CENTER FOR DIGITAL EDUCATION

Mobile Learning

WHAT IT TAKES, HOW TO GET THERE

Why Join the Mobile Learning Movement?

Mobile learning has clearly become a major new direction for improving student education at all levels: in K-12 schools as well as in colleges and universities. Mobile learning allows a working adult who is also a part-time college student to use a smartphone to view a video lecture on a lunch break. K-12 students can learn at home, on a trip or in school. A mobile device that is part of students' lifestyles combines many technologies to engage them and help them learn effectively. In these and many more ways, the power and flexibility of mobile technology are transforming both instruction and learning.

Definition of Mobile Learning

The term "mobile learning" has different meanings for different communities. Although related to e-learning and distance education, it is distinct in its focus on learning across contexts, learning collaboratively and learning with mobile devices.

A new direction in mobile learning, or m-learning, enables mobility for the instructor, including creating learning materials on the spot and in the field using mobile devices with layered software such as as Mobl21, Go-Know or Blackboard Mobile Learn. Using web 2.0 and mobile tools become an important part of student engagement and higher achievement.

The Case for Mobile Learning

Why is it important for educational institutions to join the mobile learning movement? Consider these factors:

- Mobile devices are now fundamental to the way students communicate and engage in all aspects of their lives. The Pew Internet Project found that 49 percent of Americans ages 18-24 own a smartphone, and that the majority of these young adults also own a laptop computer.[1]
- Student expectations are changing, especially in higher education. Today's students juggle a complex life of school, work, family and social time. As a result, they expect to

STUDENT BENEFITS GAINED FROM MOBILE LEARNING

The term "mobile learning" covers a broad range of technology tools and instructional methods. This paper and chart below focus on the technology elements that deliver direct benefits for student learning.

MOBILE LEARNING ELEMENT	DESCRIPTION	STUDENT BENEFIT
LEARNING APPLICATIONS	• Online courses for general skill development, specialty subjects, and special learning needs • Distance learning programs and hybrid online/classroom instruction	• Easier access to education for students who have distance or other barriers • Help improve student engagement and test scores
COMMUNICATION AND COLLABORATION TOOLS	• Class-specific blogs and discussion forums • Campus, department and program online communities • Collaborative learning experiences	• Interaction opportunities that reach beyond email make it easier to get help, work on group projects and complete assignments
LEARNING MANAGEMENT INTEGRATION	• Tools to check course updates • Submit written papers and presentations • View and complete assignments in online courses	• One place to access, store and track course information and materials
MULTI-MEDIA TOOLS	• Content sharing and creation tools — including text, video and audio — for student-created class projects or demonstration of acquired knowledge and proficiency	• Greater student comprehension • Integrated classroom and experiential learning • Accommodates different learning styles
MOBILE DEVICES AND SERVICES	• Notebook and netbook computers • Digital tablets • Smartphones • Wi-Fi and 3G and 4G networks	• Anytime, virtually anywhere access to online learning tools and materials • Bridges technology gaps • Preparation for technology use in the workplace

BENEFITS OF MOBILE LEARNING FOR TEACHERS AND ADMINISTRATORS

Mobile learning technology elements also produce benefits for the teachers who deliver classroom and online instruction, and the administrators who manage educational programs.

MOBILE LEARNING ELEMENT	DESCRIPTION	FACULTY/ADMINISTRATOR BENEFIT
COURSE DEVELOPMENT AND DELIVERY TOOLS	• Mobile learning applications, course management software, and video conference services are primary examples	• More effective teaching
COMMUNICATION AND COLLABORATION TOOLS	• Mobile devices easily access standard business applications such as email, calendars and web browsers, and often text messaging and video chat services	• More effective communication with colleagues, students and parents
LEARNING MANAGEMENT INTEGRATION	• Integration with learning management systems and student assessment software	• Easier course management; quick assessment of student progress
DIGITAL TEXTBOOKS AND CONTENT	• Lower-cost, more flexible and up-to-date digital textbooks and other learning content to replace printed textbooks	• Greater flexibility of digital textbooks • Higher student engagement fostered by multi-media content • Better adaptability of digital content to the curriculum and learning needs of individual students
MOBILE DEVICES AND SERVICES	• Notebook and netbook computers • Digital tablets • Smartphones • Wi-Fi and 3G and 4G networks	• Simpler, convenient access to applications for teaching, learning management and school administration • Demonstrates appropriate technology use for students

access learning content and to complete assignments at the time, pace and place that's most convenient for them.

