

CALIFORNIA DIGITAL LIBRARY

Comparative Analysis

Mobile Device User Research

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LIBRARY MOBILE SERVICES

A variety of library mobile services are in use in higher education libraries and public libraries. Library mobile offerings generally fall into five categories: 1) library mobile website; 2) text messaging services; 3) mobile catalog search; 4) access to resources, and 5) new tools and services.

LIBRARY MOBILE SITE

Often the first step for libraries going mobile is creating a mobile version of the library website. Instead of recreating the entire site, many recommend that libraries “identify and prioritize services for which a mobile version would be ideal” (Trainor, 2010). Most elements of library mobile sites offer simple pieces of information that a patron would want to know while on the go or en route to the library. Library mobile sites often provide simple pieces of information such as hours, directions and maps, news, and floor plans. Jeff Wisniewski from the University of Pittsburg notes that “no mobile user wants to read your circulation policy on his or her handheld while standing in line at the dry cleaners, but he or she does want to know if you’re open later than 5 p.m.” (2010).

Many libraries with mobile sites seem to have adopted this recommendation. A comparative analysis of university library mobile sites found that library hours and directions or maps were two of the top three most common features of library mobile sites. The fourth most common feature was an option to view the full library site; even though the full library site might be difficult to use on a mobile device, a user may wish to access more in depth information functionality anyway.

Some libraries have built request services into their mobile catalog search. Ghent Library in Belgium has a “request item” option on each catalog details page (see Figure 1). The request page (see Figure 2) requires ID numbers and information about the material. The Orange County Library System has a request option on the main page of search results (see Figure 3). The OCLS mobile site also allows patrons to renew library books.



Figure 1 Ghent Library search results with request option



Figure 2 Ghent Library mobile request page



Figure 3 OCLS search result request option

TEXT MESSAGING SERVICES

Text messaging is another way that libraries are making services available to mobile library patrons. These services have the potential to be used by a wider population than mobile internet services because text messaging is available on most feature phones (though there is not conclusive evidence that these services are actually being used more than mobile web services). Text messaging can be used for patrons to contact the library, for patrons to send information to themselves, or for the library to send automated notifications to patrons.

Text a Librarian: Many libraries have created text message versions of the popular “ask a librarian” feature (generally conducted by chat or email on a desktop computer). There are three common ways that a library can implement this feature: 1) send text messages from a mobile phone staffed by reference desk librarian; 2) use a service to translate text messages to emails (and emails from the librarian back to text messages to the patron); 3) use the “AIM hack” in which patrons send text messages to the library’s AOL Instant Messenger chat account by including a short code in the text message followed by the library’s screen name. Most libraries that have implemented a “text a librarian” option find that they only receive 20 to 40 text messages per month (Weimer, 2010). Administrators of a pilot program at the University of Virginia believes that usage will increase over time: “Although usage of text messaging as a means of contacting reference staff remains low when compared to phone, e-mail, chat, or in-person transactions, the overall number of SMS queries has grown steadily over the past year” (Weimer, 2010).

Text a Call Number: UC Berkeley and UC San Diego, along with many other libraries, have implemented a feature to text a call number to yourself (see Figure 4 and Figure 5). This allows users to search for an item on a desktop computer but then have a portable record of the item’s call number to refer to when physically searching the library shelves.

