



Mobile Technology in the Classroom

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Overview and Definition

Wi-Fi and mobile broadband technologies have brought network connectivity to a wide range of devices. Cell phones and smartphones dominate this trend, but a wide range of devices with wireless connectivity including personal media players (the iPod and Zune, for example), e-readers (Sony Reader, Kindle, Nook, etc.), netbooks (very small laptop computers), and tablets (like the iPad and Samsung Galaxy Tab) blur classification lines and act as mobile access points to the Internet and online resources. The key features of devices that delineate this trend are their small size, their portability, and their use of some method of wireless connectivity. Key technologies involved in this trend are SMS (text messaging), Wi-Fi or mobile broadband connectivity, and web browsers or task-specific applications (apps) formatted for smaller screens. This document will refer to this wide range of devices and technologies collectively as "small screen devices." For this Tips & Trends edition we'll consider small screen devices to include phones, personal media players, and tablets and exclude non-screen or "dumb" devices such as classroom clickers as well as small-format laptops such as netbooks, although this line is fluid and is becoming more blurred. eReaders may or may not fall into this category, depending on their screen-size and broadband capabilities. Small screen devices fit into one's hand, have a display screen and input method (keyboard or touch-screen), and have some form of wireless connectivity (e.g., SMS, Wi-Fi, 2G or 3G broadband).

Basis for Current Interest

Cell phones and other handheld mobile devices have become a significant and fast growing method of connecting to the Internet. As our society approaches ubiquitous broadband connectivity,

people who are early adopters and heavy users of technology are incorporating wireless devices into their information seeking and communication practices. Libraries that adapt their on-line offerings to work with small screen devices will be meeting an existing need and keeping libraries at an appropriate position on the innovation curve. In addition, mobile broadband connectivity is closing the digital divide among population demographics that have not, in the past, had high rates of broadband connectivity. Key segments of student populations who may have been passed over by earlier waves of broadband dissemination are now finding themselves accessing digital resources for the first time using phones or mobile devices.

Instruction librarians who strive to move away from teaching how to use specific tools and towards teaching information literacy as a set of behaviors will be interested in small-screen devices because they represent a significant growth area in how students connect to on-line information. They also have a certain amount of cachet or user loyalty. Libraries that can integrate these devices into instruction programs can position themselves as forward-thinking and user-centered institutions which are making resources available to today's students and faculty through the tools that many users favor.

Current Applications in Academic Libraries and Higher Education

Mobile technologies have been widely--almost universally--adopted in society. Mobile broadband is offering its 4th generation of technological improvements while deployment of 3rd generation broadband is being expanded to a broader customer base. In higher education, its use is still developing, but at least three broad categories of mobile applications can be identified: intermediation (making existing services function well on small-screen devices), dedicated applications, and SMS technology.

First, schools and libraries are extending their existing digital and on-line offerings to small-screen devices. Some of these efforts are nearly invisible,

as small-screen devices have been consistently improving their ability to render text and graphics. As content providers such as libraries make their content friendlier to small screen devices, the devices are doing a better job of rendering content on small screens. As a result, users are growing increasingly comfortable accessing digital content on their small-screen devices. For example, the [University of California San Diego](#) and [Stanford University](#) have developed applications that provide students with campus information directly to their smartphones. The UCSD application provides mobile access to campus directories, news, and campus maps. The Stanford application mashes-up listings from the course catalog with student ratings and course descriptions bringing the read/write web to the advising and registration process.

Several universities have established campus-wide mobile initiatives: the University of South Dakota offered PDAs to students in 2001; [Seton Hall University](#) is working with smartphones; and [Abilene Christian University](#) distributed iPhones and iPod Touches to incoming freshmen in 2008. Academic libraries at [Duke University](#) and [North Carolina State University](#) are making their services, such as the catalog, hours listings, and computer availability, accessible via mobile devices. Even library vendors, such as EBSCO, Westlaw, and RefWorks are customizing their research products for access through small screens. These innovations support mobile or roving reference services using mobile devices, currently offered at Penn State and Temple University.

Another increasingly popular mobile application that is used to provide reference service is SMS/Text messaging. SMS/Text messaging reference help is offered by many academic libraries. For a list, see the [Library Success: A best practices wiki, SMS Reference](#). Library catalogs use SMS technology to text call numbers and bibliographic information to mobile phones. SMS/Text messaging has also been used on campuses for voting, classroom assessment, teaching languages, and in communication, such as in the case of an emergency. The [University of North Carolina Wilmington](#) has developed several SMS applications for career information, real-time bus location information, and cafeteria menus.

A third mobile application seen in higher education is MP3 technology and portable media devices. Lectures and campus tours are available as podcasts, vodcasts and screencasts for playing on portable media players. For examples, see [University of California at Berkeley](#) and [Purdue University](#). In the library, portable media players are circulated and podcasts, vodcasts, and screencasts are used for library tutorials and tours. Many universities and libraries, such as Arizona State and Duke, make their various casts available via iTunes. Another class of media device, the e-reader, can be used to download textbooks for classes or loaned by libraries to for leisure reading or to satisfy interlibrary loan requests, as with the Kindle loan programs at the University of Nebraska at Omaha and Oregon State University.

