STUDY OF MULTIMEDIA COURSEWARE BUILDING SYSTEM APPLIED IN ARCHITECTURAL EDUCATION

LI LI , JINGWEN GU

College of Architecture and Urban Planning, Tongji University
1239# Siping Road ,Shanghai, China
2005lili@gmial.com, *gjw1946@yahoo.com.cn*

Abstract. A new teaching model is constructed in the study, which can make students fully involved in the learning activity while keep the guidance from instructors. Compared with traditional courseware technology, it excels in following metrics:A framework to build multimedia courseware is constructed in the system, which helps instructors to customize their own courseware in a fast and convenient fashion；The system can be used to build flexible knowledge structure and complicated information trees, which matches the practical architectural knowledge system and excels the traditional one-way flowing process；A flexible database is built within the system. The courseware created by this system can read from the database and take information out of the database at any time

Architectural education has following characteristics:
The knowledge base for Architecture is a complex system with rich context and sophisticated structure.
All subjects are closely related with each other and in clear hierarchy.
The application of media is essential in education. There can be a large amount of media files that usually require high degree of accuracy.
Architectural knowledge system is blended with other enormous and deep ones in Art, Science and Technology with no distinct line between them.

This paper focuses on a Multimedia Courseware Building System specialized in computer-aided architecture education.

1. Technical Characters of This Research

1.1.FLEXIBLE DENDRITICALLY STRUCTURE

Architectural education requires the courseware with clear layers and flexible dendritically structure to fit in the hierarchy of architectural knowledge. The structure of the courseware should match that of design courses. The knowledge structure goes from the whole picture to details gradually, which is the same in architecture education. And the creating process of the courseware is open. New things can be added while old things can be updated at any time.

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Figure 1. Hierarchy of architectural knowledge

1.2.BUILT-ON THE FLY DYNAMIC DATABASE

The application of media is essential in architectural education, which requires a large amount of media files due to their high degree of accuracy. The transmission and storage of massive media files is a tough problem for a long time in traditional courseware technology and the bottleneck in the application of long-distance education in design courses.
This research applies the technology of building dynamic database on the fly to solve the problem.
The database is dynamic in the following ways:

1.2.1.*The dynamic building and Reading:*

 When the teacher is writing the courseware, the system automatically builds the database and stores part of the media file including address, property, description and pattern, etc.. When the student chooses the media file in the front-end, the system finds and reads the file from corresponding address with related tools, and displays its address, attributes, description and format.

1.2.2.*The linkage of the Foreground and Background:*

Whenever the teacher modifies the courseware in the back end, the database is updated simultaneously. Students are able to read the newest information at any time.

1.2.3.Flexible Resource Types:

In database, the character pointed to source address can be not only file pointers but also absolute or virtual file addresses.

1.2.4.The Economic Data Capacity:

The database contained in the courseware only stores addresses of the courseware-related media materials and does not copy the file into the database so the amount of files is reduced greatly and the quantity of the corresponsive files declines dramatically. The database is shown in the illustration below.

ID	目录	描述	类型	地址	文件名	相对地址	属性	发布
254	5 1 2	楼梯平面构成、3	ppt	C:\Documents and Settings\Admi	二、楼梯的构成.ppt	the moviepath&project\mydocument\二、楼	可选	□
255	5 1 3	楼梯大、中小型	ppt	C:\Documents and Settings\Admi	三、楼梯的施工工艺.ppt	the moviepath&project\mydocument\三、楼	必选	□
256	5 1 5	楼梯设计规定和	ppt	C:\Documents and Settings\Admi	五、楼梯设计.ppt	the moviepath&project\mydocument\五、楼	必选	□
257	5 1 6	楼梯扶手栏杆构	ppt	C:\Documents and Settings\Admi	六、楼梯细部表示法.ppt	the moviepath&project\mydocument\六、楼	必选	□
258	5 1 2	沪闵路高架道路	html	http://www.smca.com.cn/pinshu/	http://www.smca.com.cn/f	the moviepath&project\mydocument\http:/	可选	□
259	5 1 2	简单结构施工过	avi	C:\Documents and Settings\Admi	过程.avi	the moviepath&project\mydocument\过程.a	可选	□
260	5 1 3	施工过程照片	jpg	C:\Documents and Settings\Admi	施工.jpg	the moviepath&project\mydocument\施工.j	可选	□
261	5 1 3	施工过程照片	jpg	C:\Documents and Settings\Admi	施工2.jpg	the moviepath&project\mydocument\施工2.	可选	□
*	(编号)							□