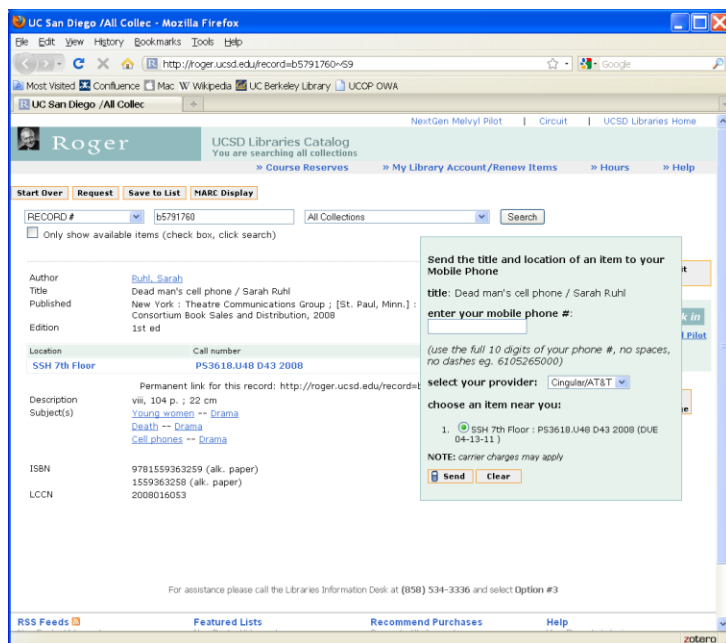


Figure 4 Option to text yourself a call number from UCSD’s library catalog



Figure 5 Text message received from UCSD text a call number feature

Library/Patron Communication: Other (but less common) services exist in which a patron can contact the library via text message—and receive a reply via text message—to request a list of items loaned, renew an item; request outstanding fine information, check the availability of an item, or determine library hours. A library may also contact patrons by text message to notify that a requested book is available or send an item due reminder (“M-Libraries - Library Success: A Best Practices Wiki”). Focus groups of higher education students in UK ranked reminders by text as the most desired mobile library service. Overall, this study found “attitudes towards text messaging from the library are overwhelmingly positive” as long as the text messages were for “useful” purposes rather than promotional messages (Walsh, 2010).

CATALOG SEARCH

Another service some libraries provide is the ability to search an online catalog from a mobile device. A survey in the UK found that “55% of total respondents were in favour of being able to access the library catalogue from a mobile phone” (Mills, 2009). Some mobile catalogs reduce the search fields to keyword only, while others provide options to search using more advanced options similar to a traditional desktop online catalog search.

Some libraries have created their own mobile online catalogs, such as Oregon State University (see Figure 6). This mobile online catalog is an example of a well designed interface because it gives users clear, informative results from the results screen. Search results from this catalog show the location and availability of the resource on the results screen, saving users from having to load another page to view details about the item (see Figure 7). The results also indicate if the file is available online and use an icon to indicate whether the file is accessible from a mobile device.

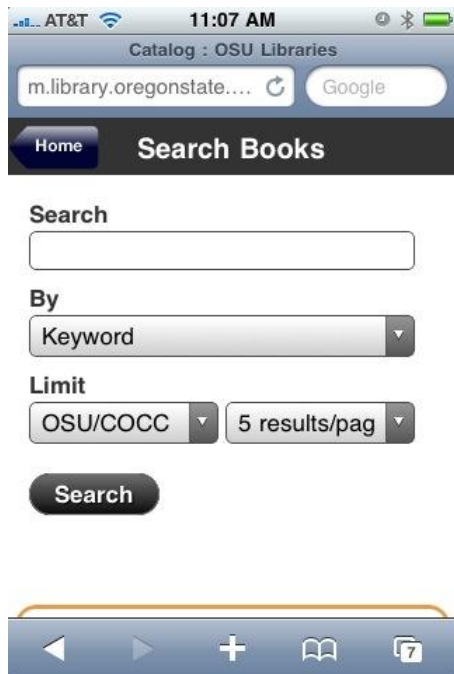


Figure 6 Oregon State University mobile catalog search. This search gives users the option to search by keyword or other parameters, choose the collection to search, and determine how many results to show on each page.



Figure 7 Oregon State University mobile catalog search results. The first page of search results shows the user the location and availability of resources. If it is an electronic file, an icon indicates if it is accessible from a mobile device.

A popular option is WorldCat Mobile, which searches OCLC databases (see Figure 8 and Figure 9). WorldCat Mobile is a native application (rather than a mobile website accessible by any mobile device with Internet) that is available on several major smartphone platforms. The application uses geolocation to display results for libraries near the mobile user. WorldCat has partnered with a company called Boopsie to create WorldCat Mobile.



Figure 8 WorldCat Mobile iPhone Application. This catalog allows users to search by keyword or select a category to search.

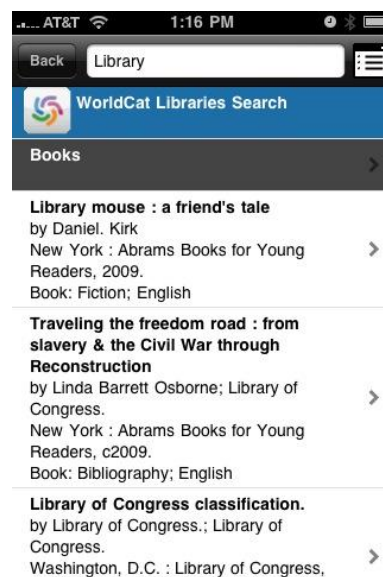


Figure 9 WorldCat Mobile search results. The user must select an individual resource to determine which libraries carry the item.

