DEPLOYING QUICK RESPONSE (QR) CODES IN LIBRARIES

ESOSWO FRANCISCA OGBOMO (Ph.D)

SENIOR LECTURER

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

DELTA STATE UNIVERSITY, P.M.B. 1,

ABRAKA, DELTA STATE, NIGERIA.

Abstract

The purpose of the study is to explore how deployment of quick response code (QR) codes in libraries. Mobile phones, are becoming ubiquitous in modern society. One way that mobile phone users are able to access information is through the use of quick response (QR) codes. With the advent of smart and Web capable mobile devices, there have been steady growths in commercial and business oriented usage of QR codes. QR codes have been incorporated into public, academic, special and school library settings. Its features include high reading speed, data storage and transfer, 360 degree readability, resistance to contamination and defects. Some of the ways QR codes can be actively used in libraries is to promote optimum use of the library resources and services. Adoption of the QR code in library will help to improve library services for users and will enhance the reputation of library and information services as well as that of the information professionals (librarians) thereby, helping them to market their product and services through the use of smartphone or mobile devices which will likely help the library patrons to find value in QR codes.

Key Words

Smart Phones,QR Codes, Bar Codes, Libraries, Mobile apps, Internet

Introduction

The number of students who own a mobile device is increasing each year. According to Educause Center for Analysis and Research (2010) as cited by Sinkinson and Stoeckel(2011),"62.7%of students currently own a mobile device that can connect to the Internet, with another 11% planning on purchasing such a device" (p.2). According to Duggan (2012) 85% of American adults own a mobile phone. Also, Rainie (2012) noted that 45% of all American adults own a smartphone. Furthermore, adults are not just using mobile phones for voice calls and texts but also perform data-related activities for quick information retrieval (Smith, 2010; Smith, 2011). It therefore implies that wireless technologies, and more specifically mobile phones, are becoming ubiquitous in modern society. One way that mobile phone users are able to access data quickly is through the use of quick response (QR) codes.

With the advent of smart and Web capable mobile devices, there have been steady growths in commercial and business oriented usage of QR codes. Introduced in 1994 by the Japanese Company Denso Wave Incorporated, QR codes have been incorporated into public, academic, special, and school library settings (Ruillard, 2008, as cited by Hack & Kingsley, 2014). Modern libraries and its services are best placed to implement application using QR codes. These codes are capable to deliver required information to modern day library users and give them quick access to the information whenever and wherever they want (Shettar, 2016). Quick Response codes are two dimensional (2D) matrix barcodes that are scanned using exploitation sensible and web capable smart mobile phones having camera, allows one to access some pre-written content such as a web site address, email address, details of things

within the catalogue, phone numbers etc. (Shettar, 2016). It can hold a large amount of data and can be used anywhere. QR code is much faster coding method than other barcodes. Summarily, QR code can be defined as a two-dimensional machine-readable code in the form of information which can be scanned by a mobile device equipped by a QR code reader or generator and which can be displayed electronically or in printed formats.

The online catalogues of libraries can be replaced with QR code interfaces to meet the expectation of Mobile-Tech savvy (knowing a lot/proficient about technology) library users. This will enable the users to know more about the various library information resources and services. Smart phones can be used to scan the QR code of an information resource intended to be read as well as reviewing and rating other readers on publisher sites. Summer (2011) explained that freely available QR code generators(e.g., Kaywa, i-nigma, Nokia, Deliver, Microsoft Tag, BeQrious, Bee Tagg, and Bit.ly) take user supplied information, such as a web page, audio, video, text or a phone number, and create a QR code image which may be displayed electronically or in print. When the image is scanned by a mobile device camera, the encoded information prompts the device to perform an action, such as open a web browser, to dial a specified phone number, or to display text. Others are Bitly (https://bitly.com/), myQR..co (http://myqr.co/), and ZXing (http://zxing.appspot.com/).

> Based on the research carried out by Abdulrasheed and Gbaje (2014), presently, no library in Nigeria is applying or using QR code scanner for disseminating information services, except business organisations such as supermarkets and other individual business that are using it in advertising and marketing their goods and services(p.3).

