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Abstract

QR (quick response) codes are two dimensional images that when scanned by a smart phone's camera, prompt the smart phone to open a web-page or display an image, video, or text. QR codes are, therefore, essentially pictographic hyperlinks that can be embedded in the physical environment. This technology has the potential to revolutionize the way libraries deliver instruction, connect patrons to information about library materials, and market their services. Although use of QR codes has not yet become prominent in Kansas communities, there are several reasons to believe that it soon will be. These reasons include burgeoning popularity of QR codes on the coasts, rapid increases in smart phone use in our communities, and expected enhancements in cellular data capacity in much of Kansas. By implementing QR codes now, academic libraries in Kansas can help expedite the adoption of this exciting technology and can concomitantly enhance their reputations as user-centered, innovative, sites for discovery and exploration. In this paper I describe how individuals with smart phones can download free QR code reading applications and use their phone’s camera to read the code; show several examples of creative ways libraries and other organizations are using QR codes to provide rich, point-of-need information to patrons, customers, and prospective user; describe in detail the process of creating QR codes and distributing them throughout physical and online environments; and highlight some of the recent literature discussing the relevance of QR codes for libraries and for education in general.

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QR Codes: What Are They and Why Should You Care?

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Abstract

QR (quick response) codes are two dimensional images that when scanned by a smart phone's camera, prompt the smart phone to open a web-page or display an image, video, or text. QR codes are, therefore, essentially pictographic hyperlinks that can be embedded in the physical environment. This technology has the potential to revolutionize the way libraries deliver instruction, connect patrons to information about library materials, and market their services. Although use of QR codes has not yet become prominent in Kansas communities, there are several reasons to believe that it soon will be. These reasons include burgeoning popularity of QR codes on the coasts, rapid increases in smart phone use in our communities, and expected enhancements in cellular data capacity in much of Kansas. By implementing QR codes now, academic libraries in Kansas can help expedite the adoption of this exciting technology and can concomitantly enhance their reputations as user-centered, innovative, sites for discovery and exploration. In this paper I describe how individuals with smart phones can download free QR code reading applications and use their phone's camera to read the code; show several examples of creative ways libraries and other organizations are using QR codes to provide rich, point-of-need information to patrons, customers, and prospective user; describe in detail the process of creating QR codes and distributing them throughout physical and online environments; and highlight some of the recent literature discussing the relevance of QR codes for libraries and for education in general.

Libraries have shown tremendous creativity in their approaches to providing patrons with just-in-time, point-of-need assistance in both their virtual and physical spaces. Their websites may include context sensitive help links, easily accessible faqs, site indices, navigational menus, search boxes, embedded widgets providing access to live help, and other features intended to enable quick access to pertinent information. Their buildings might include a panoply of signs, labels, instructional documents, informational kiosks, maps, help desks, phones, roving staff, or even video chat stations facilitating ready access to a live person (Booth, 2008). In the virtual environment a skilled web designer can incorporate help features seamlessly to afford ubiquitous access to assistance without compromising the site's usability or aesthetic appeal. In contrast, a visit to nearly any library's physical space reveals that the desire to connect patrons to whatever information they may need wherever they are creates a profusion of "stuff" that is confusing, unsightly, and expensive. Happily, there is a relatively new technology that could be used to affordably connect patrons to context-sensitive help without visually assaulting them: the QR code.

The Nuts and Bolts of QR Codes

QR codes were invented by the company Denso Wave, a subsidiary of Toyota, and released to the public in 1994 (Denso Wave, n.d.a). They are square, two-dimensional codes containing information in both the horizontal and vertical directions (Denso Wave, n.d.a). QR codes vary in data carrying and error-correction capacity with the largest and least damage resistant able to encode up to 4,296 alphanumeric characters (Denso Wave, n.d.b).

Denso Wave has chosen not to exercise its patent rights (Denso Wave, n.d.c). This has led to the development of an international standard outlining QR code requirements (ISO/IEC 18004:2006). Because the specification is open, developers are free to create new varieties of QR codes as well as applications to interpret and process them. As a consequence, a given QR code may or may not be readable by a given QR scanner.

