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Introduction

By now, most of us are aware of QR codes, two-dimensional codes that can be read by a QR reader on a camera-equipped mobile device (cell phone, tablet, or iPod touch). These codes are useful due to their ability to represent alpha *and* numeric data. Similar to bar codes, which represent a series of numbers, QR codes represent text that is then used by the mobile device for performing an action. Codes can be created to link directly to a URL, create a vCard (saved to the mobile device), or initiate a phone call, txt, or e-mail, among other functions. Because QR codes can represent so much data (up to 7,089 characters) the potential uses are varied.

QR codes, used mostly to provide a link to content on the Internet, are increasingly seen in many locations (toothpaste tubes, advertisements, UPS packages, etc.) and formats (print, video, magazine, etc.). Though the most common use of the codes is for Internet linking, the codes are also used for simply saving information (e.g. phone number, address, call number) to a mobile device. Regardless of the function of the code, text is decoded by the device at which point the user decides how to use that text (open a link or save). Mobile devices need not be connected to the internet to save the textual information, but an Internet connection is required to follow a link to connect to web-based content.

This article will contain a small sampling of current QR code implementations as well as a summary of what has been to encourage student engagement with the library through the use of QR codes at the Harold B. Lee Library at Brigham Young University.

Student engagement in the library

Over the last two decades students have been increasingly drawn into a world of immediate, online access to information and social connections. More recently we have seen the almost ubiquitous mobile access to information. While becoming more involved with the virtual world of information, students have become less connected to physical libraries and the information provided therein, instead preferring online access.

To encourage more use of the library space, and to increase student engagement with information, many institutions have created high-tech spaces in an attempt to draw students into the library. These spaces are often called "Commons" (Information Commons, Learning Commons, Knowledge Commons, etc.) harkening to the time of a commons as a gathering place for social and economic benefit. While these library spaces have garnered support from students and faculty, they have simply provided another space for student study and work. In fact, as I look out on our commons I see students looking at Facebook, reading e-mail, watching the latest episode of their favorite TV show or chatting with friends online and/or in person.

As librarians we need to adjust our philosophy of librarian as guardian and disseminator of information. The Internet has permanently changed the role of the librarians. Students want to feel connected to and involved with the information; they are more social now than ever before. We need to encourage this type of interaction between information the library provides and the users. QR codes are a means of encouraging this type of interaction.

QR code use in libraries
The flexible nature of QR codes allows for myriad applications. Many institutions have already implemented QR codes for services to users; services that encourage engagement with the library. Many of the examples described here are listed on the "QR Codes" page of the "Library Success: A Best Practices Wiki" (http://www.libsuccess.org/index.php?title=QR_Codes). Of the examples I reviewed, the most useful and successful implementations are those which provide some value-added service for the users. This means that using the QR code is better or easier than using the existing service, or providing a service that is uniquely useful via QR codes.

For example, while teaching a First-Year writing class, I saw a student use her cell phone to take a photo of the computer monitor displaying the call number and location of an item in the library she wanted to locate. There is a better way to do this. At Ryerson University and the University of Huddersfield QR codes are dynamically generated and displayed among the details page of every item in the catalog. The QR code, when scanned, saves the call number, title, author and location to the mobile device for later use. Having the information saved directly to the mobile device removes the possibility of the photo or written note not being clear or complete enough to use when looking for the book in the library. This will become even more useful if indoor location-aware services become a reality.

There are many examples of using QR codes for marketing and promotions in the library: they are used on posters (Marathon County Public Library), bookmarks (Syracuse University), range end signs linking to subject guides (Half Hollow Hills Community Library), and even at the Denver International airport, as reported by David Lee King (http://www.davidleeking.com/2011/03/07/give-away-some-ebooks/), connecting to "'free' out-of-print classics" (1st Bank). Similarly, Contra Costa County Library, as part of their "Snap & Go Project" (http://guides.ccclib.org/content.php?pid=105914&sid=797175#4774453), displays QR codes on public transportation providing links to books for commuters.

Other libraries use QR codes to provide links to library tours. Ryerson University Library and the University of Bath provide a MP3 download through a QR code, while the Mudd Library at Lawrence University provides a QR code linking to the virtual tour.

Trying to summarize all current QR code implementations is not possible. Therefore, I recommend consulting the Library Success wiki and searching out articles for other example QR code implementations. Most of what I found when searching the academic databases for published articles referenced using QR codes in the industry of inventory management. Though not specific to libraries, some of those uses can be adapted and applied to library services.

Our Implementations

The Harold B. Lee Library (HBLL) at Brigham Young University (BYU) uses QR codes to enhance the library experience of the students by providing interactivity and flexibility. QR codes are being used as an additional format for marketing materials, taking the library audio tour, and for reserving Group Study Rooms.