Instead of just traditional text search, some library mobile catalogs take advantage of features built into the device. These mobile services must be native applications rather than mobile websites in order to use the device capabilities, although newer browser standards are changing this, so some mobile websites can detect location as well (Fling, 2009).

Many applications use geolocation to find results in the user's area. In addition to applications like WorldCat Mobile, applications like Book Bazaar allow users to search for books in libraries (also using WorldCat data) and bookstores in the vicinity.

An alternative to text input is to use the camera built into many mobile devices. Mills noted that "50% of respondents at both universities said they take photos of signs, books, etc to save information for later reference" (Mills, 2009). Some applications take this habit a step further and actually use smartphone cameras to search for items. Applications like RedLaser and pic2shop combine camera phone functionality with WorldCat data. Any item with a barcode can be scanned. When the application recognizes that a book has been scanned, it displays results for local libraries as well as Google search results (see Figure 10).

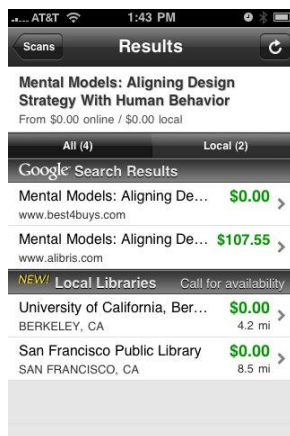


Figure 10 RedLaser iPhone app book search results

RESOURCE ACCESS

Some resource vendors are providing mobile versions of their databases, and libraries are linking to these sites. UCSF is one library with a mobile site that links to mobile licensed resources (see Figure 11). When the user is not on the campus wireless network, the user must log in using VPN.

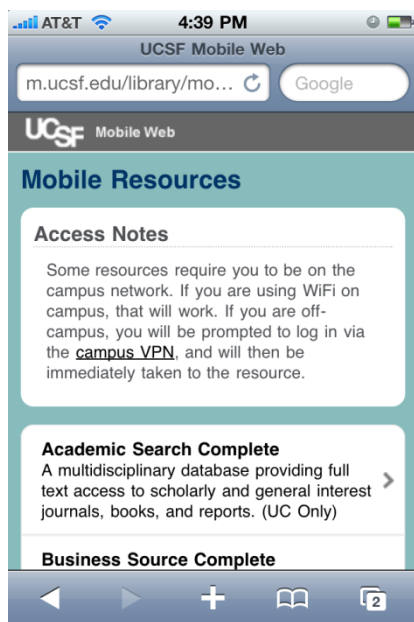


Figure 11 UCSF's mobile library page links to mobile versions of licensed resources

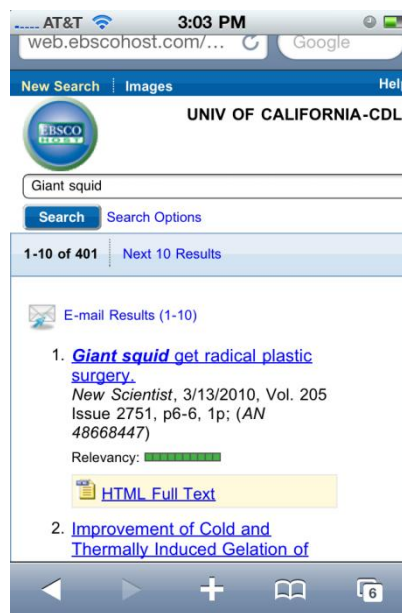


Figure 12 EBSCO's mobile search results interface

Some licensed resources that have mobile versions are EBSCO (see Figure 12), PubMed, Safari Books Online, arXivView, and many others. The difficulty in using these resources is that most require library authentication when not on the campus wireless network. It is possible to set up a library proxy for each wireless network on a mobile device,¹ but many users access the internet from mobile devices using cellular connections, even when on campus. Providing easy a clear method for authenticating library resources is a key component of providing links to licensed mobile resources.