How to Create QR Codes

If one uses one of the many free, online QR generators, the process of creating ready-to-use QR codes becomes extremely fast and simple. The general steps involved are:

1. Navigate to a specific QR code generator or use your favorite search engine to find one (a search for QR code generator will return several). The website 2d-code has an annotated list of recommended generators (2d code, n.d.).
2. Select the type of data you want the QR code to encode. Typical options include a url, a phone number, an e-mail address, plain text, or an SMS message. Less common options include business card data, calendar event information, Google Maps location, wifi network keys, and communications with social media applications (e.g., status updates for Facebook).
3. Type or paste in the data requested by the generator. The nature and types of fields will vary according to the type of QR code you selected in step 2. Some generators provide additional customization choices such as selecting the size of the image, modifying the background color, or adding an image to the code.
4. Generate the QR code. Typically this is accomplished by clicking a button. Some generators automatically produce the QR code once all the required information has been entered.

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My favorite QR code generator is the one provided by the site, QR Stuff at http://www.qrstuff.com/. I like it because it can create several types of QR codes and because its QR Code preview window automatically updates as you type in the content fields. Figure 1 shows what I entered there to create a QR code that will send me an SMS message starting with "Hi Jason. I'm outside your office. Where are you?"

Figure 1. QR Stuff's QR code generator.

How to Deploy QR Codes

After generating a QR code, the next step is to display it in places where individuals might want to use it and to do so in a manner that will make it easy for them to scan it. Almost all QR code generators allow saving generated images to a local storage device. Some will show html code targeting a copy of the image they save at a permalink. There are also a few companies whose QR code generators will affix codes to t-shirts, mugs, tote bags, caps, and other products purchased from them.

There are several practical matters one must consider when deploying QR codes. First, to be read properly by scanners, the data matrix of a QR code must be surrounded on all four sides by a blank margin (Denso Wave, n.d.d). Most QR code generators include this margin in the images they generate. When editing images or placing them near text or other images, it is crucial that nothing intrude onto this margin. It is, therefore, not possible to abut several QR codes next to one another.

A second consideration is the density of data elements in the image. The greater the density, the less likely it is that low resolution scanners (e.g., the majority on cell phones) will be able to resolve the QR code. In theory, it is possible for cell phone scanner applications to resolve QR codes with individual modules (the dots comprising the code) less than 0.5 mm wide (Denso Wave, n.d.e). In practice, however, it is best to scale the QR code to produce modules much larger than that. I recommend a minimum module width of 1 mm. At that resolution a typical QR code for a short url (e.g., http://www.lib.ksu.edu) would require a square 4.1 cm x 4.1 cm.
Four final considerations are focus, contrast, shape, and orientation. QR codes containing modules with blurred edges will be difficult to resolve. The same is true with QR codes that have low contrast between the modules and the background. QR codes must have a square shape. Interestingly, though, they can be presented and scanned from any orientation. It is even possible to scan codes that have been affixed to a slightly curvilinear surface such as a coffee cup or the back of a person's head (see figure 2)

Figure 2. A QR code tattoo linking to a Facebook profile. Source: QR Stuff.com http://www.qrstuff.com/qr_code_examples.html

How to Consume QR Codes

Although QR codes can be produced merely as decoration or art, the vast majority are intended to be decoded. That process requires the use of a QR scanner. There are several types of commercial QR scanners including hi-resolution, dedicated devices and handheld scanners. Fortunately for libraries and others interested in interacting with the public, the ubiquitous cell phone can function as a QR scanner, provided that it has a camera and has software that can decode QR codes.

There is a high probability that any QR code one encounters online or in print was produced with the expectation that it would be decoded by a cell phone. QR codes intended for such consumption include FNC-1 application identifiers that enable QR reader software to determine which application to open to process the encoded data (QR Stuff, n.d.). A cell phone that lacks the required application may be able to display the contents of the QR code (e.g., a url), but will not be able to process it.

Due to the burgeoning popularity of QR codes, many cell phone models now come with a pre-loaded QR reader. Most phones that do not have a pre-loaded QR reader can be equipped with one (or many) at little to no cost. The exact process for finding and adding QR reading software to a phone varies depending on cell phone model and data provider. Each of the major cell phone application markets has several QR readers. A cell phone user who does not have access to an app market may be able to find a QR reader online and export it to his or her phone. The site Mobile barcodes.com includes a page listing which QR readers are available for a given cell phone model: http://www.mobile-barcodes.com/qr-code-software/. Smart phone users can find compatible QR readers by using their phone to visit http://percentmobile.com/getqr.

