

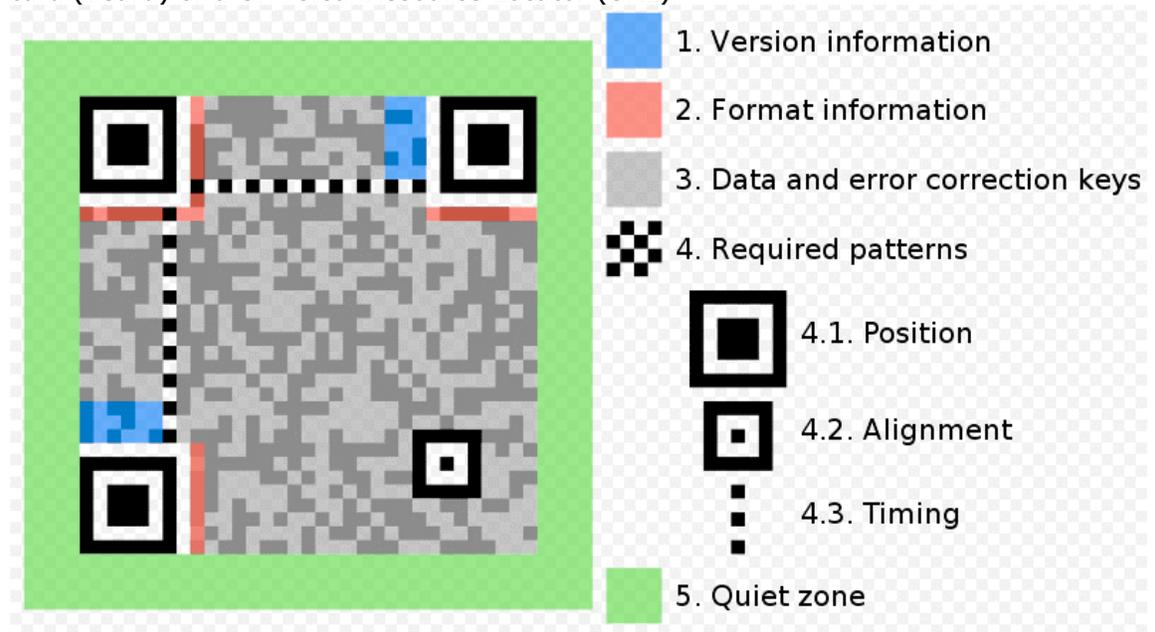
ABSTRACT

This paper describes and explores the integration of Quick Response barcodes into instructional design for environmental education. Inclusion of this method is designed to reduce transactional distance between learners in physical environments and virtual resources using widely available mobile phone applications and standard web browser interfaces. Use of QR encoding also supports the goals of Universal Design for Learning and international accessibility standards by making information and interactions available via multiple modes or channels.

The scope of this paper is limited to describing its inclusion in an instructional design for SYL Central YMCA Demonstration Gardens an instance of the Community Learning System model (See Resources for more information).

THE TECHNOLOGY

Quick Response (QR encoding) two-dimensional barcodes were developed in Japan in 1994 as a protocol for quickly tracking parts in auto manufacturing. These images carry information including text (product information or application instructions), a business card (vCard) or a Universal Resource Locator (URL).



QR_Code_Structure_Example_2.svg

http://en.wikipedia.org/wiki/File:QR_Code_Structure_Example_2.svg

With widespread deployment of cameras in cellular phones advertising was the first use of QR codes in the west. Increasingly, camera phones natively support "object hardlinking" by allowing users to scan the codes placed in physical locations such as on buses, in magazines or business cards and opening wireless networks, webpages in the phone's web browser, opening a movie or making a phone call.

Technical requirements are minimal. A mobile device with a camera can either scan or photograph the QR code and then use a decoder application (such as a free iPhone app or QRDroid on the Android platform) to decipher the instructions or information.

