A Research Project to Convert Chinese Traditional Calligraphic Paintings to SCORM-Compatible E-Learning Materials

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Abstract. The research project presented in this paper aims to meet the need for courses in Chinese traditional calligraphic art through the use of digitalized paintings. Thus, this paper delineates vital aspects associated in converting such materials to e-formats and the platform on which digital archives and digital learning may become possible. Moreover, the construction of a platform for integrating digital content with e-learning creates a frontier, opening up new resources in Chinese traditional calligraphic painting instruction.

Keywords: SCORM, e-learning, contents package, learning objects, Chinese traditional calligraphic paintings.

1 Introduction

The raw materials used for this research project comes from a wide range of sources including: teachers' designs, existing media, internet websites, commercial databases, and, most significantly, digital archives. The major institutions having participated in the national digital archive plan since its initiation in 2001 are the National Palace Museum, National Museum of History, National Museum of Historic National Records, National Library, National Museum of Natural Sciences, Office of Historic Taiwan Records, Academia Sinica, and National Taiwan University. Digital content thus shared have traveled afar to the four corners of the country as its residents, regardless of their distance from the institutions, take advantage of such a resource in research and instruction.

However, for the digital archive content to be effectively used by learners in the e-environment requires them to be further treated with value-additions. This is due to the fact that the metadata format associated with those existing digital archive contents differs in various fundamental aspects from what is needed in an interactive learning

environment. That is to say, the perspective associated with and the practicality arising from dynamic instructional settings are such that they necessitate digital archive contents to be additionally processed for their conversion to a format readily to be used for teacher-student interactive activities. In the conversion process, the raw digital contents themselves, along with the metadata format, would be specifically treated accordingly to the requirements put forth by the e-learning environment.

This project is made all the more urgent and imperative, in view of the drift in the trend reflected in the new wave of reformation in Taiwan's school education. Evidenced is the lack of courses offered to teach Chinese traditional calligraphy and paintings in elementary, middle and high schools. Courses, which would introduce students to this distinctive art form and engage them in appreciating and learning it, have been scratched because their importance and value have not been stressed. This dire situation feeds a corresponding lack of interest among art schools/departments in colleges, who no longer put emphasis upon Chinese traditional calligraphy and painting in their entrance examinations and favor Western art forms instead. Exacerbating this lack of interest is the fact that beginners who are learning art usually find Chinese traditional calligraphy painting more difficult than Western art. Therefore, the overall picture is rather bleak insofar as the popularity of Chinese traditional art forms is concerned. To provide some impetus to interest in calligraphy painting, it is critical to make these art forms widely and readily accessible to teachers and students through interactive activities. This project means investing major efforts not only to digitally preserve this valuable component of our cultural heritage for future generations to enjoy but also to present them in a user-friendly form to invite people worldwide to learn, practice, and advance Chinese art forms.

The goal of this project is to convert both raw materials and packaged teaching materials into SCORM compatible formats so that they can be shared openly. Moreover, art teachers at every level in academia nation-wide will be given an explanation about the benefits of our project product; offered incentives to try out our internet resources; and invited to use our research product in their courseware design, lesson planning, and classroom activities. Some noted paintings by Zhang, Fu and Huang are used as samples to illustrate how the product of this project would operate and function in the e-learning environment. This SCORM project aims to present Chinese traditional calligraphic paintings in an e-format that enhances art teacher-student interactions, instills public appreciation for calligraphic art, and inspires world-wide desire to learn the art.

2   Ressearch Purposes and Method

The purpose of this research project is to integrate digital archival and digital learning by analyzing Chinese traditional calligraphic paintings held in the National Museum of History and transforming them into value-added contents ready to be utilized as a online resource for e-learning. Practically speaking, this project has three major inter-related parts.

(1) To conduct investigation and surveys to determine the teacher-student needs regarding Chinese traditional calligraphic paintings.

(2) To analyze approaches to convert Chinese traditional calligraphic paintings into shareable learning objects and metadata.

(3) To construct a mechanism to convert between digital archive metadata and LOM metadata, and to establish a system to provide descriptions and package SCORM learning objects.