- Unlike the traditional activities of reading an assignment then writing a paper or completing a worksheet, students expect learning to be more interactive, collaborative and engaging. Student learning styles are changing because of their use of technology outside the classroom. Parents also expect schools to prepare students to use the complex technologies that play an increasing role in career fields.
- Lowering the technology gap is also critical for preparing the future workforce. For students who don't have Internet access at home, mobile learning is a cost-effective way to help them avoid being left behind in their understanding and use of technology.

Does mobile learning mean change for an educational institution? In most cases, the answer is yes, because mobile learning requires upgrading the curriculum to take advantage of technology and a new understanding that learning can occur anytime and anyplace with a mobile device. This is one of the reasons professional development is necessary for any successful mobile learning program. It is also very important to develop standards for the types of supported devices, apps, web 2.0 tools, content, web filtering and security. Finally, a wireless network capacity that can support students and staff inside and outside the classroom for simultaneous access is also a must. This paper discusses the technology elements of mobile learning for K-12 and higher education institutions, and provides insight on funding for technology investments.

The New Mobile Curriculum

Digital publishing capabilities are dramatically changing the definition of a textbook. It's no longer a heavy, marked-up and banged-up printed book that students must lug to and from school every day in order to complete classroom tasks and homework.

Instead, a digital textbook is a file or application on a student's mobile device that is easy and inviting for the student to open and explore. The nature of textbook content has also changed from the static text and images of books. Now, the video and audio clips, interactive quizzes and learning games, electronic notetaking, and text-to-speech features in digital books encourage students to become active participants in their learning.

The costs of printed textbooks and materials can be a significant portion of education budgets. Printed materials

can also become quickly outdated, well before the typical 5-7 year refresh cycle followed by many schools. Digital textbooks, open-source courseware, electronic databases and web content of all types are becoming viable sources to consider for incorporation into curricula at all levels.

Classroom and online instruction can also be improved by incorporating cloud-based mobile applications. Web 2.0 tools such as private blogs, online communities and social media can be considered for expanding and enhancing educational content. These resources also offer the advantages of immediate and easy access, and up-to-date information.

Through a pilot program called "Project K-Nect" where students used smartphones and software enabled for mobile learning applications, struggling math students from Onslow County Public Schools in North Carolina increased mathematic achievement by 30 percent. Teachers were able to remotely enable or disable various phone features and functions depending on students' needs and students were able to interact more with peers, tutors and teachers inside and outside of the classroom — all leading to greater academic involvement and achievement.

Requirements

Of course, mobile learning technologies can't simply be dropped into a classroom without advance planning for supported devices and applications, as well as preparation of the school's network and IT infrastructure.

Supporting Mobile Learning Devices

An important early decision is choosing which types of user devices are permitted to access the mobile learning program. These factors are also important to consider before choosing school-owned devices that are issued to students for use in the classroom and/or at home.

The below chart presents a high-level comparison of mobile learning capabilities in notebook and netbook computers, digital tablets and smartphones. All of these devices are good options for mobile learning, and cellular carriers can support multiple device types. Mobile learning is only effective when the student has access anytime and virtually anywhere. If the school does decide to purchase a Wi-Fi-only device, then a mobile hotspot device with 3G or 4G service will be required to achieve mobile learning.

Although all of these mobile device types are useful for mobile learning, tablet computers are now the fastest growing tool in education. Tablets are becoming popular within classrooms because they access the network wirelessly, allowing teachers to move easily among students. Tablets are also popular with college students for taking notes and sharing multi-media.

A policy option for school IT administrators to consider is a Bring Your Own Device (BYOD) program. Such a program allows students to use their own smartphones, tablets or laptops to access the school network and mobile learning applications. Typically, schools that allow a BYOD program

COMPARISON OF MOBILE LEARNING DEVICES

FEATURE	NETBOOK/NOTEBOOK COMPUTER	DIGITAL TABLET	SMARTPHONE
ON-CAMPUS WIRELESS ACCESS	Wi-Fi	Wi-Fi	Wi-Fi
OFF-CAMPUS WIRELESS ACCESS	Wi-Fi or 3G network and/or 4G network (requires Mobile Broadband device)	Wi-Fi (primary) or 3G network and/or 4G network (secondary)	3G network and/or 4G network (primary) or Wi-Fi (secondary)
ACCESS TO LEARNING APPLICATIONS AND ONLINE COURSES	Yes	Yes	Yes
ACCESS TO DIGITAL TEXTBOOKS AND MULTI-MEDIA CONTENT	Yes	Yes	Yes
PARTICIPATE IN ONLINE LEARNING COMMUNITIES	Yes	Yes	Yes
VIEW, RECORD AND SHARE IMAGES, AUDIO AND VIDEO	View/Record/Share	View/Record/Share	View/Record/Share
PARTICIPATE IN VIDEO CONFERENCES WITH INSTRUCTORS AND CLASSMATES	Yes	Yes	Yes
EMAIL AND SOCIAL MEDIA TOOLS	Yes	Yes	Yes

