

Florida State University Libraries

Faculty Publications

University Libraries

2012

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Abstract

Many mobile applications, also known as apps, are excellent instruments for gathering qualitative and quantitative data. This paper is a starting point for those interested in gathering assessment data using mobile tools, providing assessment app type overviews and examples. With relatively little effort, libraries can take advantage of mobile apps and gather compelling assessment data more easily than ever before.

Introduction

Mobile devices are primarily viewed as communication and content consumption devices (Carr 2010; Story 2007). While this might be true for intense writing and complex analysis, it is not true when it comes to gathering data. Mobile devices have great potential as assessment data gathering tools. For those interested in and just beginning to use mobile tools in assessment, an overview of app types and some examples are helpful. With a little knowledge and preparation, any librarian with an iPad, iPhone, Android, Blackberry, or other handheld device can gather compelling data about their libraries' users, services, and resources.

Since mobile use and consumption of information continues to grow (Purcell et al. 2011), the dominant platforms are still shifting. If one does not already have a mobile device, this is something to keep in mind when planning mobile assessment. According to a March 2011 Neilson Report, Apple has lost its operating system supremacy in the smartphone market to Android, while retaining hardware primacy (http://blog.nielsen.com/nielsenwire/online_mobile/who-is-winning-the-u-s-smartphone-battle). While this state of flux makes it difficult for libraries to choose a mobile system in which to invest, it should not be allowed to get in the way of planning. The concepts and application types discussed apply across all mobile platforms. However, because of the maturity and popularity of Apple's mobile products, this article will primarily use examples drawn from Apple's App Store.

When considering what mobile apps to use, one should remember that assessment projects tend to fall into two broad categories, qualitative and quantitative. Depending on the assessment design, many mobile apps could be used to collect both types of data. However, most mobile apps seem to be best suited for gathering one type of data over the other. Qualitative data gathering apps focus on media recording and drawing tools. Quantitative data gathering applications center on counters, environmental meters, and surveys.

Qualitative Apps

In the past, recording qualitative data required dedicated still cameras, video cameras, and audio recorders. An example of traditional qualitative ethnographic techniques requiring multiple data gathering tools can be seen in *Studying Students* (Foster & Gibbons, 2007). All of these media recording functions can now be performed by one

mobile device, making the equipping of a qualitative assessment project much more affordable. On most handheld devices these functions are filled by apps that come with the device. For example, the iPod Touch, iPhone, and iPad 2 fill these functions with the Camera application (<http://www.apple.com/ipad/built-in-apps/camera.html>) that takes both still pictures and video, which are then stored in the device's Photos app (<http://www.apple.com/ipad/built-in-apps/photos.html>). On the iPod Touch and iPhone, audio can be recorded and stored using the Voice Memos app (<http://www.apple.com/iphone/features/more-features.html>). The iPad requires that an app be downloaded for audio recording. The data gathered on any of these apps can be exported via email, SMS, or by plugging the device into a computer and using the iTunes software (<http://www.apple.com/itunes/download>).

It is important to consider two things when recording this data, the camera and microphone specifications of the device being used and the amount of free memory. Earlier handheld devices have relatively low-resolution cameras, which can cause issues if the photo is intended for big screen display. The same issue is a factor in audio recordings. If a device is being used for extensive assessment, memory can fill up quickly with all the media being recorded. This means the media will have to be downloaded often, or that a web-based storage solution, such as Flickr (<http://itunes.apple.com/us/app/flickr/id328407587?mt=8>) or YouTube (<http://www.apple.com/ipad/built-in-apps/youtube.html>) will have to be used. However, depending on the type and protocol of the assessment, use of web-based storage can raise privacy and confidentiality concerns. The terms of service and privacy policy of services must be carefully read.

Drawing tools can fill many data gathering needs. They can be used to create electronic charrettes, space design drawings. They can also be used to trace paths over the image of a map. These types of measurements are where a tablet's larger screen has the advantage. However, all that is ultimately required is a handheld device with a touchscreen and the right application.

For plain drawing with notations, Notes Plus (<http://itunes.apple.com/us/app/notes-plus-handwriting-note/id374211477?mt=8>) has a rich feature set. It allows for drawing with different colors and line thicknesses. It accepts handwritten or typed notes to annotate drawings. In addition, it has an audio recording feature built in, making it ideal for projects using think-aloud-protocol (Young 2005, 23) or for attaching interview recordings to drawings. Notes Plus allows for storage folders in the app to be password protected, and allows exports as PDF's or image files to the device's Photo Album, to iTunes, email, or Google Docs. This means the data gathering team will never run out of pen and ink.