This research project employs the following in its methodology:

(1) Interviews and panel discussions with scholars, experts, and teachers. This research has benefited from interviews and discussions with fourteen scholars in the field and top high school teachers, in order to gather from them critical information in the concerned areas. Several copies of teaching plans have resulted from this project.

(2) Empirical Procedures. Based upon the above mentioned information and teaching plans, this project has designed lesson plans for demonstration. Raw archival materials have been analyzed and/or re-scanned to come up with learning materials. Administrative systems have been established to co-ordinate raw archival materials and lessons pool. Finally, this project invites teachers to share their input and come up with derivative lesson plans.

3   Results and Discussions

Based upon interviews and surveys, experiments, and lesson plans using Zhang, Fu, and Huang paintings, the research project has produced a collection of teaching materials in Flash format. Teachers and students using the teaching materials are encouraged to creatively make their own materials, so called derivative materials, by selecting parts and components from the collection and adapting them to their specific needs. Moreover, the research project has constructed an administrative system to integrate and co-ordinate Zhang-Fu-Huang paintings and teaching materials.

The following aspects of the research results are presented here below: Requirements Specified by Art Teachers for SCORM; Treatment of Learning Objects; Design and Description of X-System and X-Learning.

Requirements Specification

Scholars, experts, and teachers familiar with teaching art, expressed their requirements for the SCORM learning objects as follows:

(1) Image resolution. Paintings are expected to be presented in high resolutions. When magnified, they should still have high image quality.

(2) PowerPoint presentation format. For art teachers, the truth in the cliché comes pressing home: a picture is more than one thousand words. Accordingly, they

need PowerPoint presentations, which integrate well with other forms of e-learning resources, created with maximum possible clarity and flexibility.

(3)   Three important features:

   (a) user-friendly. Even teachers who are relatively computer-illiterate should be able to use those materials.

   (b) versatility. They would allow teachers to alter material contents in order to adapt materials for various settings.

   (c) Classification labels based upon difficulty levels. Teaching materials should be classified as basic, intermediate, and advanced, so that teachers can have a preliminary index in their search for the right materials to use.

(4)   Rich metadata. With a comprehensive set of metadata, teaching materials can be dynamically sorted and presented as relating to particular themes and topics. This would improve on the rather dry and boring static presentations in the past. Moreover, Chinese traditional calligraphic paintings in their e-presentations could be linked to resources in other disciplines to achieve a comprehensive inter-disciplinary sharing.

(5)   Art teachers wish that Chinese traditional calligraphic paintings would infuse a breeze of humanism into our high-tech society and show a way to provide low-touch realities to our post-modern society, which is permeated by scientific/technological and materialistic ideologies.

Treatments of Learning Objects

Learning Objects are established according to the three aspects as follows.

(1)   Digitalizing originals and units. We planned to use the metadata already existing for Chinese traditional calligraphic paintings and dissect them in order to obtain sub-units from them. Yet, we found out that the units thus obtained proved to be too small to be practically useful. Therefore, we have to scan the entire corpus of 181 pieces, establishing the same number of metadata and JPG files for them. Including the sub-unit components thus produced in the process, a total of 694 files are netted. Those metadata have been incorporated into the original files, with additional descriptions attached.

(2)   Synchronizing metadata with LOM. A cross-reference table is established for those metadata files and LOM. This is due to the fact that National Museum of History first lacked those LOM files.

(3)   Categorizing the Learning Objects. In order to have those learning objects to be readily searched, we have those items categorized according to contents and techniques of those Chinese traditional calligraphic paintings.

