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# Information skills training through mobile devices

## Practical applications of QR codes in academic libraries

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### Abstract

**Purpose** – This paper aims to examine the use of different mobile devices by libraries to develop programs for information skills training, focusing on the application of quick response (QR) codes for such a purpose.

**Design/methodology/approach** – The study was developed in two stages; primarily an analysis of the literature was conducted to determine the theoretical framework underlying the use of this tool for information literacy. The second part examined the practical application of this tool, with examples of several university libraries. In all, 13 academic libraries were included as the sample, which were chosen randomly from a global search on the Internet under the thematic basis for the theme of the study and thus evaluate the different employment opportunities of mobile telephony in developing skills information on users. The study is complemented with an assessment from the practice of the applicability of the principles described, arriving at conclusions and recommendations.

**Findings** – The purpose of the study is to recognize the use given to mobile technologies from libraries, particularly the use of QR codes, to help meet the demands of users in relation to skills training information, just as you may have the need.

**Originality/value** – The benefits of the use of mobile devices for the development of information literacy actions are identified and the set of actions that can be implemented for training information skills through the use of QR codes are set based on all outlined by the Association of College and Research Libraries goals.

**Keywords** Academic libraries, Information services, Information literacy, Mobile communications, Help desks, Reference libraries

**Paper type** Research paper

### Introduction

Currently, Internet-enabled mobile devices are utilized to meet a user's need for information and leisure. To be truly relevant to the end-user, services that libraries offer must be attractive and appropriate to this generation and should make use of these tools to offer the highest quality services to improve the user experience and reduce the consumption of superfluous information. Products within the mobile devices category include smartphones, tablets, e-readers and e-notebooks. Each device has its own characteristics and the potential to connect to the Internet from anywhere with a Wi-Fi network, which drives its widespread use and, thus, the generation of new library services including those of information literacy (IL).

Utilizing quick response (QR) codes can be a good way to provide help and support to users, on demand. Although training sessions scheduled as part of a course in IL provide



the core theoretical conceptualization that users need, the ability to locate, access and use the information requires that, in practice, the user who has attended the training uses the library's services. Libraries may lack the ability to provide more personalized training (Johnston, 2003). According to Beck and Turner (2001), users are more receptive to learning when they have information needs, therefore librarians must recognize this by exploring all possible technologies for delivering access that reinforces this "just in time" training without turning the sessions into substitutes for the personalized literacy programs implemented by libraries. Libraries provide tutorials, videos, audio files or other kinds of material that show users how to easily access the different online resources that the library owns. However, these must provide information that is specific to this context to facilitate their access. QR codes are one of the most promising alternatives in this regard. It is important to know about the features and functionality of this new technology in relation to how it can help libraries to generate more attractive services and, thus, help users find the information that they need in a timely manner.

This study involves those topics and will provide results along with some experiences or best practices to help encourage the use of this technology. The main purpose of the study is to show the effectiveness and potential of QR codes to deliver IL activities through the preferred tool for the new generation of users: mobile devices. Through the literature on the subject, the detailed theoretical and conceptual aspects of mobile devices explore the potential for IL using QR codes and the available technologies for its implementation. Then, from the perspective of a case study, a group of libraries that offer IL service to its users using this technology are analysed. Studying the results of this analysis, the authors have specified important characteristics and traits, which establish the elements that this operating mode must adhere to in order to be successfully implemented. Finally, this study shows the practical use of QR codes in the implementation of IL programs, offering preliminary results of their assimilation by the users of the library of the Central University of Las Villas (UCLV) and establishing conclusions and recommendations.