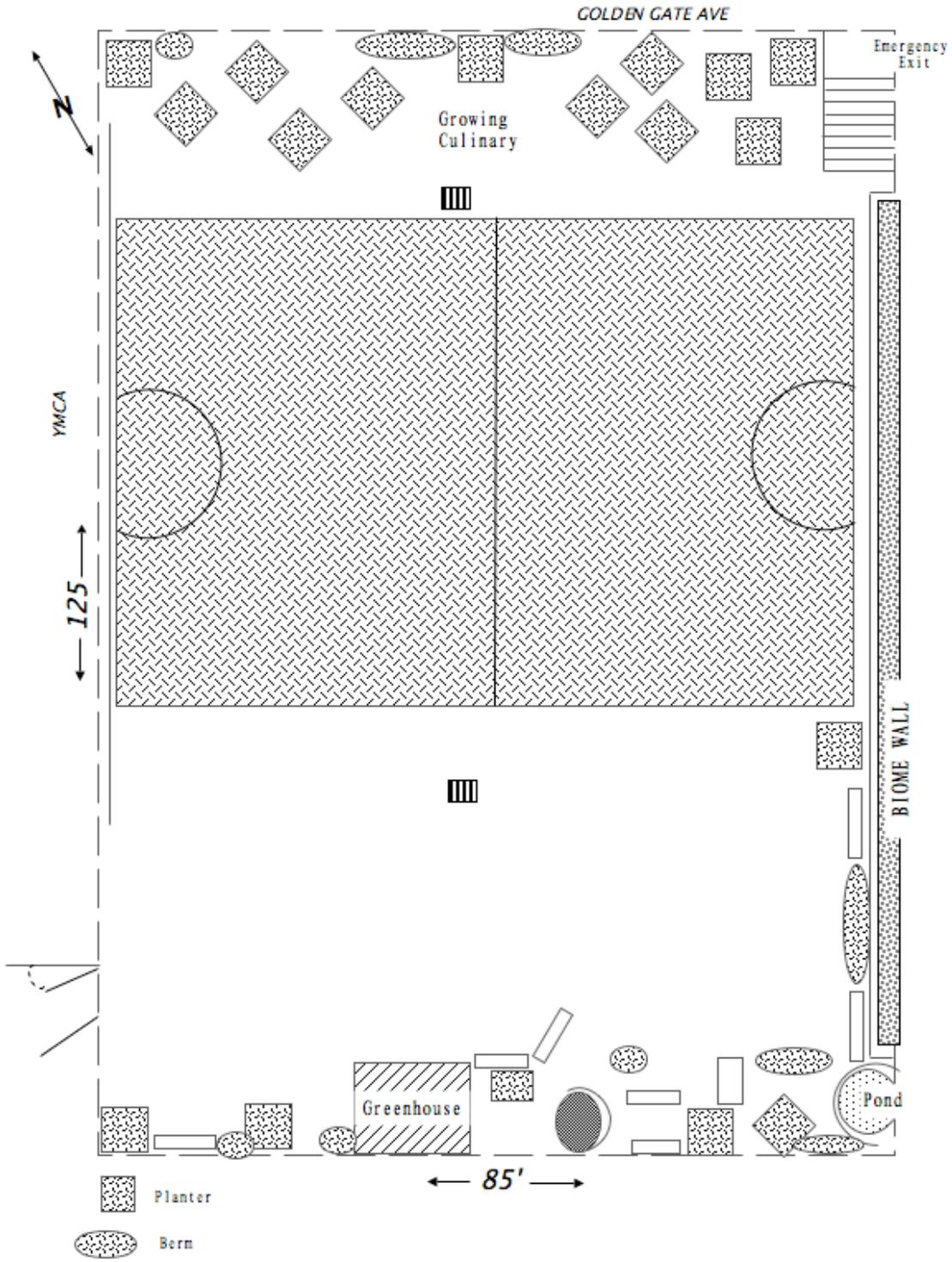
SAMPLE APPLICATION

Although developed about the same time as the World Wide Web QR codes have only slowly come into widespread use primarily for entertainment or advertising. However the opportunities for applications in instructional design are vast. Hardlinking allows close association between physical space and virtual resources. This has the potential to reduce transactional distance between learners engaged in physical environments and related virtual resources such as online materials, asynchronous experiences and through closer exchanges more authentic social learning opportunities with peers, mentors, moderators and mentees.

It may also serve to spatialize memory. Loci, or the "memory palace" mnemonic technique has been recorded in use since at least Roman times to organize memories. That is, hardlinking can empower learners with little cognitive overload through the spatial organization of experiences often lacking in virtual learning environments.