Design and Description of X-System and X-Learning

Two functional modules are included in this research project. One is the archive system, also called X-System. The other is called X-Learning and converts metadata into LOM and SCORM packages. X-System to administer archives and X-Learning to administer modular designs. The relationships between X-System and X-Learning can be depicted by Fig. 1. This research project includes the X-System to co-ordinate various metadata and archives as well as to convert metadata files to LOM. Moreover, it packages learning objects for them to meet the standards of SCORM. In other words, we incorporate digital archives and digital learning into one system. Descriptions of the system explaining its function and structure are as follows:
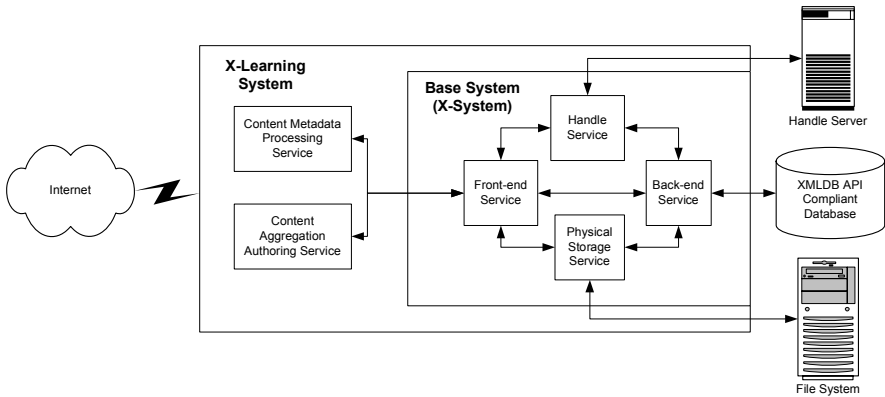

Fig. 1. The service architecture of X-Learning system

A. Infrastructural Needs

(1)   Digital Objects (DOs) stored in S-System can be described by more than two metadata formats.

(2)   The ability to deal with PIF. (Package Interchange File)

   (a) PIF storage.

   (b) Unzip PIF, release manifests, SCO, and assets.

(3)   Establish new PIFs.

   (a) Preview PIF contents (SCOs); preview DOs in X-System.

   (b) Select SCOs and DOs needed to borrow.

(c) Combine borrowed manifests with old ones to come up with new manifests.

(d) Preview integrated SCOs and Assets, and edit metadata.

(e) Insert API methods into SCO, including at least Initiate and Terminate.

(f) Package new manifests and SCOs into PIF transferable to LMS.

(4)   Practically speaking, the following functions should be available:

(a) Transfer ins and outs.

(b) Packageable contents.

(c) Re-packaegable contents.

(d) Establish metadata from contents (DOs should be at least describable by LOM and editable.)

(e) Insert SCO into API methods, with Initiate and Terminate included.

(f) Establish PIFs compatible with SCORM. Those PIFs should include imsmanifest.xml, control files (e.g. XSD), and reference materials embedded in content packages.

B. Metadata modules for Dos

(1)   Convert other metadata formats into LOM. (see Fig. 2)

(2)   If a DO is originally done for Learning Object (LO), it should be describable with LOM.

(3)   For LOs done for digital learning, their interfaces should be usable by DO makers to add some basic materials.

C. SCO and functions to insert applets

(1)   We can add to SCO API needed by standard SCORM 1.3.

(2)   We can use LOM to describe DO if it is SCO.

(3)   LO contained in digital learning materials should be open to additions from DO doers regarding basic information.

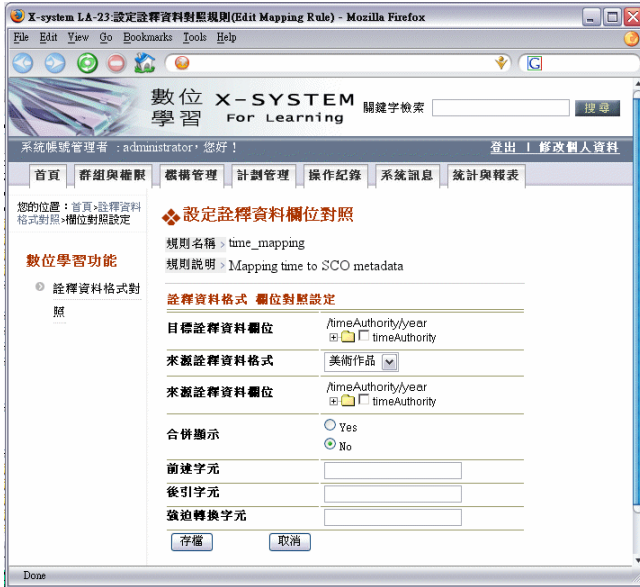(4)   The system is capable to package assets into SCO in accordance with SCORM 1.3 CAM. (see Fig. 3)