History of QR Codes

At first, QR code was developed in 1994 by Denso Wave Corporation, one of the Toyota Company's branch in Japan (Walsh, 2009). Basically this coding system is developed for tracking of shipping, but later on, it is used from industrial assembly lines to marketing and also installed on the label, exhibits, business cards, flyers and so on in the countries like Japan, Korea, and Middle-East. But, this technology goes viral when Western and European countries adopted it and started using it in every sector like, news media, public announcement, government activities and so on. Robin (2010) opined that due to the near ubiquity of advanced mobile devices on many campuses, several industries and organizations have implemented QR codes in a variety of ways. For example, newspaper and magazine publishers utilize these codes to point readers to extended article information, while marketing professionals place them on signs or store windows promoting a particular product. Likewise, libraries are using this technology so far in this present age to represent their websites, advertisements, seminars, workshops, meetings and mostly for Uniform Resource Locators (URLs) (Rahaman, 2016). Robin (2010) further affirmed that QR codes can and have been adapted for library environments too. QR codes present the possibility of meeting library users where they are and with the information they need, whether they are off-campus researching or lost in the stacks. Furthermore, they offer a low cost marketing tool easily distributed in a variety of formats and locations.

Features of QR Codes

According to Farashband and Najafi (2013) QR codes have several features which make them ideal for use in organizations such as libraries and information centers. These features are:

1. QR Code is capable of storing hundred to thousand-fold of more information. Its features include high reading speed, data storage and transfer, 360 degree readability, resistance to contamination and defects and adding up to 16 symbols to the structure.

2. QR Code is readable from any direction across 360 degree (omni-directional). A QR code can be read from any direction in 360° through position detection patterns located at the three corners. QR code can be read even if it is somewhat distorted by either being tilted or on a curved surface by alignment or timing patterns. The error correction capability against dirt and damage can be up to 30%.
3. Smartphone compatibility. These codes are readable by and displayable to mobile phones.
4. Easy user access. The QR code could navigate users exactly to where they expect to go, such as a website or a phone number skipping the bother to type in or enter a wrong link or number.
5. Environment friendly. The environment impact is reduced by replacing magnetic card with recyclable plain paper.
6. Cost-efficiency. The cost of production and use of the codes in libraries is relatively low.
7. Versatility. The codes are available for different purposes such as printing, outdoor display and direct mail.
8. Independence of means. The codes are capable of being displayed on a variety of platforms and smart phones independent of models such as iOS and Android.
9. Measurement capability. The codes activities are traceable with web analytics

and other measuring tools.

10. Applicability on library cards. With these codes, one can direct others to his webpage or other websites such Twitter, Facebook, etc.

Other features according to Shettar (2016) are:

11. QR codes are capable of handling all data varieties, such as alpha-numeric, special characters, Kanji, Kana, Hiragana, binary and control codes.
12. QR Code has error correction capacity. Even dirty or broken image is repaired and a maximum of up to 30% code will be corrected.

QR Code Generators

There are numerous online QR code generators. Choosing the right one depends on many factors, including the type of code you want (i.e. information transfer or web linking), whether you want to track code usage, and how much you are willing to pay for creating QR codes (Hack & Kingsley, 2014). Shettar (2013) indicated that there are many QR code generators some of which include Kaywa (http://qrcode.kaywa.com/), GoQR.me (http://goqr.me), QRMobilize (http://qrmobilize.com), QR Code and 2D Code Generator by Kerem Erkan (http://keremerkan.net/qr-code-and-2d-code-generator/), QR Stuff (http://www.qrstuff.com), MyQR (http://myqr.co/), Quickmark (http://www.quickmark.com.tw/En/qrcode-datamatrix-generator/), BeQRious (http://www.beqrious.com/qrcode/create), Bosqweb (http://www.bosqweb.net/en/QRcode-generator) and QReate & Track (http://app.qreateandtrack.com/#/create/event).

Rahaman (2016) gave some names of websites through which one can generate QR code, and some mobile apps through which decoding of information can be done.