Current Applications in Academic Library Instruction

In many cases, rather than performing new tasks or services, small-screen devices are being integrated into information-literacy practices by replacing large-screen devices, freeing the user to move around while accessing them. It will be more common to see remediation, or instructing students and faculty to use existing services on a mobile device rather than on a stationary workstation. When teaching the catalog, librarians might demonstrate how to text a call number. Librarians could also show students how to search for articles in a database or use web-based citation managers with a smart phone; instruct medical students to load and use medical and drug references on their PDAs, or faculty to receive TOC alerts on an RSS reader.

The use of personal response systems, or "clickers," (remote controls that operate via radio frequency) for gauging student comprehension, polling, and assessment in library instruction has proven effective and has been well-documented. However, clicker costs can be prohibitive. If mobile phone ownership is ubiquitous, small screen devices could be used for instantaneous on-demand polling in lieu of clickers. There are several SMS polling applications available (Poll Everywhere, TextTheMob, LetsGoVote) online and TurningPoint offers ResponseWare Web for use with smart phones. Using mobile phones as clickers has the added advantage that they can be

used in distance education and webinars as well as in face-to-face instruction sessions.

QR Codes take advantage of the capabilities of mobile phones to connect students with online information in the library classroom. QR, or quick response, codes are two-dimensional barcodes that follow an international standard and are increasingly in general use. The codes can encode text, phone numbers and, especially URLs. These data formats can be barriers to students who need to read and then type them in, but QR codes, by using a phone's camera, can turn physical information into digital information without requiring complex text input. Andrew Walsh (2010) suggests using QR codes in class handouts to link to web pages or videos or to access "mobile-friendly" quizzes to test student's information literacy comprehension (<http://www.mobilestudy.org> permits one to create quizzes for mobile devices). QR codes are limited to camera-enabled smart phones that are capable of running apps, and thus are not accessible to students without smart phones.

Tours of library buildings are another documented application of mobile technology. Digital audio tours can be downloaded for many academic libraries, including the John Peace Library at the University of Texas at San Antonio and the Harold B. Lee Library at Brigham Young University. Temple University offers dial-in cell phone tours of its Paley Library. These tours allow users new to a library to be guided through library buildings at their own pace and without direct staff intermediation.

Potential Value

Extending library instruction to include small-screen devices offers many potential advantages to the teaching librarian. First and foremost, since the Pew study shows that small screen devices are key in bridging the digital divide, offering access to library services through small screen devices negates a significant barrier between many students and their libraries' digital collections. Also, if, as studies suggest, many of the current generation of undergraduates favor texting or social networks to more traditional information media, they may be more likely to use library services if they are tailored to those preferences.

As each successive generation of small-screen devices offers increases in processing power, display resolution, and connection speed, more and more activities that previously require computer labs may be transferred to mobile devices. Forward-thinking libraries may realize cost savings by reducing stationary computing infrastructure and offering more mobile-centered services in their place.

Potential Hurdles

The first significant barrier to shifting to mobile-based services is the cost. More specifically, libraries should be cautious not to shift the cost for information infrastructure to the students without a free recourse. Many students will, no doubt, purchase expensive smart-phones with SMS and data plans, but many will not choose to do so or will not be able to afford such luxuries. Libraries are advised to consider the cost impact on students when shifting from stationary computing to mobile computing models.

Other concerns include fragmentation of mobile services. If libraries are writing apps, will the apps work with all the major platforms? (iPhone, Android, Blackberry, Windows Phone, etc.) While "ubiquitous broadband" is today's buzzword, actual coverage varies and in many cases is restricted to urban areas. It is possible that new library mobile services exclude rural students. Existing Wi-Fi networks have limited capacity, so libraries should consult with IT departments to ensure that networks will not become oversaturated with sudden increases in demand.

Finally, there is the ever-increasing concern of media fragmentation and workload overload. Instruction librarians are already creating print handouts, online tutorials, screencasts, telephone, IM, and email services. Adding mobile-specific services to this list may over-stress instruction departments and lead to diminishing returns. Libraries are advised to consider the return on investment and how mobile services will mesh with existing services before embarking on new projects.

Conclusion

Current successful uses of small screen technology include efforts to remediate services and to extend

access to current offerings in services packaged to fit small-screen devices. Librarians are repackaging existing content to work with the new small-screen environment and the devices themselves are getting better at making non-optimized content useable to mobile users. Other efforts are either less successful or are still in a planning phase. What is certain is that small-screen devices are becoming more powerful and adding functionality, and that they are extremely popular with segments of user populations. Going forward, libraries will be well served to consider mobile users, their unique needs, and how to best provide these users with access to library collections and services.

References and Further Readings

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Blogs & Ongoing Information

ProfHacker: tips, tutorials, and commentary on pedagogy, productivity, and technology in higher education: <http://chronicle.com/blogs/profhacker/>

The Chronicle of Higher Education's Wired Campus Blog reports on mobile initiatives and applications for Higher Education:
<http://chronicle.com/blog/wiredcampus/5/>