NEW OPPORTUNITIES

Some libraries have created new tools and services specifically for use on mobile devices, such as applications that showcase special collections in unique ways. Both BeaverTracks from Oregon State University (see Figure 13) and WolfWalk from North Carolina State University are walking tours that display historical photos from library archives. As the user walks around the campus, the application recognizes where the user is using GPS data from the mobile device. According to Tito Sierra from the NCSU library, WolfWalk was created to “increase the visibility and accessibility of university archives by integrating this content in a self-directed, location-aware walking tour for mobile devices” (Sierra, 2009).

Another feature that NCSU implemented in its mobile site is webcams (see Figure 14). The webcams show live views of areas around campus, including the line at the library coffee shop. Though this may seem outside of the scope of library services, the webcams generated over a third of mobile page views in the first 8 weeks that mobile services were introduced (Sierra, 2009). Creative services like a coffee shop webcam may generate increased traffic for library mobile options and increase awareness of library services.

¹ See instructions for setting up UC Berkeley library proxies on mobile devices here: <http://www.lib.berkeley.edu/kb/entry/81>

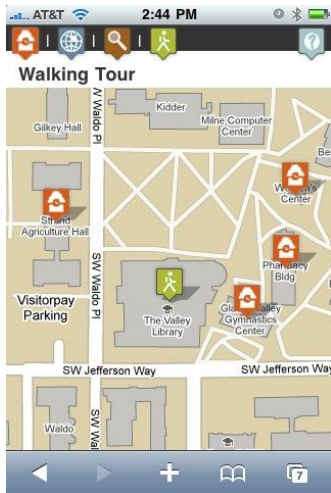


Figure 13 BeaverTracks historical walking tour

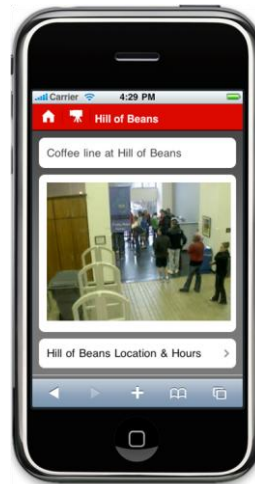


Figure 14 NCSU coffee line webcam

RELATED TOOLS FROM OTHER ORGANIZATIONS AND COMMERCIAL VENDORS

SPECIAL COLLECTIONS MATERIALS

MUSEUM APPS AND TOURS

The Museum of London iPhone App, StreetMuseum, uses augmented reality and geolocation to overlay historic photographs on current streets (Barrett, 2010) (see Figure 15). The application instructs users to “hold your camera up to the present day street scene and see the same London location appear on your screen, offering you a window through time” (“StreetMuseum,” Museum of London).



Figure 15 Museum of London's iPhone App Street Museum

The San Francisco Museum of Modern Art has changed its traditional audio tour to an interactive iPod Touch tour. Museum visitors can check out a device from the museum in order to follow along with images, video, voice, and interactive features of the tour. According to one museum curator, “Essentially, we’ve liberated the audio tour. We’ve developed five hours of content, made it extremely portable and easy to use, and devoted it to rediscovering aspects of our collection and its history. This is not about techno-fetishism. It’s about focusing on artworks in meaningful sound and video” (Schneider, 2010).

The Brooklyn Museum also has an iPhone App that allows users to browse and search art collections. This particular app is interesting not because of particularly unique features or design, but because it was created using the museum's API. An API is an Application Programming Interface that allows outside programmers to create software that accesses services or data. The Brooklyn Museum has created its own API so that others can access the museum's collections and display them in interesting ways, such as mobile applications. A museum curator commented that the API was essential for having a mobile application because "it's the kind of thing we couldn't do with our existing workload and quickly realized the API was allowing us to do more by collaborating with the developer community" (Bernstein, 2009).

PHOTO APPS

Browse *Life* magazine photographs using the Life Mobile app for iPhone (<http://www.life.com/iphone/>). The application includes editor's picks, news, celebrity, and travel categories (see Figure 16). The app also includes fun features like the ability to upload personal photos to create a magazine cover and a game where players are judged on their editing eye by selecting images to include in the magazine.

