



## USING QR CODES IN APPLICATIONS OF INFORMATION ACCESS TO CONTENTS OF DIGITAL ARCHIVE

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### ABSTRACT

In order to obtain cultural and creative material more conveniently and quickly, and to store the digital works from creators, combining quick response code (QR code) with digital archive is a feasible approach. In this study, we aim to transform the works with electronic technology into digital collection, and the uses QR code as an access media to digital cultural creations for viewers using mobile devices. This architecture is designed in accordance with the cultural and creative energy in local communities. Through saving the collections of local cultural resources, the purpose of promoting local cultural characteristics is achieved.

**Keywords:** QR codes, digital archive, cloud storage, mobile learning.

### Introduction

As Taiwan enters the era of digital technology, technology of digital archive has begun to spread and mature. Various cultural and creative centers and academic institutions also actively adapt to this new trend of transforming digitalized works. While museums positively move toward the digital age, even government agencies also enters the field of digital collection. Since digital archive requires specific technologies, most works are collected by major museums and academic institutions. However, for private creators, the degree of digitalizing works is not universal.

Since 2002, Executive Yuan, Taiwan, started to propel "National Science and Technology Plan of Digital Archives" to actively enhance the practices of knowledge management and heritage, promote resource sharing and set up the information sites of the digital collections. This project was jointly planned by the Ministry of Science, which aims to integrate the relevant experience of the previous executions. In order to provide a service of cultural preservation, resources from academic institutions and civil society organizations are also integrated. Enhancing the cultural quality of people and social groups helps Taiwan develop a digital preservation center for international culture and local characteristics. By preserving the local culture, communities and industries with local characteristics to create an information can be well developed, to create a friendly environment of combining cultural and creative outcomes with information technology.

Many domestic institutions, such as museums and libraries, use technologies of digital archive to digitalize the collections in institutions, increasing display efficiency and diversifying the educational functions. An exemplar application in National Museum of Natural Science is that, through browsers, people can view the contents of "Fields of Man and Nature in Digital Archives," to learn five types of information: zoology, geology, botany, algae and fungi specimen. By further integrating three

databases of "Multimedia Library", "Bank of Specimen Collection" and "Knowledge Collection", a library system based on the theme of natural science is constructed. One can browse, search and watch these contents repeatedly to learn the relevant knowledge effectively.

Since cultural and creative industries flourish in recent years, related contents have become important courses in nowadays education. In addition to the inherent teaching method from teachers, it emphasizes on students to cultivate their ability of independent creation and design works, based on life experience (Ministry of Education, 2000). Teachers are also expected to take cultural and creative knowledge as teaching theme, and design the related curriculum and activities. On the other hand, concepts of information technology gives assistance in solving problems in life to students, so developing diverse digital teaching resources is important as well.

Quick response code (QR code) is a square-shape code made up by lines, squares, and dots in black and white, with small squares on three vertices. These three parts are used to execute localization for decoding software. Users can read the data correctly by scanning the code in any angles without precisely aligning. After decoding, contents in QR codes are linked to texts, pictures, websites, or various information. To acquire more details, users do not need use a pen or a paper to record a long list of website address. By simply scanning the code with a mobile phone, one can complete purchase, browse blogs and obtain commodity information, which greatly enhances the convenience in daily life. In this study, we use QR code to access the digitalized works in cloud archive, so that outstanding works can be broadcasted to numerous viewers. QR code attached on the work enables people to view the creation process, learn the information of author and work, and even share the images. Also, we realize the importance of cultural and creative industries, and think it should be integrated with teaching and implemented in campus. Through

combining activities with education, creators and viewers have bi-directional communication, so that they have profound experiences in the cultural works and creation process. Based on the above reasons, there are two desired objectives in this study, linking to the information of cultural and creative works by scanning a QR code, and integrating the web platform into mobile devices. Users can search the work condition; edit author biography and relevant information with a QR code scanning.

## Literature Review

### 1. Mobile Learning

Wireless network and mobile devices, both being used without the limit of space and time, increase learning convenience, immediacy and flexibility. Students can conduct mobile learning through these devices, to achieve different effects from the traditional way (Walton et al., 2005). Since portable devices are convenient and induce learners' curiosity, mobile learning not only enhances learning continuity, but also improves the learning outcomes (Chang et al., 2011).