The actual process of scanning a code with a cell phone is straightforward. The first step is to invoke one of the phone's QR readers. When launched, the phone's camera becomes a QR code scanner. The

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second step is to bring the entire QR code into focus within the camera's view finder. For best results, allow the image to take up as much of the view as possible. Once the QR code is adequately focused, most QR readers will automatically decode the code. Some will also automatically launch an appropriate helper application (e.g., a web-browser for a url) and process the code. Others will give display the code and prompt the user to choose whether or not to launch an application. Conveniently, a number of QR readers store QR codes, enabling a user to revisit them at any time.

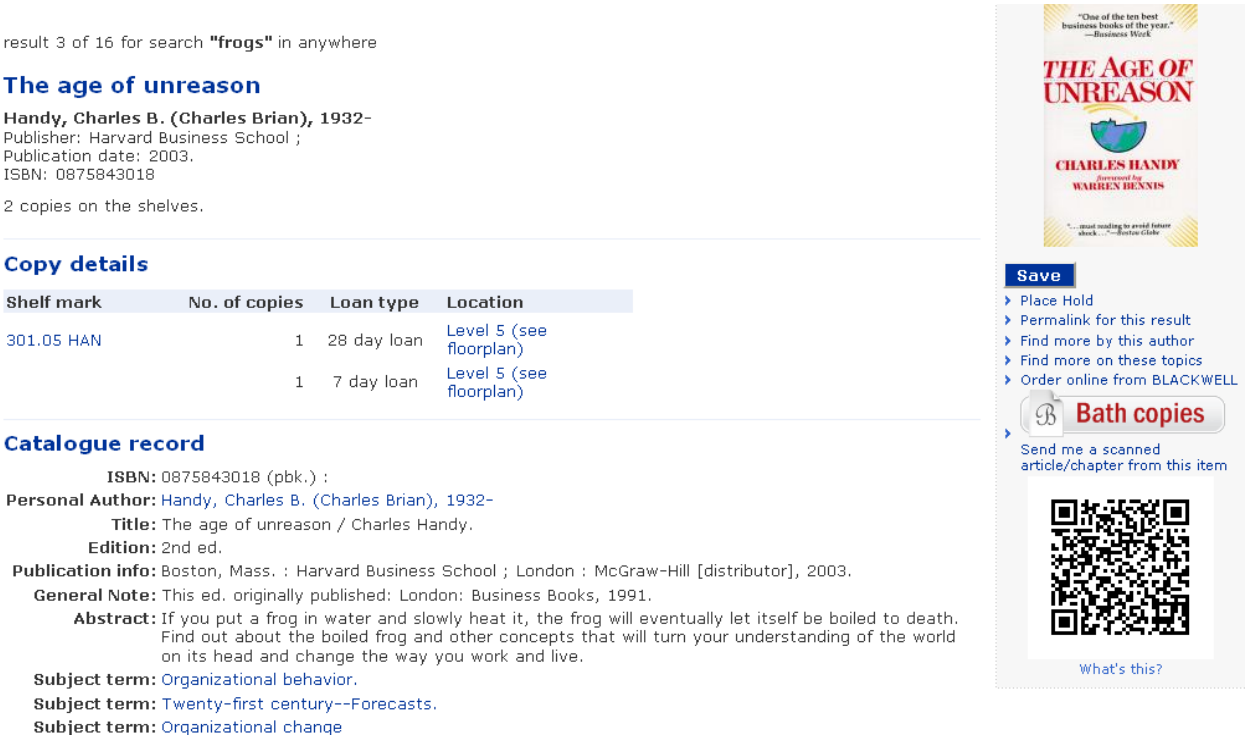
QR Code Applications

QR codes are common in China, Hong Kong, Japan, Korea, and Taiwan (Liao and Lee, 2010). QR codes are not nearly as common outside of east Asia, but they are gaining popularity (Walsh, A., 2009). A perusal of videos retrieved by a search of YouTube for the query "QR codes" photos at Flickr's QR group, http://www.flickr.com/groups/qrcodes, shows that they are being used for a wide variety of purposes. Companies are placing them on billboards to facilitate rapid online purchasing, on food and beverage containers to provide access to nutritional information (or coupons or games), on movie posters to publicize trailers, in print media to encourage visits to websites, on products to provide ready access to user manuals or instructional videos, on storefronts to link to reviews or menus, and on for sale signs to link to video tours or testimonials. Museums are placing them near displays to provide users with easy access to audio tours.