Figure 2. The database

1.3.THE FLEXIBLE AND PRACTICAL WAY OF RELEASE

The courseware can be released in two different ways after it is built.
The first situation: when the computer that the courseware is made with is the server, the system can produce the learning courseware in the students' end automatically without packaging. The database for students end only contains the absolute address but not the file itself. There are two technical benefits: the courseware runs fast and the copyright is protected to some extent since the file can't be duplicated.
In another situation, when that computer that produces the courseware isn't the server, the learning courseware in the students' end needs to be run independently without that computer. So we package all the materials including the courseware and any related media material, put them in one folder, and change the absolute address into a relative one. Then this folder is complete and can be moved to any place and still runs as a complete package. Since the courseware contains only the file and the relative address, the running speed and the quantity of the courseware are still satisfying.

2. The Usage And the Effect

When the teacher is creating the courseware, he decides the structure and then completes it with substances, which matches the features of architectural education. And the creating process of the courseware is open, which accommodates new information while current content can be updated at any time.
The system provides a log-in interface for teachers and students to confirm their identities. After a teacher logs in, an introduction page appears and he can fill the basic information for the course like name, brief introduction and

the name of the instructor etc.. Then he can start creating his courseware. On the creation interface, the teacher can first build a frame, define and modify chapters and subchapters, add specific contents such as text, pictures, graphics, videos, slide shows, links to specific web pages and even the entrance to web service.

At the same time, he gave characteristics, contents and descriptions for designated media files. These properties play an important role as keywords in the future search or query.

The illustration below shows the identification and course information interfaces.
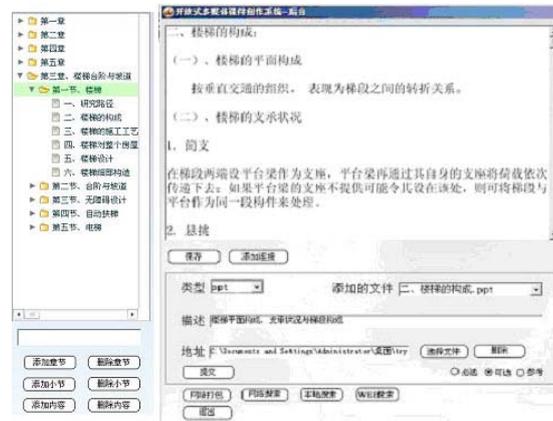

Figure 3. The pages of building category

Figure 4. The page on which the teacher gives properties to media files

Figure 5. The login interface and file paths for students

3. Feedbacks from Users

Professor Liu Zhaoru and the Ph.D candidate Chen Weiying from the College of Architecture and Urban Planning in Tongji University have tried this courseware system and give following feedback:

The system is compatible with various kinds of documents and easily links to other media in the database (including PowerPoint files that couldn't be linked when we used to make web pages).

Because the interface of the tool requires descriptions of the content of the database when the teacher is building courseware, that makes it easier for students to have better search results.

Students can get updated information as soon as the teacher changes the database. This is much better than a fixed courseware disk.

The multimedia courseware creation system based on dynamic database is much more advanced than the old PC version or web-based one in terms of dynamically updated information and space provided for students for further research.

In addition, we found that the modify tool of courseware structure for teachers could be improved. And the interfaces could be designed in a way that matches students' reading habits.

4. Conclusion

The multimedia courseware creation system provides tools for students to study and research individually or within a group. Based on the courses in architectural education, it is a completely new way of teaching by fully taking advantage of well-structured platform and tremendous resources provided by modern information technology and combine with developed theory of architectural education.

Teachers used to be the leader in the traditional classroom, and now they turn out to be a designer, an instructor, a participant, a consultant and a mediator. Not only does a teacher control the arrangement of knowledge, he also plans for the framework and the study process for students.

Acknowledgements

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