## Literature review

### *Use of QR codes in libraries*

Users use mobile devices constantly, creating new opportunities for libraries to interact with them and to develop new services that meet their needs. Mobile technology is characterized by its portability and ease-of-use, which has created a change in behaviour and brought new ways to access information, as well as created a forum for interaction in a location-based context. Church and Smyth (2009) and Heimonen (2009) reported that users generally use mobile devices to meet their needs for rapid information in a specific context, for example, local information about times and locations. According to Walsh (2012), this need is derived from the ability to search through information in a way that is quicker and easier for users than traditional methods. Users can satisfy a need for information based on the context with which they are presented, and are able to use social networks as a valuable source of information, have the ability to transfer data from one device to another and store the information they need to refer to later. Libraries need to take into account the nature of these new ways of finding and using information and, to this end, offer training to develop information skills and strengthen the traditional services offered by the institution. Walsh (2012), based on existing literature, suggested that IL via mobile devices varies from the traditional in four key areas:

- (1) access to training occurs from anywhere and from a variety of devices (phone, game consoles, e-book reader and tablets);
- (2) there is a need for rapid, brief, very specific and concrete information, usually in the context of a specific location where this need arises;
- (3) it utilizes individual applications from specialized sites instead of open websites; and
- (4) queries are often fast, favour short and precise searches, with little reflection, and information extraction should be appropriate to the natural restrictions of the device.

It is clear that information skills training should not ignore the way users communicate with each other and, through IL programs that the library provides, should also have variants that include the potential for the integration of mobile devices. One of the features that promotes the use of such devices is the reading of QR codes, which is considered to be an information storage system within dot-matrix or two-dimensional bar codes. This technology generates an additional access point that should be included into these training plans.

The main feature of this technology is the location of three squares in the corners that the reader software application detects within the code. QR codes can be read from a computer, smartphone or tablet, as long as these devices have image capture facility and decoder software installed. Most modern mobiles have this feature by default. Other features include the ability to store short texts (7,000 digits or 4,000 characters), images up to 3 KB, links to Web pages and e-mail, text messages (SMS) and phone numbers (Ashford, 2010; León and Caldera, 2013).

Ashford (2010) suggested that QR codes are an easy way to provide useful content, often at the point of need, saving users from having to manually remember or manually input accurate long strings of data, such as a URL or complementary information. This could be useful in a library to reinforce or complement the training programs that it offers to its users. Although there are no extensive references in literature on the use of QR codes in these institutions, some studies including Ashford (2010), Burns (2011), Hampton *et al.* (2011), Hoy (2011), León and Caldera (2013), Pons *et al.* (2011), Walsh (2009, 2010) and Whitchurch (2011) realized the potential of this type of tool and show theoretical considerations and applications developed by using them.

Walsh (2009, 2010) described in a general way the use of QR codes in libraries to deliver information just when the user has the need for training, including practical applications of these codes and how the method can be promoted among users. His study also presents some preliminary results on how this initiative has been welcomed by the users of the library. Ashford (2010) analysed and proposed the uses one might give to QR codes in the library, and points to the potential for linking resources to additional information by locating codes on the shelves of the library, on the covers of books and magazines or catalogue records, and to provide additional information on exhibitions and events. QR codes could facilitate the download of audio files for tours of the library, subject guides or guidelines or give direct access to services, such as reference. Shown through examples, the benefits of using this technology for both the physical and the virtual library are illustrated in Ashford's paper.

Hampton *et al.* (2011) and Hoy (2011) focused on offering a conceptual overview of QR code applicability in the library and of the different resources required to create and read these types of codes, as well as providing some practical examples in these aspects. On discussing the specific use of QR codes for user training, Burns (2011) expressed the possibility for making this technology different and fun within the library environment. In the steps Burns took to prepare and implement this innovative training session, he concluded with a description of the benefits experienced in their use while providing the user community with standards that support these results. Pons *et al.* (2011) provided an overview of the use of QR codes in the library of the Technical University of Valencia, as a way to improve the user experience with the use of services, describing each of the initiatives and the procedures followed for each of these. The authors provide several recommendations for generating QR codes, including highlighting that the information needed in brief and preferably using a URL instead of text for ease of use and to avoid some issues with symbols or accents.

Whitchurch (2011) provided user preferences regarding conducting a tour in the library at Brigham Young University, using a downloadable audio file accessible via various sources, including QR codes. The study confirmed that users like the technology, as they can use their own mobile devices for playback, act individually and not necessarily in a group, complete the course at their own pace, have the option to save sections on their device for listening to elsewhere and be able to track their location and then receive information in the proper context. León and Caldera (2013) discussed how the library, taking advantage of the potential that QR codes offer, must adapt and adopt this technology to develop IL plans. The article describes several alternatives for mobile devices and QR codes for IL and literature review.