Individuals are placing them on business cards or name tags to provide people they meet with a fast way to add their contact details to their phone's address book. Conference bloggers are placing them on bulletin boards to help attendees find their blogs. They are being placed near buildings to help visitors find maps of the building or to help them learn about the building's history. They are facilitating scavenger hunts and historical tours. They are even being used to augment ice-breakers.

Library Uses

A few libraries have launched ambitious efforts to incorporate QR codes into their online and physical spaces. San Diego State University, The University of Huddersfield, and The University of Bath (see Figure 3) have added QR codes to catalog records. When a user scans the code displayed on a computer screen, his or her cell phone displays the bibliographic details for the item as well as its location and call number. The University of Huddersfield has also placed QR codes near physical books to link patrons to online versions of the content, near individual periodical titles to link to online holdings, at the entrances to library floors to provide access to a video tour of that floor, on shelf ends near hard to use collections to connect users to instructional videos, on signs near equipment to automatically connect users to tech support, near computer terminals to link users to their "Text a Librarian" service, and near equipment to link patrons to step-by-step instructions (Walsh, 2010). San Diego State University has placed them on staff directory pages to enable users to quickly add contact details to their phone's address book. They have also placed them on non-mobile versions of class research guides to link to the mobile version. A number of other library uses are documented on the QR Codes page of the Library Success wiki: http://www.libsuccess.org/index.php?title=QR_Codes. Many of the listed examples include hyperlinks to photos or live examples.


result 3 of 16 for search **"frogs"** in anywhere

The age of unreason

Handy, Charles B. (Charles Brian), 1932-
Publisher: Harvard Business School ;
Publication date: 2003.
ISBN: 0875843018

2 copies on the shelves.

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Subject term: Twenty-first century--Forecasts.
Subject term: Organizational change

Figure 3. QR code in the University of Bath's Library Catalogue

Should We Care?

Andrew Walsh, the key architect of the University of Huddersfield Library's QR code initiatives provided the opening keynote at this summer's Reference Renaissance conference. Josh Hadro (2010) notes that the reaction to his ideas about QR codes was decidedly mixed, and relates that one attendee tweeted that they are a gimmick. This view was supported in some of the comments to his online article. Others, including Walsh himself (Walsh, 2010) have described dismay over college students' lack of familiarity with QR codes. He found that despite a concerted publicity effort and wide-spread deployment in his library, very few patrons endeavored to access the QR codes.

While QR codes may not yet have captured the interest and attention of the general public, there are a number of reasons to believe that they may soon do so. First, the fact that this has happened in Japan and other Asian countries demonstrates that QR codes have this capacity. Second, recent articles in high profile publications (e.g., Ashford, 2010, Educause Learning Initiative, 2009) and in the blogosphere have expressed great enthusiasm for the ability of QR codes to benefit learners. This publicity may lead to rapid diffusion of information about QR codes among educators. That in turn would likely lead to even more experiments and efforts to share best practices. Third, the EPA is considering incorporating QR codes into fuel economy window decals as early as 2012 (Environmental Protection Agency, 2010). This government endorsement could lend QR codes new credibility. Fourth, and perhaps most significantly, QR codes have begun appearing in ads in mainstream publications (e.g., page 8B of the Nov. 12, 2010 issue of USA Today, and page 57 of the Oct. 11, 2010 issue of Time Magazine). If this practice continues,

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countless cell phone users may take the plunge and begin experimenting with QR code readers to discover what the QR code phenomenon is all about.

As with any tool, the extent to which QR codes are adopted will depend primarily on whether they enable users to accomplish tasks more easily and effectively. If libraries deploy QR codes to fill imagined, rather than real needs, or if they use QR codes primarily as a gimmick to entice web-page views, users are likely to lose interest. On the other hand, if they are used in ways that help users accomplish vital tasks more efficiently (e.g., as a quick substitute for recording location and call number), make informed choices (e.g., links to book or movie trailers), or learn interesting information at their own pace (e.g., codes linking to audio tours) it is likely that a small wave of early adopters will convince others of the utility of all the funny squares popping up in just the right places.

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