A KNOWLEDGE MANAGEMENT BASED RESEARCH ON DESIGN OF ONLINE LEARNING RESOURCE MANAGEMENT

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ABSTRACT
This essay, based on the immanent mechanism of knowledge sharing, researches on the description and management approach of learning resources, and it also establishes a double-vision management mechanism described separately both by media attribute and knowledge attribute, so as to offer a knowledge relation between learning resources. This mechanism can guarantee that teachers, in designing online course teaching, can conveniently organize and manage learning resources by creating a personal knowledge data or a list of knowledge points. In this way, teachers can better organize online courses.

KEY WORDS

1. Introduction
With the development of information technology, the interoperation between different learning systems becomes more convenient; the popularity of the open course mechanism makes more and more learning resources be stored and provided in online systems. However, it is just the abundance and diversity of the resources that makes it difficult to retrieve, use and reuse them. The existing learning resource management modes focus much on media management of learning resources but little on effective organization of knowledge points of resources.

2. Current Situation and Demand
With the increasingly higher level of availability of the learning resources, various kinds of learning resources with different learning objectives are released in online learning system. These resources may come from teachers’ accumulation, students’ sharing or specialized R&D departments focusing on learning resources. Consequently, teachers and students involved in online education are immersed in the sea of resources, and very often it is difficult for them to “join-up” these resources. Such overabundance of information and lack of integration also cause a huge waste of time.

Mainstream resource library focus on media management, but ignore the interrelation of resources. They usually list media information and teaching content of resources, but do not include enough description and effective management of the knowledge points in these resources. Therefore, these libraries cannot help teachers effectively organize learning resources when teachers have specific learning objectives or want to teach some specific knowledge points.

Moreover, the existing resource classification methods are not dynamic, which makes it difficulty in reusing resources. In mainstream learning resource management systems, resources are generally classified by disciplines, a method in Library and Information Science. However, this method is not suitable for interdisciplinary or comprehensive teaching because it may impede resource reuse.

Therefore, the resource management mode should transform from media management to knowledge management; and the purpose for constructing repositories should also transfer from managing resources to organizing resources.

3. Concept and Features of Knowledge Management
Knowledge management consists of two aspects. First, it is management of information resources. In this sense, it is the further development of information resource management. Second, it is management of people. Knowledge does not only come from coded information, but also from some uncoded knowledge in human mind. Thus, knowledge management also includes the implicit knowledge in human mind.

The basic features of knowledge management are: 1) Knowledge is conveyed by information resources, and knowledge management is development of resource management. 2) Knowledge consists of explicit knowledge and implicit knowledge and they are mutually transformable. 3) The purpose of knowledge management is, by means of knowledge transformation, knowledge sharing, and knowledge exchange, to promote innovation, obtain added-value from knowledge and ultimately improve
individual capability. 4) The process of knowledge management includes knowledge acquisition, knowledge storage, knowledge transformation, knowledge application, knowledge sharing, knowledge exchange and knowledge innovation and so on. The above features are interrelated, and as a whole constitute knowledge management system.

To conclude, the idea of achieving knowledge transformation and innovation by knowledge management technology can benefit continuous enrichment and recombination of online learning resources, optimize resource organization mode and also enhance the quality of online courses.

4. Main Process of System and the Solution

4.1 Process Analysis of Learning Resources Management

The focus of learning resource management based on knowledge management is to restructure and arrange resources by way of managing learning resources. Figure 1 shows the process of leaning resource management based on knowledge management.

![Figure 1 The process of knowledge point management and resource organization](image)

- Resource entry and resource description: in the system, enter the media attribute, knowledge point description of learning resources, and correlation attribute of knowledge points.
- Resource management: learning resource management consists of management by media type, by content and knowledge points of disciplines and by classification made by different users.
- Resource files storage: physical storage of resources.
- Resource storage in repositories: correlate the resources entered with resource files, and then release the resources in the system for users with access right.
- Resource sequencing: teacher users can, based on their access right, arrange their learning resources, and set up a sequence of teaching activities and organize their online courses.

