

A STRATEGY PAPER FROM

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Mobile Learning:

Preparing for BYOD (Bring Your Own Device)



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The BYOD Concept

The days of students carrying heavy, book-laden backpacks to school are numbered. Increasingly, students at all levels expect to access learning materials electronically. And students expect their school to support access to the Internet from anywhere, not just from a classroom computer with a wired connection.

The push for mobile learning options isn't just coming from students. Teachers also have high opinions of the educational value of these new tools. A PBS/Grunwald survey in 2010 reported that teachers view laptops, tablets and e-readers as having the highest educational potential of all portable technologies.¹

The movement to mobile and digital learning reflects the exploding popularity of mobile devices among consumers and the parallel growth in wireless network services to support them. Instead of using shared or enterprise-owned computers at work, school or libraries, people now want to use their personally owned mobile devices everywhere, a trend called bring your own device (BYOD).

In fact, personal computing devices are fast becoming not just a luxury in both primary and secondary education, but a necessity. The growth of more virtual, personalized learning experiences throughout the educational spectrum is engaging students like never before.

The 2010 "Speak Up" education survey conducted by Project Tomorrow found that more than one quarter of middle school students and 35 percent of high school students use online textbooks or other online curricula as a part of their

regular schoolwork. The survey also found that nearly two-thirds of parents of school-aged children see digital curriculum as a key component of the "ideal" classroom for their student, making access to computing devices a key part of today's educational experience.²

This trend is creating tremendous new demand levels for wireless networks. For example, one market research firm reports growth of 40 percent in enterprise wireless local area networks (WLANs) in Q2 2011, attributable in part to the BYOD trend and the tremendous popularity of the Apple iPad.³ Gartner Research supports this notion as well, concluding that without adequate preparation, iPads alone will increase enterprise WiFi demands by 300 percent.⁴

Support for this trend is also found in Center for Digital Education (CDE) interviews with K-12 district IT staff. A notable 27 percent of school IT decision-makers interviewed expressed an intent to pursue a BYOD policy.

While the percentage of higher education students with their own devices is significantly higher than at the elementary level, CDE's Digital Community Colleges Survey reveals that they grapple with many similar technology challenges. A full 92 percent of community colleges report expanded distance learning offerings for online, hybrid and Web-assisted courses, providing ample support for their No. 1 identified technology priority: mobility.⁵

The growing popularity of mobile devices isn't the only factor straining the capacity of educational networks today. Video, interactive learning games

and other media-rich content are being watched, created and shared by students and teachers to foster learning of both skills and subject matter. These media not only gobble up bandwidth — they may also require priority over other network traffic in order to deliver acceptable performance for in-class use.

From a technical perspective, the challenge for educational institutions is supporting BYOD for students and staff with secure wireless and remote access network capabilities. Yet the movement to mobile learning isn't just about supporting new technologies. It's also about shifting to new ways of teaching and learning.

Why Implement a BYOD Policy?

Parents, community leaders and students themselves increasingly expect schools at all levels to support the technologies that are already widely used in business and personal life. These expectations can make it easier to garner the budget, policy and strategy support necessary for effective mobile learning efforts.

Even with the growing adoption of BYOD policies by business, the justification for an educational institution may not be as clear. After all, aren't portable carts full of laptops (and now media players or digital tablets) connected over the school's wireless network mobile enough? A few years ago, yes. But today, instructional technology can take full advantage of the new ways of teaching and learning that are possible with true mobile learning. Consider these opportunities:

- Enable teachers to leverage interactive digital curricula, textbooks, online

content and teaching resources to improve the relevance, timeliness and interest of their curricula as well as student assessments.

- Utilize learning management systems to more closely align instruction with student assessments.
- Increase student engagement with an individual (not shared) device to explore interactive content and develop teamwork skills to effectively work with others on collaborative projects, as prioritized by the U.S. Department of Education.⁶
- Deliver more economical services for distance learning in rural areas, students who have special learning needs and specialized curricula.
- Improve communication among students, faculty, staff and parents to increase involvement in a student's learning progress and to share resources and best practices.

Making these new learning opportunities available equitably to all students would likely be very difficult without the cost savings enabled by a BYOD policy. The National Center for Education Statistics reports that the average ratio in U.S. schools is approximately 3.4 students to each device.⁷ By taking advantage of student-owned and staff-owned devices, a school can use its scarce funds to purchase or lease devices for students who can't afford them.

However, mobile learning policies and programs are not "one strategy fits all" decisions. For example, K-12 schools in Kentucky operate under a site-based decision model, which means they can adopt mobile learning and BYOD policies that are more restrictive than policies specified at the district level.⁸

What's Required to Support BYOD Mobile Learning?