LookBackMaps (<http://lookbackapps.net/>) is an iPhone app that draws historical photos from many databases, including Calisphere, and maps the photo locations. Like the Museum of London app, the application uses geolocation to find images near the user and has an overlay option to see the historical photo on top of the current scene (see Figure 17 and Figure 18). The application has several bugs and runs slowly, but perhaps this will improve over time.

Several other sites map images such as historical photos and art pieces but do not have mobile applications. SepiaTown (<http://www.sepiatown.com/index>), Geo Coded Art (<http://geocodedart.com/>), and Historypin (<http://www.historypin.com/photos/>) are good examples.

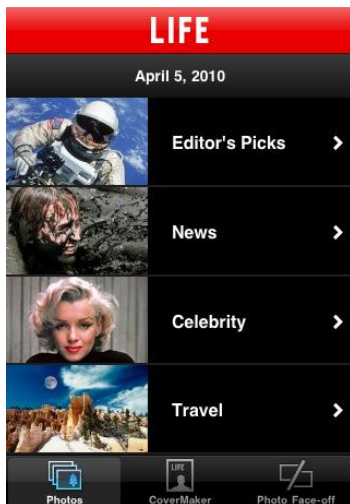


Figure 16 Browse historical photos with the Life Mobile app for iPhone.

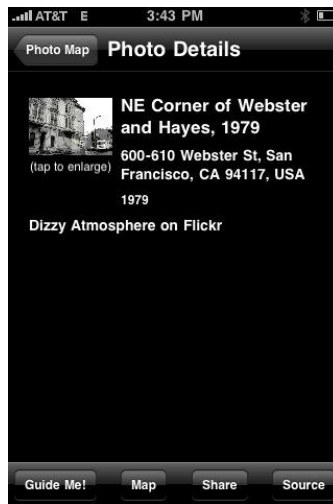


Figure 17 LookBackMaps iPhone app image detail



Figure 18 LookBackMaps historical image overlaid on current scene

CONTENT AND NOTES TOOLS

RESEARCH APPS

Fastcase (<http://www.fastcase.com/iphone/>) is an iPhone app that allows legal researchers to search cases and statutes using keyword, Boolean, and citation searches (see Figure 19). Results are sorted by most relevant results, but users can customize search results. Search terms are highlighted in the documents for easy viewing (see Figure 20).

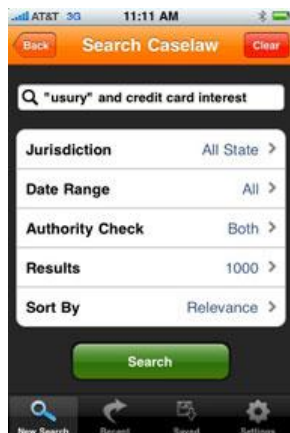


Figure 19 Fastcase iPhone app allows multiple kinds of searches and customizable results

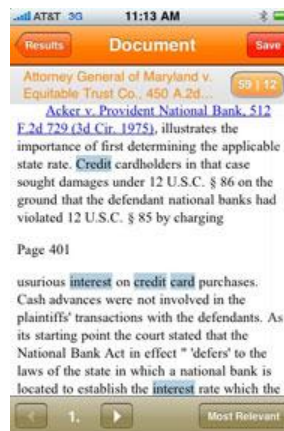


Figure 20 Search terms are highlighted in Fastcase documents

Pub Med On Tap (<http://www.referencesontap.com/>) is an iPhone or iPad app that lets users search the PubMed databases (medical and life science journals and books). Since PubMed offers many full-text resources, users can limit search for full-text and free full-text options (see Figure 21). The full text materials can be viewed within the application, and library proxy is available (see Figure 22). For materials without digital copies, users can order copies through Loansome Doc Ordering System. Users can email results lists in formats that can be uploaded to reference management systems like EndNote. Users can also store references in a searchable library within the application. Recent searches are also saved.