Websites

1. QR Code Generator–www.goqr.me/
2. BeeTagg- www.beetagg.com/
3. BeQRious-www.beqrious.com/qr-code-generator/
4. Google Chart- www.createqrcode.appspot.com/
5. Kaywa-www.qrcode.kaywa.com/
6. Neoreader - www.neoreader.com/
7. Nokia Barcode Reader-
8. http://mobilecodes.nokia.com/
9. QRStuff-www.qrstuff.com/
10. QRlicious-https://www.qrlicious.com/

Most QR code generators that allow tracking code usage are not free, nor do they allow easy tracking of informational QR codes. Hack and Kingsley (2014) indicated that in order to track usage, QR code must often generate a shortened URL that links to a webpage or other data source. This works well for QR codes linking to webpages, but it tends to defeat the purpose of informational QR codes. While it is possible to create informational QR codes with some of these systems, in actuality, the QR code links to a short URL that then opens a text file, vCard, or other online data source, which means that even informational QR codes require an Internet connection.

Mobile Apps

1. Barcode Scanner (Android)
2. i-Nigma(iPhone)
3. Norton Snap (iOS or Android)
4. QR Droid (Android)
5. QRReader(iPhone)
6. QRafter(iPad)

7. QRky (Android)
8. RedLaser(iPhone)
9. ZBar (iPhone)

Most of the modern day Smart mobile phones available in the market come with pre-installed

QR Code readers. However one can download the QR Reader software from various App Stores

(iOS, Android, Windows) and Desktop version from various online service providers.

Designing a QR Code

QR codes are 2-dimensional image sensor which is worked by some programmed processor. The three squares located in three corners using a smaller square are used to maintain the size, orientation, angle of viewing etc. of QR codes. The dots are used to represent the data by using binary digits through an error-correcting algorithm.

There are two types of QR codes; one is static QR code, which is a one-time job. Once this type of code is generated then, we can't change the code again. The second one is dynamic QR codes, which is editable. We can change the information according to the change of time and need.

A QR code can hold 7089 characters of numeric data, 4296 characters of alphanumeric data, 2953 character of binary data and 1817 Kanji (Chinese letter) character (Farashbandi, 2014). Murphy's (2012) study (as cited in Hack and Kingsley, 2014), noted that QR codes are considered a location-based technology because they link physical objects to digital information.

They may be classified into the categories of information transfer and linking to the web (Whitchurch, 2012, as cited by Hack & Kingsley, 2014). Whitchurch further noted that information transfer does not require Internet access. Upon scanning a QR code, text-based information such as phone numbers, event information and contact information is acquired from the QR code and displayed on the device. If the patron is within a cellphone or wireless signal, he/she may interact with the information received. Linking to the web requires Internet access. After scanning a QR code, an Internet connection is made. The information displayed to the user may include websites, videos, podcasts, or any other content available via the web.

Fig 1

Fig.2

Fig. 1& Fig. 2: Examples of a QR code for Plain Text and Phone number respectively.

There are various standards used for encoding data in QR code. Some of them are- Association for Automatic Identification and Mobility (AIM, 1972), Japanese Electronic Industry Development Association (JEIDA, 1998), Japanese Industrial Standards (JIS X 0590, 1999), Chinese National Standards (CNS, 2000), Korean National Standards (KNS, 2002), International Standard (ISO IEC 18004:2000, 2006 and 2015; Gupta, 2016). Decoding of QR codes may be done by online QR code decoders associated with any internet enabled good phone that has QR code Reader software package program pre-installed, If not the software may be downloaded from varied sites that are freely available on the Internet.

• Then pre-installed QR code reader decodes the QR code and displays content as text or uniform resource locator format. QR codes additionally prompt your mobile device to navigate to an internet page; or other actions such as like dial variety, send SMS, save reminders, save variety to Phone Book etc. Hack and Kingsley (2014) opined that the more data encoded, the denser the QR code will be. It is for this reason that some QR code generators create shortened URL. QR code can be resized but one should be very careful in resizing so as to retain the square and must be displayed with a white border and also remember to test it after resizing with varieties of devices in order to make sure that it's still working after resizing.

System Requirements For QR Code

According to Rahaman (2016), there are some hardware and software materials to run the QR code. These are:

1. A Computer- A computer is needed to open QR code generator websites to generate the code. It may be a PC or a laptop.
2. Marketing of Library products and services is essential to create the awareness amongst the library users because those who lack information may not even be aware of these products and services available in the library. QR codes can be used in order to promote information resources and events; create need for information; manage information explosion; create awareness; information dissemination; and connect with user community (Shettar, 2013).
3. A Local Area Network (LAN) or Network Connection- These are required to connect to the network for accessing the internet.
4. Creating Websites- One must be aware of the various websites that are capable of transmitting the information into a coded information.
5. Data- Data is the information which is to be encoded into the QR code.
6. Scanner/Decoder- A scanner or a decoder is required for decoding the coded information in QR code. An android mobile phone is the best example of a decoder.