The BYOD movement may overwhelm schools if they are not prepared, because of the extra demands placed on network bandwidth, mobile device densities and saturation and security. Education needs a network foundation to support an always-on learning environment that allows access by students, faculty and staff on campus or from home, a job site, a library or coffee shop. Education IT managers need to understand the different management requirements for digital content and mobile



Mobile Learning Ideas Across the Curricula

Teachers are putting mobile technology to use for creative learning activities in many different subject areas.

- **Special education:** Tablet computers allow students to communicate by pointing to pictures and help speech pathologists work with students on verbal skills.
- **Music:** Band teachers can record student performances on a laptop, then use an application that grades the accuracy of the performance. The teacher can also review the recording for performance quality.
- **Advanced placement courses and reading skills development:** E-books and e-readers give students content for supplemental study as well as skills remediation and enrichment. Digital content resources can reduce costs and deliver up-to-date content for many courses in the standard curriculum.
- **Science:** Equipment in lab courses can connect to a laptop or tablet computer, allowing students to easily record data, run simulations and write reports.
- **English as a second language:** Digital content and language applications can help students learn vocabulary and grammar and prepare for regular classroom instruction.
- **Teacher observation:** Principals and other evaluators can use mobile devices to directly enter observations into tracking programs, eliminating the need to later type entries from handwritten notes.

applications, as well as the options for making this new environment as simple as possible to manage.

Mobile learning and BYOD also requires training faculty and staff on the new technologies and their pedagogical use. Finally, IT staff must be ready to adopt a strategy to manage an expanded wireless infrastructure which does not add undue burden and work with school leaders to develop an appropriate user device support policy.

Consider the following factors in your planning for BYOD and mobile learning support.

Bandwidth. With more devices accessing the Internet, more often and for high-bandwidth video and learning tools, the capacity and reliability of the school's network connections are of paramount importance. Bandwidth, redundancy and scalability must be adequate within the school's wired and wireless networks.

Quality of Service. The type of applications running on mobile devices, in particular tablets like the iPad, are very different than in the past. Real-time apps such as video and voice (Skype, Facetime) prevail over traditional data apps (e-mail, Internet) and it is important that the wireless network can meet the stringent requirements that these apps demand.

Security. "Give network access to a device that I can't control that's used by a teenager ... are you crazy?" This is an understandable and instinctive reaction of any education IT manager. Of course, a chief concern is security: protecting the school's network and IT systems and the privacy of student and employee

data against breaches, malware attacks, viruses and other cyber disruptions that could originate from a personally owned mobile device.

The challenge is to balance easy network access for users with strong security policies and protective measures. This balance may mean new network configurations to segment sensitive internal traffic from the traffic generated by mobile devices. Also important are security technologies that authenticate user devices and provide identity-based access controls with user accounting. Yet for simplicity of access and management, you want a security solution that doesn't require installing software on personally owned devices. K-12 administrators have additional responsibilities according to federal regulations governing content filtering and firewalling.

Network Management. Consider what changes may be needed in network management tools and staffing, especially if expanding network capacity to serve a growing number of mobile devices. If you outsource this activity to a service provider, involve them in your planning early so you can identify potential issues and put procedures in place before launching the BYOD program. Similarly, identify the types of questions your help desk is likely to receive from students and staff about using the mobile devices and applications.

School-Owned Devices. Although many students today are bringing phones into class that can be used for more than just texting, not every student will be able to afford a mobile device. A school must be prepared to mitigate potential issues of

learning equity by providing school-owned devices for student use in class and, if appropriate, at home. Subsidized broadband Internet service for a student's home may also be important if the school offers remote access into the internal network for content and learning tools. Consider too if a shorter equipment refresh schedule will be needed so students won't be held back by a "device gap" as mobile technology continues to advance.

Student-Owned Devices. Consider the specific types of activities students will engage in with their mobile device, which can vary widely based on grade level. For example, a smart phone may be adequate to access relevant junior high school course content, but high school and college level students will likely need creation capabilities too. A more advanced device, such as a tablet or laptop, may be needed to craft an original term paper or visual presentation.

