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HOW TO SET UP A DIGITAL LEARNING CO-LABORATORY FOR CHINESE STUDIES BETWEEN THE UNIVERSITIES OF AMERICA AND CHINA

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Abstract. Similar curricula exist in the universities of America and China in the fields of Chinese economics, ancient China and Chinese archaeology, and university libraries in America and China hold strong Chinese collections that support research and teaching in these fields. This paper proposes setting up a digital learning co-laboratory for Chinese studies between America and China in order to enhance exchange for research and teaching in these fields and to increase the sharing of collections between the teachers and students of Chinese studies in both countries. The paper describes how to establish this digital learning co-laboratory including the construction of resources, the system framework and functions; how to resolve digital copyright issues; and the extensibility of this co-laboratory.

1 Introduction

When I worked in the University of Pittsburgh in the USA as a visiting scholar I observed two things about American universities and Chinese universities:

a. American universities and Chinese universities share similar curricula in the fields of Chinese economics, ancient China and Chinese archaeology. For example the University of Pittsburgh and Wuhan University both conduct extensive research and offer high quality teaching in these fields, and there are many famous professors in these academic fields in both universities.

b. University libraries of both America and China have rich collections in Chinese on Chinese history and economy, and these collections provide strong support to research and teaching. The unique history of each institution has resulted in library collections of different characteristics: for example, the collection in the library of Wuhan University has major holdings from mainland China, while the collection in library of Pitt mainly comes from outside mainland China (i.e., Taiwan, Hong Kong, Chinese communities in the West). Thus, the two collections complement each other.

These two properties are true of not only Pitt but also other famous American universities such as Harvard and Colombia, as they are also of famous universities of China, such as Peking University and Nanjing University. In order to enhance exchange for research and teaching in these fields and to increase sharing the collections between the teachers and students of both countries, I propose to design a sharing system between a university of the USA and a university of China. The main focus of this sharing system will be the fields of Chinese economics, Ancient China and Chinese Archaeology. The system will be an open sharing system, in which the faculty and the librarians of both America and China will cooperate to establish the resources, and the teachers and students of both America and China who major in these fields can share the resources and consult each other. We call this shared system "The Digital Learning
Co-laboratory for Chinese Studies Between America and China.” Other universities and libraries of America and China can join this system to cooperate and share teaching resources.

2 Resources in this sharing system

This “Digital Learning Co-laboratory” is a repository of learning information that includes different kinds of resources such as information about teachers, curricular information, papers, syllabuses, and Chinese collections.

The most valuable resources in this repository are the syllabuses and the Chinese collections, because the syllabuses reflect the teachers’ ideas and teaching methods of different universities. Teachers of both America and China could learn from this kind of information, which could also be referenced by students who major in the same fields in the two countries. The Chinese collections in this repository are the collections written in traditional Chinese and simplified Chinese that focus on the subject of the Chinese history and China economics written by different people with different views at different historical periods. The teachers and students of both countries can read these significant collections when they are in the process of teaching and researching.

This repository would also include primary resources. This kind of resource is firsthand information such as a book written in the particular era, statistical data related to Chinese economics, photographs of the history and archeology of China, etc. All of this information gives an accurate view of the events of history and provides an added visual effect for learners. If this information were made available on the Internet, it would be even more helpful for teachers and students.

Table 1. Construction of Resources

<table>
<thead>
<tr>
<th>No</th>
<th>Resource name</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher’s Information</td>
<td>Name, Title, Background, Articles, Curricula</td>
</tr>
<tr>
<td>3</td>
<td>Text Books</td>
<td>Bibliography, Abstract, Table of Content, Full Textbook</td>
</tr>
<tr>
<td>4</td>
<td>Reference Materials</td>
<td>Reference Books, Bibliography, Abstract, Table of Content, Full Textbook</td>
</tr>
<tr>
<td>5</td>
<td>Primary Resources</td>
<td>Ancient Books, Photograph, Statistics Data</td>
</tr>
<tr>
<td>6</td>
<td>Secondary Resources</td>
<td>Articles, Research Trends, Key Projects</td>
</tr>
<tr>
<td>7</td>
<td>Knowledge Database</td>
<td>Conception, Historical events, Eminent persons</td>
</tr>
<tr>
<td>8</td>
<td>Special Database</td>
<td>Qing History, etc.</td>
</tr>
<tr>
<td>9</td>
<td>Hyper Link</td>
<td></td>
</tr>
</tbody>
</table>
3 The System Framework

The system is an open system that uses OAI (Open Archive Initiative) and Open URL protocols to update metadata and access the object files. The system construction is a distributed model with the characteristics of concentration and separation, which is made up of two principal parts—metadata database and object files. All resources will be stored in different servers on the campuses of both shared universities.