NOTE: Capabilities vary by device and may require additional subscriptions or fees.

continue to provide school-owned mobile devices for students who can't afford to purchase their own. If a school district decides on a BYOD program, it comes back to the curriculum and learning programs the district will be using. Questions arise like compatibility with the operating system; or whether the student's device has the right screen size, camera, etc., to support the project, assignment or individualized learning module. How does a district take mobile learning to the next level if it is restricted by the devices the students own? These are the considerations as districts look to embrace mobile learning as a critical tool for enhancing student achievement.

A final consideration is the choice of which mobile operating system(s) to support. An educational institution may support mobile learning access by multiple student-owned devices that have different operating systems (e.g., the IOS and Android-based smartphones and tablets). However, that institution is likely to choose only one of these operating systems as the standard for devices it purchases for use by students, faculty and staff.

Installing and Managing Mobile Learning Applications

When a strategy for device support is in place, the next step is to determine how to manage access to mobile learning applications and instructional materials, especially for school-owned devices. Automated device management tools are essential for installing, configuring and upgrading applications on dozens or even hundreds of mobile devices. And mobile learning management systems provide the necessary tools for delivering and tracking student access to online courses, materials and assignments.

Managing the actual devices includes inventory control, distribution and maintenance. These mobile devices become the students' method of learning, so if the device breaks or is missing, it can no longer serve its educational purpose. The management plan should include a backup device that is ready to activate while a broken device is fixed or replaced. Inventory control and managing software can keep losses at a minimum, with the ability to track devices or delete information and deactivate.

Requirements for the Core Network and IT Infrastructure

There is no question that adding mobile learning users and applications will have an impact on the district or university network and IT infrastructure. Areas to evaluate include:

- **Wireless LAN within a school building or campus.** The network's capacity and management capabilities must be adequate to support higher traffic levels from more devices.

Shawn Gross from Project K-Nect stated, "Many of our schools could not support the wireless demand within the classroom, so students typically used the wireless provider's network." Many schools will need to upgrade their existing infrastructure to accommodate the demand of all the student and teacher devices. Wireless network providers offer wireless networks for campuses that are private and connect to the education campus' local and wide area network. This provides a robust wireless experience for the students and teachers and can be a low-cost upgrade to existing wireless installations.

- **Wireless network service for school-provided mobile devices.** Cellular access allows students to use the mobile device at home and other places where Wi-Fi Internet access may not be available. It is key that schools purchase wireless data plans that meet the data demands of the institution's curriculum and content to prevent cost overages.
- **Device and network security capabilities.** Management and security tools must be able to control and protect mobile applications and content sharing, both on the mobile device and the school network. School districts providing devices for students need to make sure they are CIPA (Children's Internet Protection Act) and FERPA (Family Educational Rights and Privacy Act) compliant — the latter applying to student data. One of the better solutions to security is to use a filtering app for tablets and smartphones which will filter sites whether the student is on a Wi-Fi hotspot or on a provider's wireless network.

The Budget Impact of Mobile Learning

Typically, a school's technology infrastructure, equipment and services are funded through conventional sources such as grants, volume contract purchases (i.e., discount programs) or allocation of capital and operating budget funds.

SPRINT AND MOBILE LEARNING

Sprint is committed to helping educational institutions implement economical and effective solutions for mobile learning. As an example, Sprint's Try-Buy program (a cost-free, no obligation to purchase, up to 60 day trial) allowed students & faculty of John Jay College of Criminal Justice — an independent senior college within the City University of New York — to use Sprint's smartphones & tablets to have almost anytime, virtually anywhere access to electronic course materials, email, the Internet and other tools to connect with each other and outside resources. Student participation and interaction greatly improved and the program was so successful that it is being expanded to even more students.[2]

Sprint mobile learning solutions include a choice of appealing user devices, applications for accessing and managing mobile learning offerings, and advanced network services.