Due to the analysis, it appears that the use of QR codes is a useful alternative to enhance IL activities that the library intends to undertake, primarily to provide assistance in the context that the user needs. In this way, tutorials about the use of information resources in the library, subject guides, instructional videos, guided tours (audio-tours), direct consultation with a librarian and access to information from the library, its services and activities are available to the user without requiring unnecessary movement of the users.

#### *QR codes: standard and software for creating and reading*

ISO/IEC18004:2000 is the international standard for developing QR codes, and specifies the characteristics and different formats of these symbols, the nature of the data, dimensional characteristics, and error correction rules, algorithm decoding, quality requirements for their production and application settings selectable by the user. As specified in the standard:

[...] each QR code symbol shall be constructed of nominally square modules set out in a square array and shall consist of an encoding region and function patterns, namely finder, separator, timing patterns, and alignment patterns. Function patterns shall not be used for the encoding of data. The symbol shall be surrounded on all four sides by a quiet zone border (ISO/IEC, 2000).

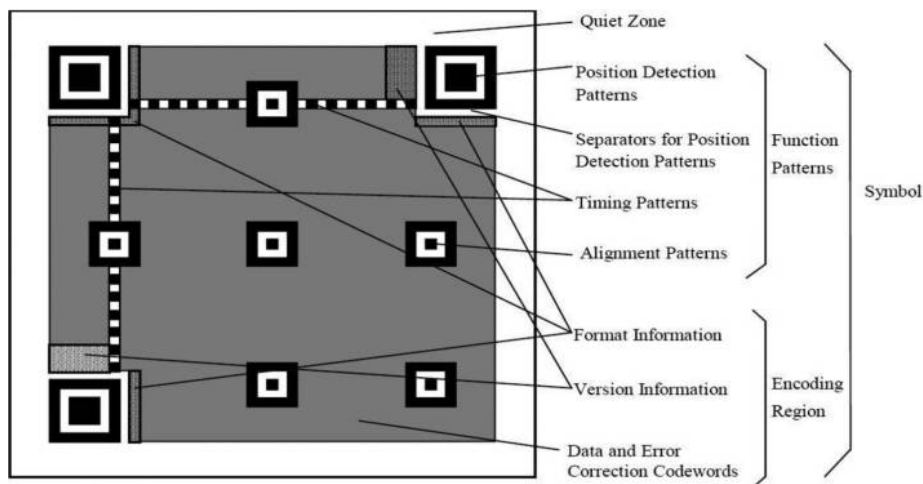
Such a structure is shown in Figure 1.

Creating a QR code is a simple process. Currently there is a multitude of online sites that generate codes to be downloaded. These different applications follow the

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**Figure 1.**  
Structure of a QR  
code



**Source:** ISO/IEC (2000)

standard ISO/IEC18004: 2000, mentioned above, which makes creation and decoding interoperable. Some examples of these services that are free on the Web include:

- BeeTagg ([www.beetagg.com](http://www.beetagg.com));
- Google QR Code Generator ([chrome.google.com/webstore/detail/qr-code-generator/](http://chrome.google.com/webstore/detail/qr-code-generator/));
- I-nigma ([www.i-nigma.com](http://www.i-nigma.com));
- Kaywa ([qrcode.kaywa.com/](http://qrcode.kaywa.com/));
- Neoreader ([www.neoreader.com](http://www.neoreader.com));
- Nokia Barcode Reader ([mobilecodes.nokia.com/](http://mobilecodes.nokia.com/));
- RedLaser ([redlaser.com](http://redlaser.com));
- QuickMark ([www.quickmark.cn/](http://www.quickmark.cn/));
- Qurify ([www.qurify.com/es/](http://www.qurify.com/es/));
- Snapmaze (<http://mobile.snapmaze.com/jar>);
- Scanlife ([www.getscanlife.com](http://www.getscanlife.com));
- Upcode ([www.upc.fi/en/upcode/](http://www.upc.fi/en/upcode/)); and
- Zxing ([code.google.com/p/zxing/wiki/GetTheReader](http://code.google.com/p/zxing/wiki/GetTheReader)).

