
The implementation of embedded quick response codes into library resources to improve service delivery

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In late 2010, the Claude Moore Health Sciences Library (CMHSL) launched an experimental implementation of quick response (QR) codes with the goal of determining whether certain services could be delivered more efficiently with this method. A QR code is a "specific matrix barcode (or two-dimensional code) that is readable by dedicated QR barcode readers and camera telephones. The code consists of black modules arranged in a square pattern on a white background. The information encoded may be text, [uniform resource locator] URL, or other data" [1]. Dating back to 1994 when they were created by Japan's Denso-Wave Corporation [2], QR codes have not only migrated into everyday life in many parts of Asia, but global use in advertising is experiencing exponential growth [3]. The 2009 Horizon Report classified QR codes as a key trend in the four-to-five-year category, specifically citing education as a primary area of use [4]. Some libraries, such as the library at the University of Bath, were avid adopters of the technology and utilized QR codes in the library catalog, making it possible to save information about a book in order to locate it on the shelf and to link students to an MP3 audio tour of the library [5]. Ramsden and Jordan write that, despite owning smart phones with the capability to read QR codes, student awareness of the technology remains very low. However, they point out that the potential for the technology to emerge further into student awareness is encouraging [5]. CMHSL believed that younger people would have the most familiarity with QR codes, with students being a prime demographic, and this supposition is supported by a survey conducted by the University of Bath across four different universities [6].

METHODS

CMHSL followed the increasing adoption of QR codes with interest and, in December 2010, issued an invitation to all library employees with the goal of establishing a committee to investigate usage possibilities. The committee benefited from the participation of a cross-section of staff and included liaison librarians from the information services department,

the associate director for information services, the manager for technology in education, the library's webmaster, staff members from the public services desk and technology in education, and the emerging technology librarian.

The first committee meeting involved demonstrating how QR codes are created and how they work, showing some examples of how they are used in both libraries and health systems, and some specific suggestions for how QR codes could be used to better serve the library's patrons. CMHSL's mission statement (which includes the statement, "We believe that knowledge should be independent of time and location" [7]) was a reminder of the library's purpose, and QR codes—with their instantaneous, anytime/anywhere nature—seemed a natural fit. However, the defining question for the committee was whether the chosen content could ultimately be successfully delivered on a mobile device.

Several factors played a role in the committee's ultimate decision to pursue integrating QR codes into the library. The stability of the technology was one: QR codes have functioned in the same way for the entirety of their 17-year history and were even approved as an International Organization for Standardization standard in June 2000 [8], bringing an amount of international acceptance to the technology. The technology's growing use in the United States was another factor (scanning of codes rose 700% globally, with the United States taking first place of the top 10 countries [9]), as was the growth of smart phone adoption: The Horizon Report states that computers will be outnumbered by smart phones within the next year, and the Nielsen Company estimates that 1 in 2 Americans will own a smart phone by December 2011 [4, 10]. Adoption rates among CMHSL's population were much higher than 50%, making an investment of time and resources practical. The committee also factored in the success that other libraries experienced [11, 12], feeling that, while those libraries' patrons might have had different needs, there was enough commonality to move forward with an expectation of similar success. The final factor in the committee's decision to move forward was its ability to rapidly identify several user needs that could be addressed by this particular technology.

With the decision made, the committee began work in December 2010 by outlining specific project phases:

- Identify at least two uses for QR codes that would solve a problem or streamline a service in the library.
- Choose the best QR code generator and reader so that the library could make official recommendations to patrons.
- Educate library staff about QR codes and keep them informed about how the codes would be used in the library.
- Integrate the codes, while simultaneously educating patrons about their use.

Creating the codes proved a simple matter: After testing several different code generators, the committee chose Kaywa [13] for its ease of use and reliability.

It was then a trial-and-error process to discover the optimal size for the codes. Ultimately, the process became this: create the code, save as "large," then size the code down to 70×70 pixels, and place it on the web page. The committee found resources on QR code size standards [2, 8] but discovered through repeated testing that these dimensions worked best for the web page.

Pleased with the appearance of the QR codes, the committee determined in April 2011 that more functionality was required: namely, it was important to gather statistical data. To that end, it was decided to regenerate all of the QR codes and direct the URLs through bitly [14]. For registered users, bitly automatically tracks usage by logging the number of times an individual link is visited. When originally creating codes, it was discovered that both Android Market and Blackberry's AppWorld supply QR codes for their applications, but the committee was unable to use the ready-made codes once the decision was made to redirect through bitly. The main drawback to using a free bitly account is that only one month's usage data are saved. Although a bitly Enterprise account would have given the committee that information, it was cost prohibitive.