Enhancing the Learning Experience

Sprint offers a variety of mobile devices — tablets, smartphones and netbooks — for access to learning content and applications outside the classroom when connecting to Sprint 3G and 4G networks. The Sprint 4G network reaches over 70 markets and counting, on select devices.

Through a partnership with Blackboard, Inc., Sprint offers the Blackboard Mobile™ Learn application, which encourages collaboration among instructors and students, supports multimedia learning experiences, and encourages engagement in course-specific communities.

The Sprint ID solution delivers a customized, school-branded user interface that can be preloaded onto select mobile devices.

Video conferencing solutions are available on select devices and via partner products to support mobile learning as well as real-time, interactive distance learning. The Sprint 4G network (available on select devices) delivers the fast speeds and high video quality that enable effective video communication and collaboration. Sprint helps eliminate worry over excess mobile usage charges by offering select data plans with unlimited 4G.

Delivering Advanced Network Performance

Students who access mobile learning applications outside the classroom enjoy a fast, nearly seamless experience while on the Sprint 3G and 4G networks. Sprint also offers Custom Network Solutions for improving the capacity and performance of on-campus wireless networks.

The largest new capital expense for a mobile learning program is the purchase of institution-provided mobile devices. Capital investments may also be required for the campus wireless infrastructure to create "smart" classrooms and to support more network traffic and users.

New operating expenses typically encompass ongoing costs of the school's network infrastructure, licenses for mobile learning applications and content, and monthly wireless service fees for institution-provided devices.

Funding Sources

As noted in the 2011 Q1 Converge Education Funding Report, mobile learning programs are becoming a spending priority at federal, state and local levels, as well as among private donors. By actively watching for new funding sources and creating effective proposals, K-12 schools, colleges and universities are receiving grants and sustained funding to support mobile learning costs.

Federal Funding Sources

E-Rate is a U.S. Department of Education program that allows eligible schools and libraries to receive discounted services for Internet access, telecommunications, internal network connections and basic maintenance. Wireless service contracts may be eligible for discounted E-Rate pricing (except for wireless, beyond what is considered a school facility is not eligible). However, the Federal Communications Commission (FCC) is investigating the merits and challenges of wireless, off-premise connectivity services for mobile learning devices through an EDU2011 pilot project. The pilot was intended to help the FCC determine whether those services should ultimately be eligible for E-Rate support.

Michigan Technical Academy was able to secure funding for 450 netbooks to support its mobile learning initiative for 4th, 5th and 6th graders using MiCTA GPO pricing. MiCTA is a professional organization of telecommunications directors at Michigan's public universities that provides needed services to the public sector and nonprofit entities. Since the E-Rate 470 bid process can be complex, MiCTA offers group purchasing pricing with a national E-Rate award for wireless services. Any member school or district can use this contract on its 471 without going through the 470 process.

The sources and amounts of other federal funds for digital education are likely to increase in the coming years. Funding for technology and mobile learning investments may be available from a new K-12 Race to the Top program as well as No Child Left Behind, Title I/Title II and other targeted federal programs.[3]

State, Local and Private Funding Sources

Many state governments also offer discount programs for purchasing technology devices and services, as well as special grants for technology investments. Local foundations and corporations may give grants to local educational institutions for technology and mobile learning projects.

At the state level, legislative and administrative priorities are changing for how schools spend their allocation of state funds. In Florida, for example, a proposed plan would require that 50 percent of funding for K-12 instructional materials be allocated to digital content. The other 50 percent of funds would be spent on other mandated instructional materials. Any remaining funds could be used by a local district to purchase the technology needed to use digital content in the classroom.

Reallocation of Funds Gained from Cost Reductions

Although mobile learning requires new financial investment, it is possible to recover some of that initial expense from ongoing cost savings. For example, mobile devices and their applications may be less expensive to purchase and support than traditional classroom PCs. Educational institutions that allow BYOD programs can realize cost savings because they will need to purchase fewer institution-owned devices for use by students, faculty and staff.

Another prime area for cost savings is replacing printed textbooks and learning materials with digital textbooks and online content. These savings can come from lower initial costs and inexpensive digital updates compared to printed books and materials. Studies show that K-12 districts can save more than $3,000 annually in printing and textbook costs by going all-mobile in a single classroom.[4] College students can save on textbook costs when they can access e-books and other free or paid online content that is specified in a course syllabus.