For annotating photos or doing location-mapping assessments, SketchBook Pro (<http://itunes.apple.com/us/app/sketchbook-pro/id364253478?mt=8>) is a robust tool. Like desktop photo editors, it can be daunting for the uninitiated at first, but it includes clear instructions and in-app help. A base layer, such as a library floor map, can be imported, and then up to 5 layers, perhaps documenting subject paths, can be put on that base image. Completed drawings can then be exported to the device's Photo Library, iTunes, Flickr, Facebook, or email.

These are just some of the options for gathering qualitative data using a mobile device. As the handheld market continues to develop, more options will become available, including apps that are more suited to gathering quantitative data.

Quantitative Apps

There are three major types of apps well fitted for quantitative assessments: counters, environmental meters, and surveys. Mobile counter applications are like hand tally counters with taps rather than clicks triggering a count. Counter apps go beyond their analog counterparts in allowing multiple tallies to be entered and viewed simultaneously. The apps also merge counting capabilities with basic calculation capabilities. Many of these applications can also time-stamp and export the data with a few swipes of a finger.

One excellent illustration of this type of app is Tallymander (<http://itunes.apple.com/us/app/tallymander-a-tally-clicker/id303492366?mt=8>). It not only has all the features discussed above but also allows the data to be color coded and associated with images. This makes it much easier to train assistants to gather quality data. For example, if a library was conducting a space usage assessment, Tallymander could easily be configured, color coded, and illustrated with the items being counted on the floor. This might include counting students using computers or smartphones, engaging in group study, or consuming food. Associating visuals with data types prompts the assistants to enter data correctly, even if they do not work with the project often.

While Tallymander is a useful application, its app genre continues to develop. A similar Android app with greater capabilities is currently under development at North Carolina State University Libraries (NCSU) (Casden and Chapman 2011). It will be interesting to see how NCSU's app and other libraries' efforts in this area evolve.

There are also apps available to quantify environmental conditions, such as light and sound levels. These tools could be useful in ensuring the environmental quality of an assistive technology area or, when paired with a survey or interview, in determining the amount of ambient sound that still falls within users' definition of quiet.

LuxMeter Pro (<http://itunes.apple.com/us/app/luxmeter-pro/id408369821?mt=8>) uses the iPhone or iPod Touch's camera to measure the ambient light level. As of April 2011, it is the only dedicated Luxmeter in the Apple App Store. Although the app needs to be calibrated before use, it allows for measurements of peak light, light range, and maximum light to be gathered. Unfortunately, the only way to record the measurements is manually. There are also numerous lux meter applications available for Android phones. Due to variations in camera sensitivity in handheld devices, it is recommended that any luxmeter mobile app be checked against a dedicated luxmeter before use to ensure accuracy.

There are numerous apps available for measuring sound level that work on smartphones or iPod Touches. Decibel Meter Pro (<http://itunes.apple.com/us/app/decibel-meter-pro/id382776256?mt=8>) is currently the only sound measurement tool available for all Apple mobile devices with microphones. Using the built-in microphone, Decibel Meter Pro measures the peak, average, and maximum decibel level of an environment. The measurements taken by the app must be recorded manually; there is no option to email the measurement out with time and/or location stamps. Handheld microphone hardware varies from device to device, and this will influence the accuracy of measurements. Just as with the luxmeter, it is best to check the application against a dedicated decibel meter before serious use. Mobile applications that measure

environmental conditions, such as light and sound, make assessing the library atmosphere easier since there is no longer a need for dedicated equipment.

Survey apps are also good quantitative data gathering tools. Currently, most of the options available are similar web-based surveys. These, in turn, are like traditional paper surveys with checkboxes to be touched/clicked. As mobile platforms mature, more apps are appearing that utilize mobile tools' full capabilities and allow researchers and respondents to integrated images, videos, and voice responses. Capturing multimodal feedback at the point of service is a tremendous benefit over conventional techniques. It should be noted that most survey apps require an account with a web-based survey company in order to be fully functional.

An excellent example of this type of app is TouchPoint Mobile (<http://www.opinionmeter.com/products/touchpoint-ipad-iphone>). It allows surveys that mix traditional questions with open-ended questions, which permit audio, video, picture, or text responses. In customer service measures, TouchPoint Mobile can also be configured to send text notifications if low satisfaction responses are returned. Gathered data can also be tagged with GPS coordinates. Surveys that take advantage of the new capabilities of handheld devices allow a powerful combination of qualitative and quantitative data to be gathered.

Conclusion

Mobile devices with well-chosen applications can gather qualitative data through media recordings and drawings as well as quantitative data through counters, environmental meters, and surveys. It is clear that smartphones and tablets are developing into more than just basic communication and media consumption devices. Whether

considering a quick, informal assessment project or planning a formal, long-term venture, mobile data gathering offers access to a multiplicity of tools and streamlines data management in ways previously impossible. Hopefully, librarians will be inspired by the possibilities and harness these tools to gather user data, improving library services and resources.

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