These tools create codes consisting of four different types of content: a URL, text messages, calendar and contact information. The use of these applications is very simple and does not require prior knowledge of QR codes. A user should choose a content type, add it in the text box entitled to do so, click on the “Generate” button and copy or download image created.

Aside from the general characteristics, there are some specific features that give these tools a certain preponderance in relation to each other; for example, BeeTagg,



permits payments, creation of dynamic QR codes that feature tracking possibilities, editing, management and organization of such codes, and also allows creation of encrypted and programmable QR codes. The BeeTagg Reader software, in addition to opening the browser on the device after scanning a code, complements this action with additional information and context.

The Google QR Code Generator allows you to create a QR code from within a Web page, selecting a link via a right-click menu. This creates the code from the address bar of the browser with the option to save to a storage device or share on social networks. It also allows reading of the codes to decode the content included in them, for which you need to install an extension in the browser and click the right button which will display the QR code image. I-nigma adds to the basic functionality of the QR reader by keeping a history of searches in your application, including the ability to add to a favourite folder of scanned QR codes.

The I-nigma site suggests some basic considerations for creating QR codes that have the required quality. The ideal size should be at least  $2 \times 2$  cm with at least 4 mm of white space around the code for a code that is 10 cm and a used impression greater than  $2 \text{ cm}^2$ . These characteristics will help with high-quality visualization when printing on flat surfaces. These essential elements go into making such codes and display the diversity of media which may include posters, brochures, business cards, bookmarks and more.

However, selection of the right tool for the creation of QR codes must first be based on the technological requirements of the user community it seeks to serve. Hence, to select the technology, you must know the type of mobile device and operating system supported and subsequently analyse other features that allow the generation of these codes. As such, the library may suggest to its users the best or the most complete applications to this end.

### Methodology

This study can be considered descriptive, during which authors have used empirical methods from classic documentary analysis and case studies. The sample includes 13 projects, all from academic libraries, including Spanish- and English-speaking libraries. For the selection of this sample, a global search on the Internet was performed using thematic criteria for the subject of the study, randomly selecting individual examples that gave representative results in reference to the literature reviewed (Codina-Vila *et al.*, 2010; Porter and Lee, 2013; Walsh, 2010; Whitchurch, 2011). The universities selected are listed in Table I.

To confirm the feasibility of QR codes implementation into IL activities identified during the study, a survey was developed at the Central UCLV library to measure the real value of use of that application, using surveys and a QR codes use analysis. All of the UCLV library users were considered as the population, with a final return rate of 15 per cent (423 users). QR codes were used in the following categories: instructions for the use of a collection, titles or different suggestions of resources; basic information about the document; link to virtual reference services and library overview. The procedures followed for the implementation of each of the categories considered were as follows:

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**Table I.**  
Acronyms of the  
universities in the  
studies

Brigham Young University's Harold B. Lee Library	BYU
University of Texas Library	UTEXAS
Wright State University Libraries	WRIGHT
Half Hollow Hills Community Library	HHH
Virginia Tech Libraries	VT
Bath University Library	BATH
San Diego State University Library & Information	SDSU
Biblioteca Rector Gabriel Ferraté, Universitat Politècnica de Catalunya	UPC
Ryerson University Library and Archives	RYERSON
University of Huddersfield Library	HUD
Albertson's Library, Boise State University	BOISESTATE
Miami University Libraries	MUOHIO
Universitat Politècnica de València	UPV

- *Library overview:* A QR code with information about library hours was placed in the entry sign. The text message also included information from the main library services.
- *Instructions for the use of a collection:* A QR code was placed at the top of each book rack with information relating to the collection located there and how to access it as a way to help users to find a title in the collections of printed books.
- *Suggestions of titles or different resources:* Additional information, such as “other books by this author”, “other books on this subject” and “review of this book”, were incorporated into some books using a QR code.
- *Basic information about the document:* Basic information about identifying elements of the book was provided by a QR code to allow users to reference them easily.
- *Link to virtual reference services:* The possibility of contacting librarians through the virtual reference service was announced using a poster at the entrance of each library. A QR code was incorporated into the poster with the virtual reference service URL, to allow users to access it directly without requiring recall of the electronic address.