![System Framework Diagram](image)

**Fig. 1 The System Framework**

**Item database:**

The item database is a metadata database, or resources storage that includes all items about curriculum, teacher, references, articles, knowledge, web site, bibliography, primary and second data, etc. All items will be described by DC (Dublin Core). This storage is established by any database like Oracle, MySQL, or SQL-Server and so on. There is just one database of metadata in this system, which can be established in any campus of both universities and can be accessed by all users of both shared universities.

If it is necessary to have two item databases separately established in two campuses to avoid Internet traffic congestion, the mirror function of the database management system can be used to update two synchronized metadata databases, allowing the patrons of both universities to access the metadata database at higher speeds.

Using the OAI protocol the item database can harvest the metadata from two object databases as a metadata harvester, and it can be retrieved by the other system or users as a metadata provider.

**Object database:**

The object database is a file server used to store all digitized archives and full text. There are two different object databases in this system that will be established in two campuses of the different countries. The object database includes E-books in PDF format, images in GIF or
JPEG format, and audio/video in MP3, WMV and RM format. Because these two object databases have the same structure but different content, each university will store their own digitized object resources in their local servers, and the information describing these digital resources will be harvested in the item database, so that registered users of both universities can share these resources with each other.

4 The system functions

4.1 The system retrieving function

The retrieval system has powerful functions to access the information. The retrieving function can apply a relative research between teacher and curriculum, curriculum and resources, textbook and curriculum, textbook and teacher, etc. For example, by entering the teacher’s name as the retrieval term, information about the teacher can be found; and by clicking on the “curricular” button in the same screen, the list of courses taught by the teacher will appear on the page; if the request “text book” is submitted, information about the text book will be displayed. This is what is known as the relative research function. Users can access all resources in this system from anywhere within the network via the Internet. All faculty and students of both countries can retrieve teaching information from this system via the Internet no matter where they are. This type of sharing is important and very valuable.

4.2 The reference function in the curriculum information

A “Curriculum information database” can be established in this system. The curriculum information concerning the same field of both universities will be stored together, including the names of the courses, introductions, syllabuses, schedules, lengths of study terms, credits, and examples of examinations. The professors in the same field of both universities will input the information into the database via the website of this system before the term begins. This information can be retrieved by the teachers and students to help them to understand and reference the teaching organization and the teaching system in the same field of both universities. This will help them to prepare for teaching and studying, let them extend the thinking and visual fields, and effectually enhance teaching exchanges.

4.3 Teacher information reference functions

Teacher information available in the same field at both universities will be stored together in this system. Teacher information includes the teachers’ personal information and their achievements in research and teaching. This information can be input and updated by teachers themselves via registration at the Internet site. The professors and students in the same field at both universities will pay close attention to information such as the articles, projects, achievements and awards in a given discipline. By visiting teacher information, the faculty and students can know and learn from each other, can establish relationships with each other, and can understand trends developing in the same field between the USA and China.

4.4 Textbook and reference materials reference functions

A “textbook database” and “reference materials database” can be established in this system. We can digitize textbooks and reference materials into e-book format and full digital text in these
three curricula. Certainly we must find methods to solve the digital copyright problem first. In the process of study and teaching, faculty and students can read this digital information anywhere and at anytime via the Internet through site registration. Digitizing all textbooks and reference materials has much value: it can solve the problem of shortages in print copies of course texts; and the faculty and students of both universities are able to reference the textbook. This should increase the efficiency of distance learning.

4.5 Primary resources reference function

Primary resource databases including vivid and accurate material related to “Archeology illustrations”, “Ancient books database about Chinese history,” and “Statistics database about Chinese economics” can be established in this system. These primary resources can be browsed by subject captions or searched by keywords. Teachers may retrieve primary resources and show the digital archives on the screen in the classroom immediately or a student may use these resources to do research. These digital archives will be a strong support to teaching and research.

4.6 The interactive and consulting functions

All contents in the system databases can be input and updated by the faculty member and librarian via the Internet with authentication and authorization. They can assign the bibliography of the textbook and reference materials; they can push object archives, such as PowerPoint files, Word files, e-book and other electronic materials into the database; they can make a link from the curricula to the textbook and reference materials, make a link from the bibliography to the object archives; and they can submit the request to the librarian. This interactive function is mainly based on the WEB database technology.

The interactive consulting function is reflected in the forum system. The forum system is a discussion area like the BBS. Students can raise questions and teachers can answer them in the forum. Teachers working by themselves can introduce discussed points into the forum via the Internet. All questions will be stored in the database and become a FAQ (Frequently Asked Questions) database that can be retrieved by students in the future.