7. Decoding Apps- QR code generator applications (APPs) is needed to be installed in the mobile phone to read and decode the information.

Planning and Implementing a QR Code in Libraries

Before one can scan a QR code, the mobile phone needs to have a QR code pre-installed otherwise download one from the mobile phone's application store. To scan a QR code, hold your mobile device in front of the or over the code. Your mobile device will recognize the symbol and either display information or direct you to the appropriate link (Winter, 2011, as cited by Hack & Kingsley, 2014). Waters (2012) noted that there are some malicious QR codes and so users especially those who own Androids should be careful when scanning QR codes. They should make sure they are familiar with the sources and that they are from trustworthy entities. Waters further indicated that to help patrons determine the legitimacy of a QR code, libraries should provide additional information about what the patrons should expect after scanning the code.

According to Hack and Kingsley (2014), the following are the steps to take when planning and implementing a QR code in libraries.

1. Set Goals: Consider the aim of implementing a QR code campaign.
2. Plan your Technology: Consider the software application you will use to create, maintain or track your QR code. According to Waters (2012), tools for creating QR codes should accommodate four common data types- URL, plain text, phone, and short message service (SMS). A decision on whether the code will be created by an individual or a team should be decided as well.
3. Select your Content: Select the resources you wish to promote and make sure they are accessible through mobile device. Some QR codes are not optimized and so there is the need to reformat content so that it can be displayed correctly on various mobile devices.

4. Know your Patrons: Not all patrons may be aware of QR code, its uses and the technology that will enable its usage.Therefore, in the QR campaign, additional instructions should be added to the code, or by organizing classes on the technology itself.
5. Train your Staff: Staff should be trained on how to turn on devices and to install the QR code readers.
6. Test your Codes: Testing is very important. Different mobile devices should be used in testing the code to determine if it is working as desired.
7. Market your Codes: Market the QR code both inside and outside of the library. Murphy (2012, as cited by Hack & Kingsley, 2014), recommends posting QR codes like adverts in unexpected areas.
8. Offer Support: Not all patrons may know how to download or install a QR code. Therefore, support in the form of signs near the code explaining where and how to download and install the code reader is very important.
9. Provide URL: Some patrons' phone may not be able to scan the QR code or some may experience difficulties scanning the codes. It is therefore advisable to provide a URL as an alternative way to access the content that was hitherto not accessed.

Use of QR Codes in Libraries

The following are some of the library services that QR code can be used to achieve as opined by Shettar(2013).

1. Quick response code can be actively used in libraries to promote the resources and services of the library to the library users in order to facilitate the library resources and services optimum use.

Alarge number of Web 2.0 tools and techniques can be implemented in library promotions to reach out and engage with the new generation users. This will

help in connecting with library users thereby showcasing the library resources and services. This can achieved by creating links to the website of the library and also with the use of social networks to help create awareness and encourage users to share their feedbacks and opinions.

2. QR code can be used to ask the librarian questions (Ask the librarian). This can be achieved by creating interactive sessions for small message smmm (SMS), WhatsApp, Message Box, E-mail messages with the librarians contact details.
3. In order to increase user awareness of library collections and services, QR codes may link to mobile friendly databases or mobile library catalogue. QR code can be used for a library with a web online public access catalogue (Web OPAC) with Wi-fi enabled library, users will no longer require computer to use the library. They require a smart phone to access the WebO PAC.

4. QR code can be used for library outreach, awareness and marketing events. QR code can contain events such as library outreach programmes or awareness campaigns or other marketing events like book exhibition, launching of new services and applications, etc. Generated QR code can be published on posters and flyers and even on the library's webpage. The events QR codes will allow library users to save the event in their smart phones calendar, which will remind them of theevent date,to assure them to attend theevent.