Mobile learning extends the learning field from classrooms to outdoor spaces. For example, students took photos of animals and sent them to teachers' e-mail boxes as the teaching slides, in a teaching activity held on Taipei City Zoo, Taipei, Taiwan. Students learned details of animals through the query function of the digital platform. Teacher could assign a task to students to find a specific animal at a precise location that was marked on the zoo map in the website page. The learning vehicles mentioned above are personal digital assistants (PDAs) and camera phones. The project, which named "ubiquitous mobile classroom", was a research focused on the sixth grade students executed by National Taiwan University (Li, 2004). From these studies, one can find the sites of implementing mobile learning could be in indoor and outdoor environment. In addition, by using mobile devices and designing appropriate teaching activities, learning efficiency and interactions between teachers and students are enhanced.

However, even if there are variant modes of mobile learning, most of them still belong to the traditional mode of teaching delivered from the teachers. A few teaching applications have been used for group discussions between students and peer learning. Therefore, this study sets the research target as the cultural and creative works from teachers and students. The authors can not only explain their own concepts, but observes the creations of others to agitate ideas between authors.

### 2. Digital Museum

Currently, international organizations set digital archive as the development priority, to show the attention to cultural characteristics and information industry in domestic region. Digital museum is one of the most important applications of digital archive. Technical support team in major museums digitalize the collections, and the collection information are used for a part of contents of entrance site of the museum. Therefore, visitors can have real visiting experience without coming in person. For example, collections of Taiwanese artifacts and related contents in British Museum, London, England, are digitally built in the website of the museum. This project was executed by National Taiwan University and Asia

Division in British Museum in 2008. Using the concept of digital collection to save the exhibits not only gives viewers a convenient way to access artifacts but indirectly extends their lives. In the future, the number of visitors to digital museums will pass the ones to practical museums. Also, because of the web browsers, the source audience extends from the local region to around the world (Hsiang et al., 2003).

Because current cultural trends all show the importance of digitized museum, "National Science and Technology Plan of Digital Archive" was proposed in Taiwan, 2004. National Palace Museum, Taipei, Taiwan, which collects more than 650,000 pieces of cultural relics, was choose as the chief executive unit of the national program. As the program progressed, there had been significant improvements in quality and quantity of digital collections. These items included images, texts, and Meta data. To provide a complete cultural learning environment, the museum authority further proposed "The E-learning program of National Palace Museum", whose main objective is to build digital museums in a variety of topics.

History of digital museum of has developed a considerable period. The collection of exhibits in these museums is easy to store and propagate, which has great contribution to promoting intercultural exchange. Most of museum collections are masterpieces, which are the crystallizations of human wisdom. However, with the universal implementation of cultural education, folklore has become the main source of cultural and creative works. Because of the very large quantity, how to categorize these pieces, maintain the quality of storage, and accelerate the number of digitized works, have become an important issue.

## Research Method

Among a variety of bar codes, QR codes have the best characteristics. In addition to the feature of large storage capacity, they also can be printed in small and scanned rapidly. The common standard of QR codes in Taiwan has met the requirement of ISO / IEC 18004: 2000 (Hsu, 2010). QR codes have a shape of square, with color in black and white. With the development of encoding technique and mobile cameras, the two-dimensional bars appear in different colors. The small squares located at three corners of QR code are used for localization for decoding software. Users are not required to photo the code at a particular angle to read correctly the information. Currently, some main applications in QR codes include: (1) automatically downloading personal information, such as address and phone number (2) downloading digital contents (3) quickly linking to websites (4) identity identifications and business transactions (Liang, 2009). There are many researchers and operators apply QR codes in education, tourism, commerce, navigation and other fields. The purposes are all aim to provide people with the most convenient way to achieve information exchange. Therefore, this study combines QR codes with the feature of smart phones, to design a system of digital archives. Students may leave the classrooms and move toward outdoor environment to experience learning directly.

## Research Results

This study fits with recent trends of cultural and creative industries as well as the concept of digital archive. Digital

archive emphasizes on good methods of digital conversion and storage, as well as simple mode of file accessing. The former aims to preserve cultural entities in digital form. The storage period and the convenience of culture circulation are enhanced. The latter gives the learners a convenient way of learning. When there are learning motivation for students, they can access and view learning materials in time. Thus, one can avoid losing the valuable learning opportunities duo to the limitations of time and sites. This study cooperates with the Network and Information Center, Tainan University of Technology (TUT), Tainan, Taiwan. Technical conferences are held regularly to control the development progress and record the specification items of the platform. Furthermore, relevant experts are recruited to participate the meetings and provide valuable advice for planning the main structure and system analysis.

### Conclusions

In order to obtain more conveniently and quickly cultural and creative materials, and to store the digital contents for a longer time, this study examines QR codes in digital archive application. Works from are preserved with electronic technology for digital collection. QR codes are used as an access media to connect these works. Research can effectively highlight the local community culture, and thus achieves the purpose of promotion of local culture.

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