Mobile Learning: It's Time to Start

Mobile technologies are now truly ready to transform learning both within and outside the classroom. It's now time for educational institutions at all levels to develop mobile learning programs and reap the benefits of lower cost, more effective instruction and greater student achievement.

Where to Learn More

- 2011 Q1 Converge Education Funding Report on Digital Teaching and Professional Development: http://www.convergemag.com/reports/q1-2011/
- 2010 Q4 Converge Special Report on Digital Content and Learning Management Platforms: http://www.convergemag.com/reports/q4-2010/
- Center for Digital Education's Digital Content Strategy Guide: http://www.convergemag.com/paper/Digital-Content-Strategy-Guide.html
- Sprint Case Study on Project K-Nect: www.sprint.com/k12
- Sprint Case Study on CUNY, John Jay College of Criminal Justice: www.sprint.com/highereducation
- 2011 Q2 Converge Special Report on Mobility and Security: http://www.convergemag.com/reports/q2-2011/
- NMC Horizon Report — 2011 K–12 Edition: http://www.cosn.org/Default.aspx?TabId=6375
- PBS Grunwald 2011 Annual Ed Tech Study — Teachers Increasingly Rely on Media and Technology: http://www.grunwald.com/pdfs/PBS-GRUNWALD_2011_ANNUAL_ED_TECH_STUDY.pdf

Foundations & Grants

- Gates Foundation — Next Generation Learning Challenge: http://nextgenlearning.com/
- Kauffman Foundation: http://www.kauffman.org/about-foundation/funding-guidelines.aspx
- Lumina Foundation: http://www.luminafoundation.org/grants/information_for_grant_seekers/preparing_and_submitting_a_letter_of_inquiry.html
- MacArthur Foundation: http://www.macfound.org/site/c.lkLXJ8MQKrH/b.913959/k.E1BE/Applying_for_Grants.htm
- Motorola — Innovation Generation Grants: http://responsibility.motorola.com/index.php/society/comminvest/motofoundation/applyforgrant/
- National Endowment for the Humanities — Institute for Advanced Topics: http://www.neh.gov/grants/guidelines/IATDH.html
- National Science Foundation: http://www.nsf.gov/funding/
- Cyberlearning — Transforming Education: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503581
- Transforming STEM Learning: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503571

ENDNOTES:

1. The Pew Internet Project, 35% of American adults own a smartphone, http://pewinternet.org/Reports/2011/Smartphones.aspx
2. www.sprint.com/k12
3. http://www2.ed.gov/about/overview/budget/budget12/summary/edlite-section2a.html#schoolimp
4. http://www.simbainformation.com/Going-Mobile-PreK-6055405/

This Thought Leadership Paper was produced on behalf of Sprint. **Blackboard Mobile Learn App.:** Sprint network data use without a data plan or pack is $0.03/KB. Available on select devices. **Sprint ID:** Up to 5 packs available at once on select devices. Packs may vary by device. Pack selection may change without notice. **Try-Buy Program:** Available to eligible corporate-liable lines, small business accounts, enterprise accounts and public sector accounts. Initial Evaluation Period is for 30 days for limited number of devices at no initial charge to customer according to company's agreement with Sprint. Initial Evaluation Period may be extended an additional 30 days with 14 days notice prior to end of Initial Evaluation Period. At the end of the Evaluation Period, monthly service will continue and company will be billed for device and monthly rate according to company's agreement with Sprint. Company must contact Sprint representative to cancel service. Following cancellation, company shall return Try Devices to Sprint on or before the Return Date. Additional terms and restrictions apply. **Voice/Data Usage Limitation:** Sprint reserves the right, without notice, to deny, terminate, modify, disconnect or suspend service if off-network usage in a month exceeds: (1) voice: 800 min. or a majority of minutes; or (2) data: 300 megabytes or a majority of kilobytes. Prohibited network use rules apply. As advertised and notwithstanding those restrictions, engaging in such uses will not result in throttling (limiting data throughput speeds) for customers on unlimited data-included plans for phones, but could result in other adverse action. See in-store materials or sprint.com/termsandconditions for specific prohibited uses. **Other Terms:** Nationwide Sprint Network reaches over 278 million people. Coverage not available everywhere. Sprint 4G network reaches over 70 markets and counting, on select devices. Sprint 3G network reaches over 274 million people. See sprint.com for details. Sprint and the Sprint logo are trademarks of Sprint. Other marks are the property of their respective owners.

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