QR codes applied to Instructional design can make us of a "Kasbah" effect, the apparent paradox of something that appears smaller on the outside than it is on the inside. Through the tiny gateway of a printed label stuck to a wall or doorway photographed and decoded via common cellular phone capability and software, discovery points in a physical landscape are connected with digital, networked materials. This will enrich the dominantly physical real-time-and-place learning experience by remote, asynchronous linkages and participation. A further benefit can be realized in accessibility for all learners as information organized for QR encoding can also be transmitted visually or aurally through a mobile handset.

At the Shih Yu Lang Central YMCA Demonstration Gardens community-based environmental education goes on daily since 2009. Led by volunteers, about 100 community members of different ages and backgrounds work and learn together in an outdoor context. At 387 Golden Gate Ave, near the famous Lighthouse for the Blind resource center, Hastings Law School, City Hall, State and Federal Courthouses, the Heart of the City Farmer's Market, the Asian Art Museum, the Main Public Library and a dense population of predominantly poor, disproportionately old and young people speaking eleven different languages, this garden and whatever resources it can garner for environmental learning and teaching are in high demand. Nearby there are many people who would like to participate and support but need pathways that connect their busy lives to the site. To begin to test methods for connecting people and resources QR codes have been placed around the Central Y Gardens.



SYL Central Y Gardens & Play Yard
 Spring 2011 Kasey Asberry

TESTPLAN

In the first stages of deployment discovery points for information exchange will be developed and an understanding of what types of information are most useful and to whom.



SYL Central YMCA Demonstration Gardens

Volunteer Opportunities
Environmental Education

Come learn about our BIOME
387 Golden Gate 415-885-0460

mailing labels printed and posted, April 2011

This code opens this URL: <http://humanorigins.org/gardens/Gardenmobilesplash.html>

Which links to this mobile web page:



Future features include plant collections catalog, sharing and downloading training

Asberry: QR encoding

videos, interacting with Garden mentors in real time or playing games like *SimGarden* in community. Gardeners could log questions or hazards as well as tasks completed via "Suggestion Box" QR code.

CONCLUSION

QR coding represents a crucial link between physical and virtual experience in environmental education. It has potential to reduce problems related to disembodied, asynchronous experience that are common among community-based education programs whether in museums, community centers or public planning sessions. By spatializing virtual experience learners gain a powerful orientation for memory. By equipping learners who are working in an intensely physical context with virtual resources both states' good qualities can be amplified.

RESOURCES

American Community Gardening Association. 2010. Ten Tips for Community Gardening. Available from:

<http://communitygarden.org/learn/best-practices-10-tips-series.php>

American Community Gardening Association. 2010. Garden Mosaics: Garden Science, Intergenerational Learning, Action Learning, Multicultural Education.

Available from: <http://www.gardenmosaics.cornell.edu/>

Asberry, K. 2011. Modeling Community-based Education, presented to ITEC Graduate Showcase, May 13, 2011, San Francisco State University . Available from:

<http://humanorigins.org/lab/labproject/cls/index.html#>

CAST. 2008. Universal Design for Learning Guidelines Organizer. Wakefield, MA. Available from

Gardner, H. 2010. Five Minds for the Future.

Maldonado,H. et al. 2005. We learn better together: enhancing eLearning with emotional characters. Proceedings of the 2005 conference on Computer support for collaborative learning: Learning 2005: the next 10 years! International Society of the Learning Sciences (pp 408-417)

Smith, B. 2010. Understanding QR Codes. Ch 13. Sams Teach Yourself Google Places in 10 Minutes. SAM Indianapolis,IN

WikiHow. 2008. Method of Loci.

Available from:

http://en.wikipedia.org/wiki/Method_of_loci

Zhiao, H. Shneiderman, B. Plaisant, ,C. 2007. Listening to Choropleth Maps: Interactive Sonification of Georeferenced Data for Users with Vision Impairment (pp 141-173).

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Universal Usability: Designing Computer Interfaces for Diverse Users. Wiley & Sons.
<http://cgis.cs.umd.edu/localphp/hcil/tech-reports-search.php?number=2006-22>