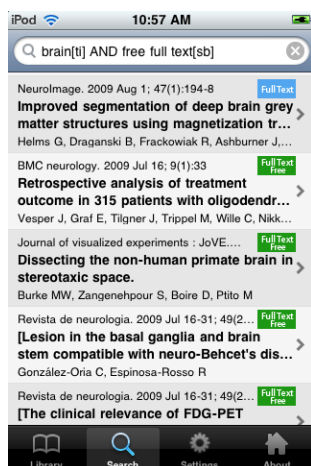


Figure 21 Pub Med On Tap allows users to limit search to full text and free full text materials

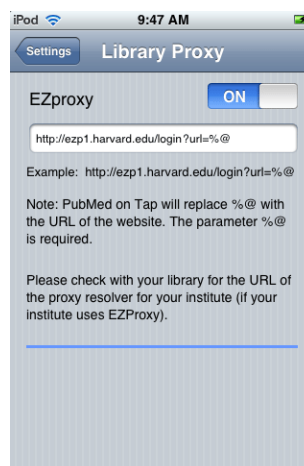


Figure 22 Library proxy is available through Pub Med On Tap

Papers is an iPhone or iPad app (<http://mekentosi.com/papers/iphone/>) that allows users to search for and download articles from digital article repositories like Google Scholar and ACM (proxy settings are configured by EZproxy) (see Figure 23). Articles are stored in a personal library and can be retrieved by author name or journal title (see Figure 24). Users can view metadata (see Figure 25), open PDFs within the application, and email with the PDF attached. The Papers app is a good model for searching, saving, and annotating articles on a mobile device.



Figure 23 Papers iPhone app searches digital article repositories. Proxy settings can be configured



Figure 24 Articles within Papers can be retrieved by author name or journal title



Figure 25 Papers displays article metadata

PLoS Medicine (<http://itunes.apple.com/us/app/plos-medicine/id362137769?mt=8>) is an iPhone app from the Public Library of Science that publishes journal articles from their open access journal. The application displays most recent, most viewed, and search functionality (see Figure 26). Articles are also categorized by collections, subjects, and issues. Users can mark articles as “favorites” to recall later (see Figure 27).



Figure 26 The PLoS Medicine app organizes articles by most recent and most viewed, and provides search functionality.



Figure 27 The PLoS Medicine app also organizes articles by collections, subject, and issue.

NOTES APPS

The AJI Annotate app for iPhone and iAnnotate PDF for iPad (<http://www.ajidev.com/apps.html>) allow users to annotate—add highlights, notes, underlining, and bookmarks—on PDF documents (see Figure 28). Documents and the user’s PDF library can be searched by keyword. Annotated files can be uploaded to view in Acrobat or Preview on a full computer.

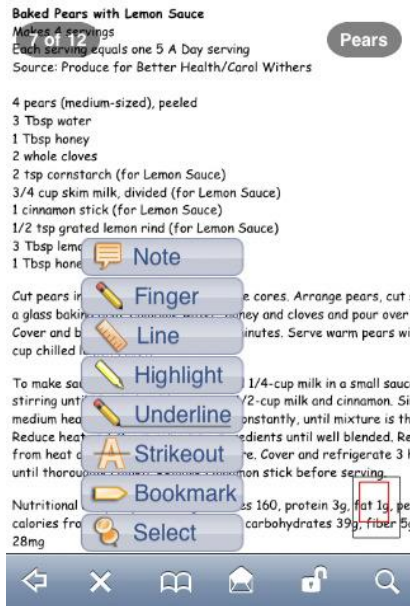


Figure 28 AJI Annotate application for iPhone provides annotation tools for PDFs.

iBooks (for iPhone and iPad) includes options to add notes and bookmarks to eBooks and PDFs. Notes and bookmarks can be viewed from a summary page (see Figure 29).

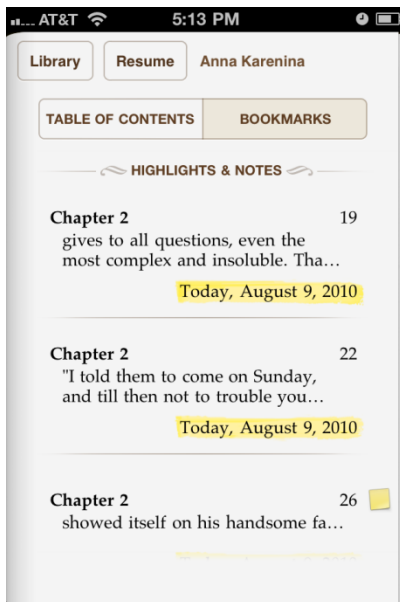


Figure 29 In iBooks, notes and bookmarks can be added to eBooks and PDFs and viewed on a summary page.