Once the categories by which the effectiveness of QR codes implementation in the library would be tested were established, the authors proceeded to implement a survey among a group of users with the aim to understand the impact on the community. For this purpose, a short questionnaire was developed ([Appendix 1](#)), which included questions relating to the type of mobile device, knowledge about QR codes and suggestions for other possible uses of QR codes.

## Results and discussion

### *Survey of UCLV users*

The survey shows that 22.7 per cent of users knew what a QR code is and that 93 per cent of them had a mobile phone with an integrated camera. The use of QR codes at UCLV is analysed and evaluated in [Table II](#).

Although some users were aware of QR codes, the first challenge is to educate the user community on the use of QR codes and how to work with these from different



existing devices. To address this deficiency, bookmarks, newsletters and posters with information on QR codes, along with information on how to install and use the codes, were distributed among users. Librarians provided set speeches and direct assistance to users was offered. These methods achieved an increased awareness on the part of users of QR codes.

Of the collected data, it is interesting that 56 per cent of users report that the provision of basic information about the documents was useful. In this regard, the topic areas of inquiry are: computing (46 per cent), electrical mechanics (38 per cent) and engineering (41 per cent). The percentage of use is largely due to an assumption that these are the specialties where users have greater mastery of information technology. The result corroborates what the literature refers to as an element of greater impact on the user community, as it facilitates routine tasks, such as shaping the references on a research project.

Also, users noted that the instructions about how to use collections (48 per cent) were useful, as this element makes access to the collection easier and the document location – as one respondent commented – “allow[s] me to inform [myself] on the spot, without needing to know in advance the procedures to find a document”. Burns (2011) suggested that the act of instructing users in the actual location is a fun and different way to offer this activity inside the library. The results also corroborate the statements of Walsh (2009, 2010) who noted that users prefer consulting librarians specifically in the context in which they are presented with the information need.

In all, 47 per cent of users accessed the virtual reference services that the library offers by using the QR code that provides the link to that service. Uses fell into the following categories: basic facts or information (28 per cent), ask about services (23 per cent) and advice and instruction (16 per cent). Another significant group of users (33 per cent) have used the suggestions to different resources that complement a particular title, actions that they found novel, as it allows them to access additional information which helps them to discover other information resources and know what other users of the document found interesting. This ultimately helped them make a judgment and decide whether or not to query the original document. The utility of the use of QR codes as an alternative to providing assistance to users at the point of need is corroborated by the study results.

Respondents showed a greater interest in the use of QR codes to retrieve basic information about the documents. The usefulness lies in the ease of not having to remember the data when reviewing literature for their research. The codes are also important when locating documents on the shelves and contacting the virtual reference services to ask about a need in the context in which it presented itself.

Service	(%) use
Library overview	15
Instructions for the use of a collection	48
Suggestions of titles or different resources	33
Basic information about the document	56
Link to virtual reference service	47

**Table II.**  
Uses for QR codes in  
the UCLV library

*QR codes in other libraries*

As previously determined through the literature review and the survey results from UCLV, the application of mobile technology, specifically QR codes, is an advantageous alternative for users trying to help themselves, without requiring a librarian to locate these resources, and works to reinforce training at the point where the need is presented. Many libraries around the world already use this pocket technology to meet the changing needs of users. A survey of some of these initiatives will delve more deeply into the issue and its importance for the development of this mode of supply.

Taking the theoretical framework outlined in the literature review, the authors defined eight possible applications of QR codes to implement into library IL activities. Thus, for this inquiry, the considered possibilities are: provide instructions for the use of the collection, provide information (book review, summary and some text), provide suggestions or titles of diverse resources, offer general information about the library, link to the virtual reference services, access library feedback systems, provide access to documents, add to the catalogue records to provide basic information about the document and watch a help desk/support tutorial on QR codes. From direct observation, the websites of selected libraries supported, in some cases, reference services using QR codes. The authors obtained data on the different ways that these institutions apply these codes to offer their IL services. A summary of this data is provided in [Table III](#).