Other benefits as indicated by Sinkinson and Stoeckel(2011)are:

5. QR code has numerous uses for marketing, promotion, and outreach initiatives. For example, a code printed on a business card may point to contact details, a subject guide, or chat window. Codes placed in an online directory of employees will allow a user to save and store contact details in their mobile device, after scanning the code for a particular librarian or library. Traditional promotional materials such as posters, flyers, or event calendars may be supplemented by QR codes, as can social media tools such as Facebook, blogs, or Twitter.

6. QR code can be used for online registration in the library. Online registration forms can be incorporated or embedded into QR codes. In order to increase user awareness of library collections and services, QR codes may link to renewal services placed inside book cover(Sinkinson & Stoeckel, 2011).
7. Also, library instructions such as library rules, opening and closing periods, contact details, e-mail address, telephone number, links to a library's website, can be linked using the QR codes. The QR Codes can be fixed or pasted on any flat surface in the library like printed handouts, shelf ends, webOPAC desk, reference desk, magazine racks, etc. With these, the time of the library users will be saved.
8. Library Virtual Tour (2011) indicated that QR codes can offer mapping and way-finding solutions. They can point to an online mapping service which, once scanned, will allow a user to save navigation directions to their mobile device. It can be used to facilitate users' way-finding inside thelibrary build ing, libraries may also embed QR codes in the online catalogue. A user may scan the code in order to record the call number as well as stack and call number maps. Some libraries are also developing virtual tours of their buildings, instead of (or in addition to)conducting personal tours of the building. Lawrence University's library displays QR codes throughout the building. When touring, a user can take a picture of a code that links them to more information about the location in which they are standing. Tour information linked from a code might include a video, podcast, a mobile webpage,or images.
9. Walsh (2010) stated that QR code can be used for point of need services. He

noted that the allure of QR codes is that they connect the physical to the virtual. This function is one that instruction librarians can harness to provide point of need instruction. Codes can be printed and posted next to physical items in the library so that patrons can find related resources, electronic holdings, and instructional videos related to the item. For example, Half Hollow Hills Community Library embeds codes in the stacks, which when scanned connect patrons to research guides about the subjects. Instruction librarians are increasingly creating online learning tools, which can logically connect to actual physical places in the library where a person may need instruction (Walsh, 2010).

10. In order to increase user awareness of library collections and services, QR codes may link to the electronic equivalents or related works from physical holdings (or exhibits). QR code can be used to link various library resources such as journals/magazines, online dictionaries as well as other applications. It can also be used to bookmark important links.
11. QR codes can be used to promote reading especially fictional books. A site can be created using QR codes to promote reading where readers can add comments or recommend their favorite books.

Furthermore, Melorose and Careas (2015) identified the following as some of the uses of QR codes in a library environment:

1. To give directions to the user
2. To provide brief information to user
3. To inform of required documents

4. To promote the library services
5. To create link to all the resources available in the library
6. To create link to virtual tour of library sections
7. To use in library exhibitions like Videos, Audios, and websites
8. QR code is used to provide text messages for reference service and contact information of library staff as well as library patrons

Seven Steps to Getting Started or Using QR Codes In Libraries

One does not need to be a technology whiz to use and create QR codes. Start by exploring what already exists, think about applications for your library, and then build your own projects. The following steps can be applied when getting started according to Ramsden(2010):

Steps 1 - Use QR codes yourself. Download a QR app on your phone, iPod Touch, tablet, or other mobile device with a camera and web access. Go to 'Mobile Barcodes' to download software for your device.

Visit your library. Look for QR codes on books, toys, or other ICT materials. Open your app, point your camera at the code, and information automatically appears on your screen. The content may be a book blurb, discount coupon for a toy, nutritional information about cereal, or 'how to' manual. QR codes can link to websites containing text, images, videos, audio, maps, or even surveys. They can also be used to download information, send email, or complete other web-based activities.

Step2- Walk around your library. Think about your student needs. Do they know how to use the photocopier? If not, place a QR code on the copier for directions. Are they aware that electronic databases might be a good choice for medical information? Place a QR code on the shelf near your health reference books.

Step 3 - Make a QR code. Many websites provide utilities for making downloading QR codes like QR Stuff, Delivr, GOQR.me, or Kaywa. Try one. Rev your library brochure and place a QR code on the front that links to your libra website. Remember that mobile devices sometimes display websites differently t laptops. Check your website to ensure compatibility.