Over the course of several months, the committee identified and implemented five uses for QR codes in the library:

- Link patrons directly to mobile resources, such as apps.
- Propel patrons into a chat session with the roving technology support team.
- Connect patrons to mobile-optimized instructions for a circulating projector.
- Provide contact information for both individuals and the library.
- Connect patrons to more information about the various pieces of artwork that are housed in the library.

Mobile pages

Among the most valuable and most often used resources that the library offers its patrons is the Mobile Resources page. This page is divided by operating system—Android, Apple, and Blackberry—and links to useful medical software. This page is particularly useful to University of Virginia's third-year medical students, because they are required to purchase a mobile device. The Mobile Resources page was an obvious choice for incorporating QR codes, because it would allow patrons to eliminate several steps in their acquisition of an app. The pages were designed to contain the name of each resource (e.g., Epocrates), the link to the download page (the App Store, etc.), and a description of each resource. In this way, patrons without reader software were still able to access the apps, but those with reader software could simply scan the code with their mobile device and go directly to the app for immediate installation.

Chat

Two physical service desks in the library, the reference desk and the technology support desk, were eliminated several years ago and replaced with on-call services. The technology support service is called Rover [15], and patrons are encouraged to request help by either calling the number provided or sending an instant message via a web page or on their mobile device. The committee realized that utilizing a QR code to launch a chat session would make it easier for patrons to reach Rover via chat, as it would eliminate the need to log on to a computer, locate the Rover chat icon, and launch the session. The process of creating the QR code that launches the chat session involved pointing toward the mobile Rover chat link and then, because there is an @ symbol in that URL that causes Kaywa to malfunction due to reading it as an email address, putting it through bitly and creating the QR code from that link. Once the code was created, signage providing contact information for Rover was edited to include the QR code.

Circulating equipment

One idea about which the committee was enthusiastic from the very beginning was that of placing QR codes on the library's circulating equipment. Patrons have access to iPads, laptop computers, and more, and the service desk often receives questions regarding this equipment, with the most common being how to connect a portable projector to a laptop. The technology in education consulting committee member, with some help from the webmaster, worked with the service desk member to create an elegant piece of instruction that is linked from the library's mobile website. Once that instructional page was created, it was a simple matter to create a QR code containing the link to the instructions, print it, and attach the code to the projector.

Contact information

The QR code use that inspired no debate whatsoever was the one that provided contact information: The committee unanimously agreed that utilizing the codes in this way made perfect sense. As Kaywa did not have the ability to generate QR codes for contact information, the team turned to ZXing [16] for that purpose. ZXing prompts the user to fill out a form listing details such as name, title, telephone and fax numbers, email, and so on, and then generates the code. When scanned, a pop-up window with all of the information supplied on the form appears, and two options are given: save to contacts or call. Many librarians added their contact codes (Figure 1) to their portal pages, and a contact code was created for the physical library and added to the footer of each page of the library's website. A request that the librarians be allowed to add their contact QR codes to their new business cards has been submitted to the health

Figure 1

An example of a quick response (QR) code containing contact information



system's marketing department, but as of this writing, the committee has not yet received approval.

Library art

The final way that the committee decided to utilize QR codes relates to the many paintings that hang in the library. Due to space concerns, the library is unable to provide detailed information on the paintings themselves, their backgrounds, or the artists who created them. QR codes offer a "green" solution for the library to provide that information to interested patrons, eliminating the need for printed brochures or signs.

Education and promotion

Throughout the process of implementing the QR codes, the committee spearheaded education and "soft" advertising efforts. A QR code "What is this?" sign was placed at the library's entrance, and similar advertisements were added to the digital display in the lobby and on the library's website. Articles were included in the library's newsletter that is pushed to over 1,500 subscribers. The emerging technology librarian offered informational classes on QR codes for both library staff and all members of the health system.

RESULTS

One of the main goals of this project was to test the use of QR codes in a medical library environment, and because they were the most heavily accessed of the digital spaces where codes were placed, the Mobile Resources pages were chosen as the focus of the data collection effort. Though the codes were placed on those pages in February 2011, it was not until April 2011 that the library was able to gather data. During that one-month period, the codes were scanned a combined total of approximately 50 times. The Mobile Resources pages were visited 205 times during this same period. While these numbers suggest that the QR codes are being utilized, more data are needed to monitor use over time to determine future directions. The library assumes that, mirroring broader adoption trends, overall use will increase. In addition, the Mobile Resources pages experience heavier traffic during specific points in the curriculum. The library will use these points as opportunities to emphasize the codes.

Encouraged by both positive anecdotal evidence and the limited statistical data provided from bitly, the library made the decision to maintain use of QR codes. To encourage use, the library will continue to offer educational opportunities including classes and pointing out the codes in the physical space during tours.

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