Use Policies. Review your network access, acceptable use and conduct policies — as they apply to students and employees — to determine if an update is needed to reflect the new issues involved in BYOD and mobile learning. Among the issues to consider:

- Whether and when mobile phones and devices can be used on the school campus, during and outside of class
- Rules for taking home school-owned devices, as well as clearly stated policies regarding school/district responsibilities in the event a student-owned device is damaged or stolen
- While K-12 administrators have additional responsibilities relative to

content filtering for minors, restrictions on types of content that can be downloaded or uploaded over the school network still need to be explicitly laid out

- Guidelines for using applications and communicating via e-mail and social networks, including education on cyber bullying, harassment and the transmission of inappropriate materials
- Steps for protecting privacy and safety of users and data
- Whether guest access will be supported on the school wireless network

Faculty and Staff Training. Some members of your faculty and staff may already be among the most active lobbyists for BYOD, because they want to benefit from mobile resources for their work. Many educators cite these new technologies as supportive of a more modern teaching style — the oft-cited “guide on the side” rather than the more traditional “sage on the stage.” No longer tethered to their desks, teachers can roam the classroom offering specialized help to students who need it. Some staff may need skills training on using the device itself and guidance on integrating mobile learning with the classroom curriculum. Summer workshops, training days during the academic year, informal demos and online community forums can all help faculty learn how to make the most of mobile devices for their teaching and administrative tasks.

Best Practices for BYOD Mobile Learning

Technology administrators in three Kentucky K-12 districts offer insightful guidance on planning and implementing wireless and BYOD programs.

Allow for flexibility. Both the BYOD policy and the wireless network infrastructure should be able to accommodate differences in learning needs and uses. “I want to create an infrastructure so the individual school councils have the flexibility to decide what’s right for their schools and what best meets the needs of their students,” says Robby Forsyth, director of technology and CIO for the Warren County School District in Kentucky.

Recognize when consistency is important. For certain classroom activities, supporting only school-owned devices may be more valuable than allowing BYOD. “It’s easier to build a lesson plan when you know that every student will have an identical device,” says Jerrod Graybeal, CIO for the Grayson County School District.



Manage bandwidth demands. To reduce the impact of high-demand streaming video downloads from the Internet, use traffic shaping and quality of service (QoS) techniques to prioritize learning and administrative applications.

Don’t allow BYOD until your network is ready. “We have asked students not to bring in their own devices until we have the wireless infrastructure in place,” says Jason Bean, network administrator for the Allen County School District in Kentucky. This decision helps to avoid a negative impact on network performance for the school-owned wireless devices already used in district classrooms.

Review current policies. You may not need a separate BYOD policy if current guidelines for acceptable network use and user conduct already adequately address the issues of permitted devices, content access and online activities.

Planning and Budget Considerations

Like most initiatives that involve technology, there are necessary costs and schedules for supporting a BYOD program. Budget items to cover in your planning include:

- Adequate capacity for Internet access, the wireless infrastructure, and LAN wiring and switches
- Cost of purchasing or leasing school-owned mobile devices
- Faculty and staff training
- New network management tools and support resources

A mobile learning program may involve a multi-year effort for complete transformation, but smaller deployments can be made within just a few months. Start by looking at your overall technology plan to find where already-budgeted upgrades, such as for computing and network equipment, can be leveraged to support mobile learning initiatives.

Mobile Learning Solutions to Consider

The table below shows specific areas in your network infrastructure that may be affected by growing use of mobile learning and BYOD. Network equipment vendors that offer integrated solutions can simplify the evolution and management of the school network in all of these technology areas.

Funding Sources

For K-12 schools, a variety of funding sources for mobile learning infrastructure

are available, including the federal government's E-Rate program, state EdTech programs, and regular or special tax levies for technology purchases. Districts and schools can use Title I funds to support a technology-enabled curriculum that leverages online or distance education, digital content and software to track student progress.

For public colleges and universities, state funding may be available to help support these efforts. Some technology companies also offer grant programs open to both public and private institutions.

For eligible students, public/private partnerships among local governments, non-profit agencies and vendors may subsidize the cost of their mobile devices as well as home broadband Internet service.⁹

And don't overlook the cost savings produced by a BYOD policy. Instead of purchasing a laptop computer for every

student and employee, you'll likely need to purchase far fewer mobile devices by allowing BYOD. The total cost of ownership (TCO) for media players and tablet devices can be substantially lower than the TCO for laptops because of lower purchase price, fewer repairs and reduced energy use. (However, these cost savings may be reduced if the mobile devices are replaced on a shorter schedule than laptops.) The saved funds can be reallocated to the additional wireless and network infrastructure needed to fully support mobile learning.