The analysed projects were dominated by the application of QR codes to provide instructions for the use of a collection. The application generally provided access to downloadable podcasts or videocasts, with instructions about how to explore and understand the layout of the library. This happens at the pace of the user, without having to join a guided tour, all in the context of where the user has their need. [Whitchurch \(2011\)](#) recommended that multimedia audio files used for this purpose be in appropriate formats for mobile devices to avoid inconvenience to users in its reproduction. Examples of good practice in this regard are the libraries of Virginia Tech, the University of Huddersfield and Brigham Young University.

The incorporation of these codes facilitates access to documents by adding to catalogue records to provide basic information about them (author, title and location code on the shelf). This feature, in conjunction with access to suggested titles or URLs of similar resources – although the latter was not used very often by the studied libraries – are beneficial for the user, as this reduces the need to record data on a sheet of paper to remember. Users can simply store such information on a mobile device and refer back to it on demand.

The third most widely used feature is the option to provide general information on the use of the library. This allows users to familiarize themselves with the ability to find and access information. Although one of the potential options described in the literature review is the ability to provide access to the “Ask a Librarian” reference service as a way to promote and further facilitate the satisfaction of a need for training or user information, this option was only used at the libraries of the Universities of Huddersfield, Boise State and Miami.

Another underused alternative is to use QR codes embedded on the cover of a book or magazine to provide additional information, such as reviews or comments from other readers who have previously read the book, through a link that references the book’s

Features/Universities	BYU	UTEXAS	WRIGHT	HHH	VT	BATH	SDSU	UPC	RYERSON	HUD	BOISESTATE	MUOHIO	UPV
Provide instructions for the use of a collection	X								X				X
Provide information (book review, summary, some text)							X					X	
Send to users suggestions of titles or different resources								X		X		X	X
Library overview	X						X			X			X
Link to virtual reference services								X					
Feedback system access library										X			
Facilitate access to documents by adding to the catalogue records to provide basic information about the document		X							X			X	X
Helpdesk/support on QR codes										X		X	X

Information  
skills training

**Table III.**  
Summary of QR code  
benefits offered by  
different libraries

content or extended multimedia content. This would help users to form an opinion of the work and decide if the book is the document that they really need and help them to develop an ability to discriminate information which may not be beneficial.

*Best practices and recommendations for QR codes*

After conducting an analysis of the theoretical and practical applications of QR codes for IL, the following steps to implement this technology within the library are recommended:

- define the information to be displayed using QR codes after examining user; needs.
- develop text, audiovisual material and additional information. In the case of audiovisual material and other types of documents, post them to the appropriate media (library website, blog, social networking and similar).
- generate QR codes from the application selected as the most suitable according to the characteristics of the institution and its members.
- design posters, brochures or other media that are attractive.
- post QR codes in the media designed to support them and set a schedule for promotion and support; and
- continually evaluate the effectiveness of these means.

These simple steps will enable the library to create another access point to facilitate learning for users when they need to provide for the demand of information in context (just in time), thus making librarians learning advisors or facilitators of information. Undoubtedly, the use of QR codes is a different and attractive proposition to provide assistance or instruction in the context, but there are questions about how this technology can be effectively implemented. [Table IV](#) outlines a set of ways in which this technology can be used. This proposal is based on a set of goals outlined by the Association of College and Research Libraries (ACRL) in the *Information Literacy Competency Standards for Higher Education* (ACRL, 2000).

In summary, learning using the benefits that mobile devices offer is not intended to be a substitute for formalized IL programs offered by the library through tutorials, classes or other forms of teaching. However, it is an option that should be used to integrate these programs as a complement, as a way of providing individualized and personalized training “just in time”, something that users claim they want very often.