The Evernote app for iPhone, iPad, Blackberry, Android, Palm Pre, and Windows Mobile (<http://www.evernote.com/about/download/>) lets users store notes in the form of text, pictures, and voice recordings (see Figure 30). Unlike the previous applications that allow users to create notes within PDFs or eBooks, Evernote notes are independent of other materials. Notes can be retrieved by browsing thumbnails, searching, or viewing the GPS location of the place the note was created.



Figure 30 The Evernote app, shown here for Android, allows users to capture notes using a variety of inputs

CITATION TOOLS

There are many new tools that import and organize citations, but few have mobile versions. These tools often contain word processing plug-ins that allow citation insertion and automatically generated bibliographies. Popular citation management tools like Zotero, Mendeley, and EndNote do not have mobile versions.

RefMobile is a mobile version of RefWorks. Although RefMobile doesn't import citation information automatically, the tool will search for references based on key information like PMID numbers. Users can organize references in folders and add notes. References added within the mobile version are automatically shared with the desktop version of RefWorks.

EBOOK READER DEVICES AND APPS COMPARISON

Smartphone reading applications may be able to steal more of the market share from eReaders if they can offer the same (or even more) functionality as eReaders. Some desired functionalities, especially for those reading material for academic purposes, include the ability to highlight material and make notes, see a concise summary or all annotations, bookmark material, sharing options, text search, PDF support, and access to third-party resources like dictionaries.

This table discusses functionality of eReaders and apps, particularly those that are important for academic users. Amazon Kindle DX, for example, has a larger screen than the Kindle 2 and is geared toward academic users. Other

sources provide information on the technical and hardware specifications for various devices, such as [http://wiki.mobileread.com/wiki/E-book Reader Matrix](http://wiki.mobileread.com/wiki/E-book_Reader_Matrix).

Functionality	eReaders			Apps		
	Amazon Kindle DX ²	Sony Digital Reader Daily Edition ³	Barnes & Noble Nook ⁴	Kindle app (iPhone, iPad, Blackberry) ⁵	Kobo (iPhone, Blackberry, Android, Palm Pre) ⁶	iBooks (iPhone OS 4, iPad) ⁷
Annotations	Highlights, notes and clippings. Cap at 7-10% of book. Not available for PDFs.	Highlights and notes (including freehand option). Can search highlights.	Highlights and notes. Not available for PDFs.	Highlights and notes. Not available for Blackberry app.	No	Highlights and notes.
Summary of annotations	Saves locations of highlights to text file to view on a computer.	Export notes to your computer.	Can view all annotations on a page, but not for an entire book.	Saves locations of highlights to text file to view on a computer.	No	Yes
Bookmarking	Yes, but not available for PDFs. Synchronizes across devices.	Yes	Yes. Bookmarks synchronize with Nook app.	Yes. Synchronizes across devices.	Yes	Yes
Share books with others	No	Can authorize up to 6 devices per book, but not allowed to share with other accounts	Can lend books to 1 friend for up to 14 days	No	No	No
Search	Yes. Search within a book or	Search title names.	Search within a book.	Search within a	No	Yes

² <http://www.amazon.com/gp/help/customer/display.html?nodeId=200375850>,

³ <http://www.sonystyle.com/webapp/wcs/stores/servlet/ProductDisplay?catalogId=10551&langId=-1&productId=8198552921665562069&storeId=10151#features>

⁴ <http://the-gadgeteer.com/2009/12/14/barnes-noble-nook-ebook-reader-review/>

⁵ <http://www.amazon.com/gp/help/customer/display.html?nodeId=200298480>

⁶ <http://www.kobobooks.com/smartphones>

⁷ <http://www.apple.com/ipad/features/ibooks.html>

	entire library.			book (iPhone only)		
PDF reader	Yes, though does not support PDF annotation, zoom, or clicking on links	Yes	Yes. Does not support annotations.	No	No	Yes
Folder navigation	Yes (called "collections")	3 rd party tools for folder organization	No	No	No	No
3 rd party linking or search	Ability to search Google, Wikipedia, or Dictionary	Dictionary	Dictionary	Dictionary, Google, and Wikipedia search coming soon.	No	Dictionary
Other	View most popular highlights. Text to speech option.	Supports ePub. Partners with OverDrive to connect to library eBooks. Supports Word and .rtf documents.	Supports ePub.			

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