Cost savings can be realized on the textbook side as well, as districts all over the country are realizing. According to the Speak Up 2010 survey, released in May 2011, "Policymakers and administrators are intrigued with the twin objectives of leveraging existing technology and lowering (or even eliminating) the costs associated with traditional textbooks."¹⁰

Technology	What You May Need
Routing & Switching	Additional LAN switch ports and high-bandwidth routers to support more users and higher levels of network traffic.
Wireless LAN	More access points and controllers to provide adequate coverage and performance within buildings and in outside areas.
Security, Identity Management, Network Access and Control	Additional security capabilities to protect the school network and allow authentication of mobile devices and users. Revising security measures to maintain compliance with content filtering and user privacy mandates.
Remote Access and VPN	If appropriate, support for secure access to the school network by students, faculty and staff outside of school hours and facilities.
Network Management	Tools that will allow current staff to manage a larger wireless infrastructure with more users and more dynamic traffic demands.

Change Leadership for Mobile Learning

Schools often take their cues from leaders at the district, state and even federal levels. A superintendent conducting a paperless school board meeting from a tablet device, for example, sets a powerful example for administrators, faculty, parents and even students. Policy direction encouraging the integration of technology at all educational levels, including BYOD programs, is laid out explicitly in the U.S. Department of Education's "Learning: Powered by Technology" publication.¹¹

Jason Bean summarizes the goals of any mobile learning initiative: "You want to integrate mobile technology in a way that really engages students so they want to learn from the Internet, instead of just using it for games, music or social networking," he says. "You also need to make sure that you have all the wireless access points and bandwidth you need so the network performance will be enough to make mobile devices worth using in class."

Creating a policy for BYOD is a valuable step toward realizing these goals. BYOD support frees funds for upgrading the school's network infrastructure. It can also open pathways to powerful ways of teaching and learning across the spectrum of subjects and skills development. Finally, because mobile

learning and BYOD programs prepare students for contemporary life and work, they enjoy the enthusiastic support of boards, parents and community members.

As Graybeal notes, "Ultimately, we live in a connected society. Parents, students and staff expect to be connected to each other and the information needed for students to succeed in the classroom. As long as it has a positive impact on the education process and our relationship with students and parents, we are obliged to provide that connection."

Where To Learn More

1. Q1 2011 Converge Education Funding Report: Digital Teaching and Professional Development: <http://www.convergemag.com/reports/q1-2011/>
2. Center for Digital Education articles: "School Districts Lay Foundation for Mobile Devices": <http://www.convergemag.com/infrastructure/School-Districts-Lay-Foundation-for-Mobile-Devices.html> and "Virginia Shares School iPad, E-book Experiences": <http://www.convergemag.com/policy/Virginia-iPad-ebook-Pilot.html>
3. "Is Your WLAN Ready for the K-12 One-to-One Student Computer Initiative?", Gartner Industry Research G00224644, October 31, 2011 ■

Endnotes

1. "PBS and Grunwald National Research Indicates Lack of Technology Infrastructure in Classrooms", <http://www.pbs.org/about/news/archive/2011/2010-grunwald-report/>
2. Project Tomorrow's Speak Up Survey 2010, "The New 3 E's of Education: Enabled, Engaged, Empowered: How Today's Educators are Advancing a New Vision for Teaching and Learning", May 2011
3. Dell'Oro Group News Release, "Enterprise Wireless LAN Revenues Accelerate to 40% Year-over-Year", August 30, 2011: <http://www.delloro.com/news/2011/WLAN083011.htm>
4. Gartner Research, "Without Proper Planning, Enterprises Deploying iPads Will Need 300% More Wi-Fi," October 2011, http://www.gartner.com/DisplayDocument?doc_cd=219007&
5. Center for Digital Education, Digital Community Colleges Survey, <http://www.govtech.com/education/Colleges-Moving-as-a-Group-to-Cloud-and-Online-Services-Survey-Finds-.html>
6. U.S. Department of Education, National Education Technology Plan 2010, "Transforming American Education: Learning Powered by Technology"
7. National Center for Education Statistics, <http://nces.ed.gov/pubs2010/2010003.pdf>
8. Kentucky Department of Education, School-Based Decision Making, <http://www.education.ky.gov/KDE/Administrative+Resources/School+Based+Decision+Making/>
9. Los Angeles Times, FCC Launching \$4 Billion Program to Narrow Digital Divide, November 9, 2011, <http://www.latimes.com/business/la-fi-fcc-broadband-20111109,0,7709028.story>
10. Project Tomorrow's Speak Up Survey 2010, "The New 3 E's of Education: Enabled, Engaged, Empowered: How Today's Educators are Advancing a New Vision for Teaching and Learning", May 2011
11. U.S. Department of Education, National Education Technology Plan 2010, "Transforming American Education: Learning Powered by Technology"



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