It should be noted that before creating and distributing QR codes, libraries should create guides to help users to understand the utility of QR codes. It should also be pointed out that to achieve real utility and not be just be a fashionable element, the following characteristics must be adhered to:

- the design must be simple and attractive for users;
- content must be interesting and a complement of the provided information, increasing the value to the message that is promoted;
- information provided should be concise, brief and refer to the context or specific place where it is located;

Standards	Forms of instruction with the use of QR codes
Determine the nature and extent of information needed	In each, the title includes a list of documents or resources that complement and address the related issue Link to virtual reference services to receive advise on various sources of information related to the subject
Access the needed information effectively and efficiently	Provide instruction through tutorials or guides on how to access electronic or printed resources Forward suggestions to access databases Link to virtual reference services, for help on how to access remote databases Facilitate access to tutorials to teach skills to print, save or download information and obtain other types of information you may need (author data, institutions, how to access an institution or document, etc. . .)
Evaluate information and its source critically and incorporate selected information into one's knowledge base	Provide information in a document completed by incorporating reviews and opinions of other users in the resource itself Link to guidelines for the evaluation of information resources
Use information effectively to accomplish a specific purpose	Provide access to resources to assist in the development of the report
Understand many of the economic, legal and social issues surrounding the use of information and access, and use information ethically and legally	Add to catalogue records to provide bibliographic information and thus help in the preparation of quotations and references

**Table IV.**  
Information literacy  
goals and possible  
forms of instruction  
using QR codes

- used as a way to increase the value in using order to facilitate routine tasks for users;
- contribute to self-learning;
- become an alternative way to complement other forms of access to identical resources; and
- avoid references to websites not adapted to the mobile phone.

## Conclusions

In conclusion, it can be stated that, given the flexible nature of QR codes as something with numerous applications, their use could be helpful for improving the user experience within the library, helping to promote the use of the institution and closing the gap between users and libraries. It was observed that QR codes can be used to link diverse information that perfectly fits those related to IL, including tutorials, guides and information and resources, completed with the reference librarian who normally completes training activities right in the context where the user has the need.

There are several technologies that create such codes. A look on the Web gives us access to many examples of its use in the library, so each institution needs to evaluate

these practices and select the one that best meets the technological requirements of each institution and, fundamentally, of its individual users.

Libraries and librarians must redefine their roles as gatekeepers and disseminators of information to promote and explore all possible avenues and alternative technologies to facilitate community access to resources and training, without necessarily requiring the physical presence of a librarian. QR codes are another alternative for this purpose.

The authors confirm that the implementation of technology should not be limited to reproducing IL services, as these services are offered in physical spaces and libraries must adapt the message to new means of distribution, including QR codes.

### References

- Ashford, R. (2010), "QR codes and academic libraries: reaching mobile users", *College & Research Libraries News*, Vol. 71 No. 10, pp. 526-530.
- Association of College and Research Libraries (ACRL) (2000), "Information literacy competency standards for higher education", available at: [www.ala.org/acrl/files/standards/standards.pdf](http://www.ala.org/acrl/files/standards/standards.pdf) (accessed 12 January 2014).
- Beck, S.E. and Turner, N.B. (2001), "On the fly BI: reaching and teaching from the reference desk", *The Reference Librarian*, Vol. 34 No. 72, pp. 83-96.
- Burns, E. (2011), "Remaking the library information hunt using QR codes", *Pennsylvania Library Association Bulletin*, Vol. 66 No. 1, pp. 11-13.
- Church, K. and Smyth, B. (2009), "Understanding mobile information needs", *10th International Conference on Human Computer Interaction with Mobile Devices and Services (MobileHCI '08)*, ACM, New York, NY, pp. 493-494.
- Codina-Vila, M., Gálvez, A.P. and Campos, J.C. (2010), "Mobile services in the Rector Gabriel Ferraté Library, Technical University of Catalonia", *Reference Services Review*, Vol. 38 No. 2, pp. 321-324.
- Hampton, D., Peach, A. and Rawlins, B. (2011), "Reaching mobile users with QR codes", *Kentucky Libraries*, Vol. 75 No. 2, pp. 6-10.
- Heimonen, T. (2009), "Information needs and practices of active mobile internet users", *Mobility '09 Proceedings of the 6th International Conference on Mobile Technology, Application & Systems, Nice, 10-13 September*.
- Hoy, M. (2011), "An introduction to QR codes: linking libraries and mobile patrons", *Medical Reference Services Quarterly*, Vol. 30 No. 3, pp. 295-300.
- ISO/IEC (2000), *ISO/IEC 18004:2000(E) Information Technology-Automatic Identification and Data Capture Techniques-Bar Code Symbolism-QR Code*, ISO/IEC, p. 114.
- Johnston, P.E. (2003), "Digital reference as an instructional tool: just in time and just enough", *Searcher*, Vol. 11 No. 3, pp. 31-33.
- León-Moreno, J.A. and Caldera-Serrano, J. (2013), "Códigos QR en las bibliotecas", *Ciencias de la Información*, Vol. 44 No. 1, available at: <http://cinfo.idict.cu/index.php/cinfo/articulo/download/483/pdf> (accessed 12 January 2014).
- Pons, D., Vallés, R., Abarca, M. and Rubio, F. (2011), "QR codes in use: the experience at the UPV Library", *Serials*, Vol. 24 No. 3, pp. S47-S56.
- Porter, M. and Lee, K.D. (2013), "QR codes in libraries: some examples", *Public Libraries*, Vol. 50 No. 3, pp. 25-27.