4.7 The knowledge study function

The knowledge database will be established and updated by professors and librarians. All contents in this database are related to the issues of the discipline, especially in the curriculums of “Ancient China” and “Archeology of China.” Key concepts, events and persons will be added and described in detail. Some material objects with historical significance will be digitized and stored in the knowledge database. These resources can be displayed in different forms. Browsing this database can help the students broaden their knowledge level.

4.8 The document delivery function

This co-laboratory aims to digitize all resources related to the three curriculums. In the event that some authors cannot agree to digitize their own resources, the library will deliver the content to the users. The libraries of both universities must have a delivery system in use, and in fact many libraries of America and China have such delivery systems. For example, the library of the University of Pittsburgh has the Gateway System and the Library of Wuhan University has
the Document Delivery System. These delivery systems will be embedded in this teaching resource sharing system and will be used to serve the teachers and students efficiently.

5 The solution to digital copyright

Because of the number of books, papers, and materials to be digitized in this digital learning co-laboratory, establishing the shared system must be concerned with the issues of digital copyright. America and China both have the laws protecting copyright, with a stipulation that documents published 50 years ago (in China) and 70 years (in America) have no copyright restriction. Thus, ancient books and materials can be digitized, but all other resources except curricular information must comply with the copyright law. Finally, there are some resources that can't be digitized. To conform with digital copyright materials are handled by the four following methods:

(1) The bibliography, abstract and table of contents of any resource can be digitized without violation of copyright.

(2) The authors of books and papers must sign a copyright authorization; materials then can be digitized in full text.

(3) Public resources (like concepts, events etc.) are not governed by copyright and can be digitized.

(4) A teacher may enter course-related documents such as the syllabus, PowerPoint files, and examples of examinations into the system.

6 The major tasks that establish the co-laboratory

6.1 Establish the databases

The teacher information database: All teachers' information will be written by teachers themselves and translated into the two languages; the teachers or librarians will enter this information into the database and test it.

The curricular information database: To collect the curricular information of both universities, translate all information into both languages (Chinese to English and English to Chinese), and input it to the database. Under the current condition the curricular information in this co-laboratory will come from America because there is a lack of digital curricular information in China at this time.

The textbook and reference material database: First digitize the bibliography, abstract and table of contents; librarians at both of universities will use metadata to describe all information. Second, scan all pages that the author agrees to have digitized into full text; use the TIFF format to store the image; use OCR software to capture the characters and save them to the file system and translate the TIFF image to a PDF file.

The primary resources database: Mostly primary resources are stored in the library of China, so the librarians and teachers in the universities of China will cooperate to collect and organize these resources, and digitize them into different form, using the DC to describe the primary resources and input to the database. If some of the primary resources are in America they can co-operate with each other. Descriptions of these kinds of resources will be in both Chinese and English.
The Secondary resources database: Secondary resources focus on articles, research trends and key projects. The articles database is an index database that will collect articles from periodicals published in the last five years in English. The research trends database is a full text database that will collect the research achievements of the two universities during the last five years. The key projects database is a full text database that will collect information on the key projects of both universities. The research databases and key project database will use two kinds of language; the index term will use English and the contents will use the mother language.

Discipline navigation database: In the collection of the websites on the Internet, use DC metadata to describe the website, established navigation system and retrieval system.

The knowledge database: This database will be established gradually from concept to event, picture, voice and media. All information in this database will be described in two languages.

Special database: The special database collects the holdings of both universities on the subject of the “Qing dynasty;” some resources will be digitized to E-book if the copyright is securable.

6.2 Development of the management system

The management system will use the technology of the WEB database to control the teaching resources; registered users can update the different kinds resources if they are authorized. All processes including digitization, description, input and output, are based on the B/S function.

6.3 Development of the retrieval system

The retrieval function is as follows: from field to course; from course to textbook and reference material; from the course to the teacher; from the teacher to the course. This system handles retrieval in the knowledge database. All retrievals are based on the B/S model.

6.4 Development of the interactive consultant system

Using web database technology, we can realize the interactive function in reference and consultation on the net. Each point about reference or consultation will be determined by the teachers, according to the deferent content in the terms they set up, and they can update the discussion point via the browser. All discussion points, questions and answers will be managed by the database and accumulated in a FAQ database that can be retrieved by the students in the future.

7 Extensibility of this sharing system

Because this sharing system will be a research project in sharing collections across libraries and countries, it has important academic value in both teaching and research in these disciplines; it is also an exploration of how to expand the utilization of library collections. If this system can work well and prove its value for faculty and students, we can extend it to facilitate cooperation and resource sharing from one library to other libraries and other universities or other countries in the same disciplines.