Step 4 - Be creative.QR codes can be placed on bookmarks, book covers, worksho bulletin boards, and walls. A QR code is like an invitation. Students might not th about going to your library blog, but they may be lured in by a QR code feature your book display or taped to the door of the media center.

To draw their attention, use colored QR codes or some of the fancy options incorporate images. For instance, try Unitag.

Be careful not to distort the QR code image or it won't work. Also, the glare of a b cover or shiny tape can cause problems. When placing the code, be sure it's on a surface. It won't work if it's folded or on a curve. Finally, try each code before you it with others.

Step 5 - Provide an alternative. It's easy to get enthusiastic about using QR code your library. However remember that not all your students and lecturers have devi that can read QR codes. Use a URL shortener like Google url shorte <http://g oo.gl/> to create a shortened URL that can be printed along with the QR c for people without QR readers. Users can simply type the URL into their laptop other device to access thecontent.

Step 6 - Partner with lecturers. Many school programs are using iPod touches, iPa

or other devices with cameras and wifi access. Work with your special education lecturers on ways that QR codes could be used to access special needs resources.

Create a list of projects students do in your school. Think about how QR codes would be woven into the assignment.

Step 7-Make it work! Use what you have. Every student doesn't need a QR reader for a project to be a success. You'll be surprised how many devices you can collect when you consider your own iPhone, a couple iPod touches, an iPad, and the smartphones students are hiding in their pockets. Remember that you can download QR software for laptops too.

Advantages of QR Code

The following are some of the advantages of using QR code as indicated by Rahaman(2016).

1. Itis very fast to access the information embedded with the code
2. Can store huge amount of data
3. Can be used anywhere
4. No specific skill is required
5. No additional technology is required
6. Can use the information later
7. Anyone can generate it
8. Increased customer satisfaction etc.

Also, Ramsden (2010) listed the following as the advantages of QR code

1. Itisavailable for free, one can create the QR code using free software
2. Easy toreadtheQRcode
3. The nature of QR code is versatility

4. Error correction or Data restoration
5. Encoding Kana and Kanji Characters
6. Easy Codification or Code Confidentiality

Disadvantages of QR Code

Rahaman (2016) listed the following as the disadvantages of using QR codes.

1. It's not working without the decoder like android phones;
2. Sometimes need Internet connection;
3. Still users'are not fully aware of this technology;
4. Humanerrors happen sometimes at the time of coding;
5. Codes are not working sometimes due to the compatibility of the decoder.
6. QR code not default provided

Problems with the Implementation of QR Codes

Implementing QR codes in libraries and information centers brings about some difficulties, some of which include:

1. Determining the place for attaching the codes in audio tours and other library resources is difficult (Farashband & Najafi, 2013).
2. Production and design of the codes. The design and production of a large number of codes is time-consuming(Farashband & Najafi, 2013).
3. Mobile model. Due to the diversity of smartphones used by students, models compatible hardware and software are required to read the codes which are difficult to easily achieve (Farashband & Najafi, 2013).
4. Education. Most library users are unfamiliar with QR codes. The training of the users could be cost effective and time consuming (Soleimanzade & Najafi, 2013).
5. Hack and Kingsley (2014) noted that not all patrons own a smartphone or mobile device, or may not know what the codes are and even how to download the QR reader.

Conclusion

Smartphones are becoming the most common internet access tool used by current generation. Modern day libraries need to be upgraded with new technologies to cope with modern day technology savvy users. QR code is such great technology which will help the library users with their crucial demand for access to information through mobile phones. Therefore, libraries need QR codes to market their products and services. Adoption of the QR code in the library will help to improve services for users and will enhance the reputation of library and information services as well as that of the information professionals (librarians) because as smartphone or mobile devices are increasing,it is likely that the library patrons will find value in QR codes.

Recommendations

One should consider that library users are busy people, and one of the key points in attracting them is providing them with needed information with greater ease and speed. These showcase the ease and popularity of the use of QRs in the libraries, however, as with any new technology, familiarity with the features of QR codes and applying them requires the users to be trained in their use. This is especially true in countries with less familiar QR codes technologies, such as Iran and other developing countries like Nigeria. Therefore, campaign for the use of QR codes by library staff and users should be initiated and sustained.

References

Adulrasheed, R.A, & Gbaje, E. (2014). Application of quick response (Q libraries and information centers. Retrieve https://abulismasters2014.wordpress.com...