- 
- Walsh, A. (2009), "QR codes, staff presentations: QR tags and mobile phones in the library", available at: <http://librarymobiles.blogspot.com/2009/09/qr-codes-staff-presentations.html> (accessed 12 January 2014).
- Walsh, A. (2010), "QR codes – using mobile phones to deliver library instruction and help at the point of need", *Journal of Information Literacy*, Vol. 4 No. 1, pp. 55-65.
- Walsh, A. (2012), "Mobile information literacy: a preliminary outline of information behaviour in a mobile environment", *Journal of Information Literacy*, Vol. 6 No. 2, pp. 56-69.
- Whitchurch, M.J. (2011), *QR Codes and the Library: The Library Audio Tour*, ACRL, Pennsylvania, PA, available at: [www.ala.org/acrl/sites/ala.org/acrl/files/content/conferences/confsandpreconfs/national/2011/papers/qr\\_codes.pdf](http://www.ala.org/acrl/sites/ala.org/acrl/files/content/conferences/confsandpreconfs/national/2011/papers/qr_codes.pdf) (accessed 1 December 2015).

**Appendix 1**

The Library at Central University Marta Abreu of Las Villas has implemented a new way to promote and make easier the access to information's services through mobile devices. With the aim to improve the efficacy of this way, we need some information about the mobile devices you use daily at university.

All the information given by you will be confidential and used for scientific research only. Please answer the following questions:

1-What kind of mobile device do you have?

- A tablet  
 A cell phone with an integrated camera  
 Laptop  
 Other. Which? \_\_\_\_\_

Note: You can select more than one option

2-Do you know about the QR code's facilities to search information and access to information services?

Yes  No

3-Which library's services have you accessed before using QR codes?

- a)  Library overview  
b)  Instructions for the use of a collection  
c)  Suggestions of titles or different resources  
d)  Basic information about the document  
e)  Link to virtual reference services

-If you have chosen one of the options b, c or d, please tell us how many documents have you consulted within the following topics:

- |                                                 |                                                  |                                               |
|-------------------------------------------------|--------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Social Sciences        | <input type="checkbox"/> Agricultural Sciences   | <input type="checkbox"/> Architecture         |
| <input type="checkbox"/> Humanities             | <input type="checkbox"/> Psychology              | <input type="checkbox"/> Physics              |
| <input type="checkbox"/> Law                    | <input type="checkbox"/> Chemistry               | <input type="checkbox"/> Electric Engineering |
| <input type="checkbox"/> Mathematics            | <input type="checkbox"/> Computation             | <input type="checkbox"/> Biology              |
| <input type="checkbox"/> Mechanic Engineering   | <input type="checkbox"/> Pharmaceutical Sciences | <input type="checkbox"/> Economy              |
| <input type="checkbox"/> Industrial Engineering |                                                  |                                               |

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-If you have chosen option e, please tell us about why you needed librarian support through virtual reference services.

- To ask about factographic information
- To ask about the advantages of virtual reference services
- Because you need some kind of advice
- To search information for a research project
- Others reason. Which? \_\_\_\_\_

Give us your comments about your experiences using QR codes:

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Thanks!

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