

QR Code: An innovative teaching learning tool

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Abstract

Quick Response (QR) codes are 2-dimensional barcodes invented in 1994 by Denso Wave. In the previous decade QR codes have gained recognition as an effective tool for advertising, marketing, product information and logistics etc. QR codes enable a fast, flexible, suitable, and user-friendly mode for students to access content and learning materials online. At present QR codes are used in the education sector only to access web sites with course information and study materials, directions to locations and business cards. There is need to explore possibilities of usage of QR codes efficiently in teaching learning process. The QR codes can be effectively used in day to day teaching learning process. The purpose of this article is to explore and study the teaching methods and processes that incorporate QR codes and mobile devices in education. In this study, how QR codes can be used in education is demonstrated. Creating and reading QR codes allows teachers to include them into their educational activities. The processes to retrieve or store QR codes are very simple and rapid, and with mobile devices, they are ideal educational tools for teaching and learning. The present study revealed that QR codes can support learning in different contexts with special emphasis on plant sciences.

Keywords: QR code, teaching-learning.

1. Introduction

The study of QR codes in education can be employed in the perspective of mobile learning. Investigation has been conducted on mobile learning all over the world however merely a few studies have addressed the use of QR codes in education (Law and So, 2010). Current studies shows increasing acceptance of the use of mobile technologies in teaching and learning (Wexler *et al.*, 2008). However, mobile learning (m-learning) operations are often heavily reliant on keypad. The prolonged and often clumsy methods of accessing stored information and services through the limited input functionalities of mobile phones are time-consuming, frustrating and affects acceptance of these m-technologies. To increase the impact of m-

deployments a number of institutions are using QR codes and Mobile Tags (MT) to provide learners with speedy and ready access to information and services (Ramsden, 2009) and formative assessments (Susono and Shimomura, 2006). QR codes connect digital resources to printed text this suggests the potential to enhance paper-based learning materials. These enriched learning materials can serve and stimulate students with diverse learning needs (Chen, Teng & Lee, 2010).

2. About QR code

QR code is the trademark for a type of matrix barcode (or 2-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical tag that comprises data about the item. The code consists of black modules (square dots) arranged in a square grid on a white background. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte / binary, and kanji) to efficiently store data; extensions may also be used. A QR code has ability to store information in both vertical and horizontal directions. It can be read from any direction in 360° through position detection located at the three corners as shown in Fig. 1.

Table 1 Capacity, Features, and Standards for QR code:

Developer	DENSO
Country	Japan
Numeric	7089
Alphanumeric	4296
Binary	2953
Kanji	1817
Major Features	Large capacity Small print out size High speed scan
Standards	AIM International JIS, ISO

F. Masalha (2014)



Fig.1. QR code sample

Step 2: Insert the proposed information into the QR Code Generator. For example,

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Step 3: The QR code generator or creator will generate the QR code for you as shown below.



3. Preparing and Reading a Document with QR Codes:

To make a document embedded with QR codes, the easiest mode to do is to generate the specific codes by means of some of the software's freely available from the internet. These images can then be embedded into the document at the appropriate places. If the mobile device does not build in any QR code reader, the user needs to download the right decoder from google play store and installs it on to the device. The following steps demonstrate the processes.

Step 1: To encode the required text/SMS/URL/Contact into a QR code, we can make use of some offline freeware's or websites available online that can generate the QR code. These include:

- QR-Code Studio
- Free QR Creator

Step 4: Save the generated image file (QR code) and label it (in .png format).

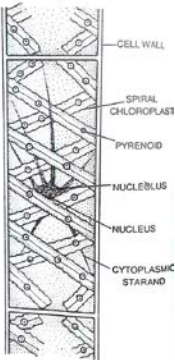

Step 5: Embed the saved image file into any presentation deliverables (power point presentation, worksheets, word documents, workbooks etc.).

Step 6: The android user need to install an application to decode QR code from google play store into the mobile device. E.g. Barcode Scanner

Step 7: To decode the QR code the user can just slide the decoder over the QR code area and the text will automatically be displayed.

4. Applications of QR code in teaching and learning plant sciences

4.1 QR enabled Specimen Cards

Department Botany		
F.Y.B.Sc.		
Practical No 1 Study of <u>Spirogyra</u>		Card No 1
	<p><u>Spirogyra</u>: Thallus structure: The thallus is haploid, multicellular, unbranched and uniseriate filament. All the cells of a filament are morphologically similar. Individual filament consists of a few hundred of identical cells placed end to end in a single row. All the cells are bright green and capable of growth, division and reproduction. In some species the filaments are attached to the substratum by a specialized basal cell called as hapteron or hold fast. The holdfast is colourless, may be lobed and rhizoid like structure that help to get attached to the substratum (e.g. <u>S. adnata</u>)</p>	

4.2 QR embedded lecture notes

Chapter III

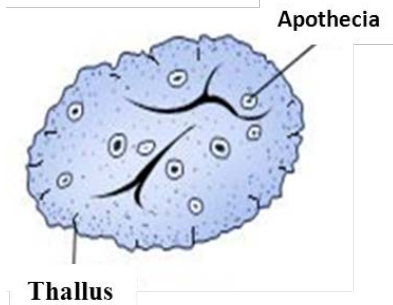
Lichens

Introduction

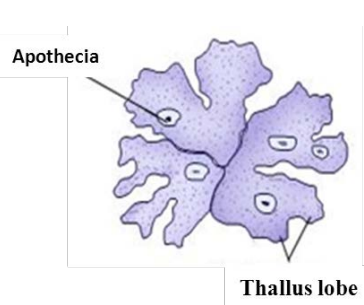


Types of Lichens

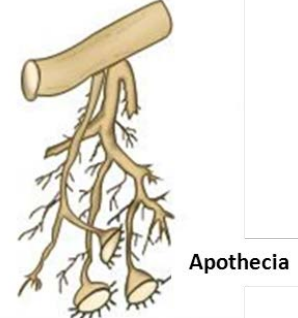
a. Crustose lichen





b. Foliose lichen



c. Fruticose lichen



4.3 QR enabled Museum Specimens

Department Botany Paleobotany Museum	
Specimen No. 026 – <i>Lepidodendron</i>	
	

Conclusions

QR codes have great potential in education. Some possibilities are demonstrated in this paper and there are a lot of creative ideas waiting for us to explore. Also, this paper can be served as the first step for the readers to explore this exciting topic of mobile learning.

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