch panel similar to Apple's iPad, scheduled for release later this year, that the Japanese manufacturer promises will make the best of its gadgetry and entertainment strengths.

The product—code-named S1, and shown April 26 in Tokyo—will come with a 9.4-inch display for enjoying online content, such as movies, music, video games, and electronic books, and for online connections, including eMail and social networking. It will be compatible with both 3G and 4G networks.

Sony, which boasts electronics as well as entertainment divisions, also showed the S2, a smaller mobile device with two 5.5-inch displays that can be folded like a book.

The company did not divulge prices. Sony Corp. Senior Vice President Kunimasa Suzuki said the products would go on sale worldwide around September. Both run Google's Android 3.0 operating system, nicknamed "Honeycomb."

The announcement of Sony's key net-linking offerings comes as it tries to fix the outage of its PlayStation Network, which offers games and music online.

It is unclear when that network will start running again. Sony has blamed the problem on an "external intrusion" and has acknowledged it would have to rebuild its system to add security measures and strengthen its infrastructure.

Suzuki said both of the latest tablets feature Sony's "saku saku," or nifty, technology that allows for smooth and quick access to online content and for getting browsers working almost instantly after a touch.

"We offer what is uniquely Sony," Suzuki said after demonstrating how the S1 was designed with a tapered width for carrying around "like a magazine."

The devices will connect to Sony's cloud-computing based library of content, such as movies and music, as well as to Sony PlayStation video games adapted for running on Android and digital books from Sony's Reader store, the company said.

Sony, which makes the Vaio personal computer and PlayStation 3 video game console, has lost some of its past glory—once symbolized in its Walkman portable music player that pioneered personal music on-the-go in the 1980s, catapulting the Japanese company into a household name around the world.

It has been struggling against flashier and more efficient rivals, including Apple Inc. of the U.S. with its iPhone, iPod, and iPad machines, as well as South Korea's Samsung Electronics Co., from which Sony purchases liquid-crystal displays, a key component in flat-panel TVs.

Sony already has promised a successor to its PlayStation Portable machine for late this year, code-named NGP for "next generation portable," promising the quality of a home console in an on-the-go machine boasting a screen double the size of smart phones.

The popularity of smart phones, including the iPhone, has been another threat to Sony.

Kazuo Hirai, promoted in March to head Sony's sprawling consumer products and services division, said Sony's strategy has always been about combining the benefits of hardware, software, and networking to make consumers happy, and that was the same goal for the S1 and S2.

"There is no change to that approach," he said.

Google tablets expected to challenge the iPad

Apple's iPad will maintain tablet supremacy for the next four years, but higher education soon could see an influx of tablets that operate with Google's operating system (OS) during the same period, according to an April 2011 report from IT research company Gartner.

After changing the tablet market the way the Apple iPhone "reinvented" the smart-phone market, the iPad and its iOS—Apple's operating system—account for almost 70 percent of media tablets, while Android-based tablets account for 20 percent of the market, according to Gartner.

Google's Android OS, however, will see steady growth over the next four years. By 2015, Google will own 39 percent of the tablet market, compared to the iPad's 47 percent, Gartner predicts.

Growth of the Android OS will be "capped," according to Gartner, because Google officials decided not to open its OS—known as Honeycomb—to third parties, meaning the price of Android tablets will decline more slowly than the iPad.

More than 47 million iPads will be sold in 2011, a number that will skyrocket to 138 million in 2015, according to the report. Nearly 14 million Android-based tablets will hit the market this year. That figure is expected to jump to 113 million.

Carolina Milanesi, Gartner's research vice president, said iPad competitors are focusing on hardware and "making the same mistake that was made in the first response wave to the iPhone, as they are prioritizing hardware features over applications, services, and overall user experience."

She added: "Tablets will be much more dependent on the latter than smart phones have been, and the sooner vendors realize that, the better chance they have to compete head-to-head with Apple."

Gartner analysts predicted that customers would gravitate to tablets made by the same companies as their smart phones. On college campuses, where students with web-enabled phones favor the iPhone, this could give Apple an advantage.

Milanesi said customers want their tablets and phones operating on the same OS so they can "share applications across devices, as well as [have] the sense of familiarity the user interfaces will bring."

Allegiance to a popular OS could be trouble for tablets that use the Web OS or MeeGo, because neither system has a ubiquitous smart phone that can attract customers to its tablet, according to the report.

Jean Coppola, associate professor of computer science and information systems at Pace University in New York City, said allegiance to operating systems is commonplace in higher education, with most students taking the Apple side of the Apple-Google smart phone and tablet battle.

"I do see a lot of brand loyalty out there," she said. "And [Google and Apple] are both very strong companies constantly coming out with new things … so it'll be an exciting next few years with this kind of competition."

Coppola said the rising cost of college textbooks—about $1,000 annually, according to industry estimates—could drive students to tablets, especially if cheap or free digital textbooks can be downloaded on the mobile device.

"Students aren't going to go anywhere without their tablet in the higher-education setting," she said, adding that she expects popular learning management systems to be widely available on tablet operating systems. "Anything they need will be right there for them, and instant gratification is something students are always looking for."

Tablet experts said the convenience of eBooks—and the subsequent elimination of the weighty backpack—would attract more students to tablets in coming years.

"With all the materials students need to bring to class and the long distances some have to trek if they live off campus, tablets are a sensible addition to a college student's backpack," wrote Gianna Walton, a blogger for BostInnovation, a website that tracks educational technology, among other topics.

Walton said tablet usage would grow in higher education because "laptops are bulky, heavy, and just more of a nuisance for students to carry. Unless they're taking a computer science class, students rarely need their laptops for activities that can't be performed on both mediums; why not bring the tool that's easiest to carry?"

<u>Links and Bibliography</u>

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[GoKnow](#)

[Katy ISD](#)

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eSchool Media, Inc.
7920 Norfolk Avenue, Suite 900
Bethesda, MD 20814
800-394-0115
301-913-0119 (fax)