Ashford, R. (2010). QR codes and academic libraries: reaching mobile use and Research Libraries, 71(10),526-30.

Duggan, M. (2012). Cell phone activities 2012, pew internet and Am project. Retrieved http://www.pewinternet.org/~/media//Files/Reports/2012/PIP_CellA 1.25.pdf

Farashband,F.Z., & Najafi, N.S.S.(2013). Quick response code application and information centers. Jentashapir Journal Health Resource, 5(2). 73-

Hack, J., & Kingsley, I. (2014). Qr codes and libraries. In B.C. Thomsett-S Marketing with Social Media (pp.131-146). London: Facet publishing .

Jackson, D.W. (2011). Standard bar codes beware-smartphone users may p codes. Law Library Journal, 103,153-158.

Library Virtual Tour (2011). Lawrence University. Retrieve http://www.lawrence.edu/library/tour/

Melorose, J. R. & Careas, S.(2015). QR codes and their applications for libr case study from the University of Bath library. Statewide Agricultural L Baseline, 1. Retrieved from http://doi.org/10.1017/CBO9781107415324.

Pulliam, B., & Landry,C.(2011). Tag, you're it! Using QR codes to promot services. Reference Librarian, 52,68-74.

Rahaman, W. (2016). Enhancing library services using barcode, QR code and RFID technology: A case study in Central Library National Institute of technology, Rourkela. International Journal of Digital Library Services, 6(3), 39-50.

Rainie, L. (2012). Smartphone ownership update: September 2012, pew internet and American life project. Retrieved from http://www.pewinternet.org/~/media//Files/Reports/2012/PIP_CellActivities_11.25.pdf

Ramsden, A.(2010). The level of student engagement with QR Codes: Findings from a cross institutional survey. Working Paper. University of Bath, Bath. Retrieved from http://opus.bath.ac.uk/19974.f/students_qr_codes_cross_ints_survey_2010.pdf

Robin, A. (2010). QR codes and academic libraries: Reaching mobile users. College and Research Libraries News, 71(10), 526-530. Retrieved from http://crln.acrl.org/content/71/10/526.full

Sinkinson, C., & Stoeckel, S. (2011). Tips and trends: QR codes. Association of College and Research Libraries and American Library association, Fall. Retrieved from arcl.ala.org/IS/wp...2011summer.pdf

Shettar, I.M. (2013). QR codes in libraries: New delivery tool for library marketing and information dissemination. Journal of Library Management, 2(3-4),61-69.

Shettar, I.M. (2016). Quick response (QR) codes in libraries: Case study of the use of QR codes in the Central library, NITK. Retrieved from https://www.researchgate.net/publication/301887341

Smith, A. (2010). Mobile access 2010, pew internet and American life project. Retrieved from http://www.pewinterest.org/Reports/2010/Mobile-Access-2010/Sumary-ofFindings.aspx

Smith, A. (2011). Americans and their cell phones, pew internet and American life project. Retrieved from http://www.pewinterest.org/Reports/2011/Cell-Phone.aspx

SoleimanzadeNajafi, N. (2013). Training course on applications of QR Code in library and information centers. Isfahan: [Scientific Workshop]. Isfahan, Iran School of health management and information science, Isfahan University of Medical Sciences.

SoleimanzadeNajafi, N., & Mojiri, S.H. (2010). Application of Mobile phone in library marketing by QR Code. Proceedings of the conference on the Social media and library and information science; Feb 2; Tehran, Iran.

Walsh, A. (2010). QR codes- using mobile phones to deliver library instruction and help at the point of needs. Journal of Information Literacy, 4(1), 55-64. Retrieved from http://jil.lboro.ac.uk/ojs/index.php/JIL/article/view/PIC-V4-I1-2010-1

Walsh, A. (2011). Blurring the boundaries between our physical and electronic libraries: Location-aware technologies, QR Codes and RFID Tags. Electronic Library [Serial Online], 29. Retrieved from http://apps.webofknowledge.com/full_record.do?product=WOS&search_mode=GeneralSearch&qid=1&SID=U2FeCelk1gIIGf8nBgE&page=1&doc=1&cacheurlFromRightClick=no

Waters, J.(2010). QR codes for dummies portable editions. New York: For Dummies.