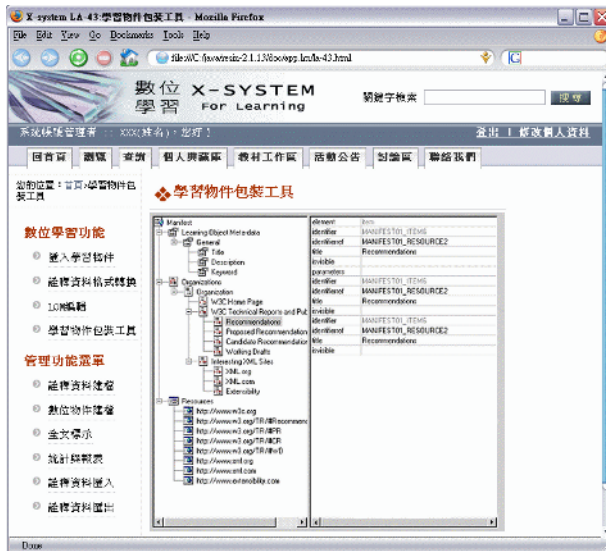**Fig. 2.** Mapping from archive metadata to LOM metadata in X-Learning system

Fig. 3. Authoring interface for packaging assets into SCO in X-Learning system

D. Content Aggregation (CA) Descriptions and Packages

(1)   The system is capable to package SCO and assets into CA in the standards set by SCORM 1.3 CAM. The constructed PIFs would include imsmanifest.xml, control files (e.g. XSD) and reference materials in content packages.

(2)   Metadata format from LOM can be used to describe CA.

E. Testing SCORM Packages

The fundamental goal of this research project is to convert archive items into learning objects. X-Learning system has such a capacity and can package files acceptable to other e-learning systems.

4   Conclusions

Some problems and insights discovered while converting Chinese traditional calligraphic painting archives into SCORM teaching materials are shared as follows:

(1)   LOM has a column for categorization. However, the categorization systems available, including those used by the Chinese Library Science Association, Dewey system, and American Congress Library, do not lend themselves readily to those paintings. LOM is suitable for categorization needs arising from universally recognizable materials. Applying it to those paintings is like swinging a samurai sword to kill a chicken. Therefore, it has become necessary for us to come up with a new categorization scheme for Chinese traditional calligraphic paintings, in order to bring out their techniques and contents, as well as the knowledge and scopes involved. Such new categorization, however, entails subsequent maintenance work.

(2)   The need to take new photos of the paintings. This tedious task of re-taking the photos becomes necessary due to the fact that, in the already existing archive photos, seals and inscriptions on the paintings are too tiny to be identified and analyzed. Taking new photos is something beyond our research's original scope; consequently, this research project took longer to complete than first planned. Based upon this experience, we recommend that all photographic works to be done on those paintings should include in their considerations the need for digital learning.

(3)   The future need to incorporate paintings from other museums. This is to meet the goal of making available eventually of all the paintings to art teachers in SCORM formats, so that their creativity in coming up with instruction materials and aids will be further enhanced. Based upon this on-going need, we recommend that paintings from other major museums should be similarly processed and their SCORM materials integrated into the existing pool, so that eventually they are conveniently accessible to teachers.

(4)   We strongly encourage teachers to make public and share the derivative materials they have developed. It is amazing how wonderfully their derivative works present themselves and lend to imaginative uses. Such public and open sharing would materialize a virtually limitless universe overflowing with quality courseware.

(5)   An ultimate goal in producing SCORM materials is for them to be transformable and hence reusable according to teachers' creative needs in different contexts and approaches. What learning objects teachers need in their specific course designs varies significantly by the ideals to which they are inspired. It is critical, therefore, for teachers to have the resources needed to come up with the widest possible range of learning objects. How much they would be able to take advantage of resources available in a digital learning environment is determined in turn by the effectiveness of search, administration, and re-use functions. To be able to digitally de-construct and re-construct a painting in a way most conducive for such functions, needless to say, becomes an imperative task in SCORM material productions. We should aim to produce SCORM materials of such ready access and quality that they meet the challenges arising from the soaring spirit and soul of art teachers in their instructional activities. We will strive towards a seamlessly integrated e-learning environment utilizing all possible digital hardware and software, so that teachers can be helped by SCORM to achieve the excellence they aim for in their instructions. Now, more than ever before, we are aware of the long way to go before we realize the maximum potentiality in SCORM.

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