The audio tour, developed for the First-Year writing courses, consists of 21 QR codes spread throughout the 665,000 square foot building, and located in areas about which the students need to know to pass the post-tour quiz. Using the audio from the existing audio tour, which provided a linear tour of the library, the audio for the tour using QR codes uses no directional content and instead relies on a map to show the locations of all the codes in the library. Students interact by scanning the QR code (see Figure 1) to get the audio and are allowed the flexibility of visiting the areas in any order. As long as each code is visited, the necessary information will be heard and hopefully learned. (insert Figure 1 here)

One of the issues we had to overcome was the need to track the QR code usage. In order to verify the usefulness of the codes we wanted to show how often the codes were being used.

The way QR codes were implemented for the audio tour was to direct the student to the audio track when the code is scanned. The audio is in the MP3 format which provides no way to gather statistics. There are commercial products that provide a way to track usage, some even free, but recognizing the volatility of the mobile market (i.e. how long would the service continue?), we created a work-around to track the usage. Instead of linking directly to the MP3 file, the QR code links to a HTML page that has two important pieces of code. The first is code for Omniture, web analytics software, which tracks page usage. The second piece of code is a redirect that points to the MP3 file. This process is transparent to the students.

The second implementation of QR codes at the HBLL is the reservation of the 47 Group Study Rooms (GSR) in the library. Reservations can be made using the online system (http://groupstudy.lib.byu.edu/) or through the mobile site (http://lib.byu.edu/m/). If, however, a student is by a room and wants to make a reservation at that moment, finding a computer or trying to navigate the mobile site to the specific room is more difficult than scanning a QR code. Each GSR has a QR code (see Figure 2) located under the room number linking to a reservation page allowing the student to reserve that room, if available. The page also provides options if the room is already reserved: reserve that GSR for another time, or another GSR in the library. Setting up a system to gather statistics for the GSR system was easier to accomplish. Each code links to a web page for the specific room, those pages each have Omniture code for tracking the usage. (insert Figure 2 here)

Issues With Implementation

As QR codes were being implemented in the library a variety of issues became apparent. First was determining the location of the QR codes for the audio tour. Finding the best location to place the codes was, and still is, difficult. Despite having a map of the locations, we received feedback from the students that some of them were not easily found. With this feedback we have adjusted placements in hope that the codes are more easily found.

QR code production and design were also addressed. The first codes produced were simply printed black-on-white and mounted on black foam core before being placed (see Figure 1). While creating the codes is not difficult, making so many was time consuming. Between the two projects (audio tour and GSR) there were a total of 68 QR codes that needed to be created, printed and then placed.

By the time we began the process for the GSR project we had learned some things about designing QR codes. An article by Hamilton Chan for Mashable (http://mashable.com/2011/04/18/qr-code-design-tips/), about designing QR codes that are more visually appealing, gave great insight into options for customizing the codes. Figure 2 shows the code developed for the GSR project. Notice the color of the QR code and the image in the middle. Customizing the codes is another way to form a connection with the students and encourage engagement.

With only 14% of students on the BYU campus who own smart phones (Unpublished BYU Academic Technologies Report, 2010), providing this technology seemed a little ahead of the time. However, smart phone ownership is increasing continually, and with the introduction of the new iPod Touch (which also has a camera) toward the end of 2010, the potential for more users increased dramatically.

Having access to the hardware is only one of the issues we face. Another, perhaps more important issue is that of education. Most library users are still unfamiliar with QR codes and how to use them. This presents a need for continual education efforts in the library. To this end a subject guide was developed (http://lib.byu.edu/sites/qrcodes/) which contains information about QR codes, how to find a reader for a mobile device, and specific details about the HBLL implementations (audio tour and GSR).

Conclusion

In our struggles as librarians to disseminate information and to engage with a generation of mobile, social and always-connected students, QR codes have tremendous potential. Using this technology provides an opportunity to not only facilitate library tasks but also to form a connection with this generation.

When developing and implementing QR codes in the library, consider the following keys to success we used in the development of our QR code projects. Remember that keys to success for using QR codes will vary for each institution.

- Use the codes only when the implementation will add value to the experience of the user. Using QR codes for the sake of the technology is seldom a good reason.
- Modify the codes with colors or images to be customized to your institution.
- Provide as much education as you can about QR codes, including how to use them and how to install a reader. Simply using the codes effectively is a great marketing tool.

- Start with temporary signs and move to more permanent signs as the implementation becomes more permanent.
- Experiment and be creative with different uses to find those that work better. This requires that usage of the codes be tracked.
- Codes are cheap and easy to produce. Adapt existing codes to how they are used.
- Just because one implementation is not used does not mean that QR codes are not worthwhile or effective. Try another project until you find implementations that work well in your environment.
- Have fun with the codes and broaden the possibilities of how to use the codes to help students engage with the library and content provided.

Figure 1

Figure 2