4.2 Process of Releasing Online Resources by Teachers

Teachers, after the uniform identity confirmation, log in the learning resource management system. In the system, they can set up personal knowledge data, with the help of knowledge correlation diagram of personal data offered by system, to search for resources and work on special topics. They can also classify resources with access right under different topics, and then publish these resources on line for the use of learners. The process is showed in figure 2.

![Figure 2 The process of releasing resources by teachers](image)

- Personal resource library: on the online learning resource management platform, teachers can enter and manage personal teaching materials, and then establish a personal teaching repository.
- Knowledge point correlation diagram: based on the correlation of knowledge points, in teachers’ personal repositories, knowledge point correlation diagrams can be automatically displayed, and then with the help of such diagrams, knowledge point related learning resources can be tracked.
- Instructional topics: in order to organize online courses, in personal teaching repositories, teachers can formulate special topics and design contents within the third-level headings on these topics. On each level learning resources in personal repositories can be correlated; or in the whole learning resource management system, teachers can correlate resources on these topics and make proper restructuring for them.
- Releasing resource sequence: the restructured resources, as a resource sequence or a special topic, can be released for the use of relevant learners.

4.3 Process of Using Resources by Students

Students can use online learning resources on the Learning Resource Management platform and they can also use learning resources on different subjects by themselves based on access right. They can learn subjects and resource sequences available for them, and store resources they are interested in into their personal knowledge point bases. The process is showed in figure 3.

![Figure 3 The process of using resources by students](image)

- Personal knowledge point repository: when students use resources, they can establish knowledge point repository of relevant resources. The knowledge points in repositories are resources they use. The knowledge correlation diagrams in knowledge point repositories are independent of topics, and they are simply for helping students to organize knowledge.
• Resource topics: students can research and study on resource topics available for them. Resource topics may consist of structure and relevant resources.

4.4 Solution of Learning Resources Description

In the management of learning resources, an important task is to describe learning resources. Learning resource description is a framework. By describing attributes of learning resources and correlating resources, this framework sets up inner links between learning resources, so that all learning resources can be managed and reconstructed.

In this research, we establish a two-version-description method. In this method, the attributes described in learning resource description consist of two kinds of visions: media and knowledge. The media attribute focuses on describing, from media perspective, physical attributes of resources, such as media type, storage capacity and technical parameters. Media attributes can be used to better manage and release learning resources. The knowledge attribute concentrates on describing knowledge content of resources from knowledge management perspective, such as information about discipline, knowledge points, and description of resource content. Knowledge attributes are mainly used to better incorporate resources into online courses.

Figure 4 shows the correlation of resources under the structure of double-vision attribute of learning resources.

As showed in figure 4, the knowledge attribute of resources A includes attribute of preliminary knowledge, which is used to describe the prerequisite knowledge for leaning resources. The value of the knowledge attribute of resources B matches the preliminary knowledge of resources A. Therefore, in the knowledge management of learning resources, resources B can be regarded as the prerequisite learning resources for resources A, and offer information for teachers and learners. In this way, a knowledge connection or semantic connection between resources A and B can be established. Similarly, in the process of knowledge management, if the value of resources A content tag is detected to be overlapping with that of resources B, then the repository will automatically point out that these two resources are correlated.

5. Key Technology Points

5.1 File Transfer Mode When Uploading Resources

Uploading large files is a key function of learning resource management system. It is highly likely that the browser is sluggish or unresponsive when uploading some large learning resources such as teaching videos, screen records, multimedia courseware with videos. The uploading sometimes may fail, which very often frustrates the users. This is a common problem that troubles software developers of learning resources.

This system adopts SWFUpload, an open source JavaScript library based on Flash Player. It supports simultaneously uploading multifile without the need of refreshing the web, like AJAX; it shows the uploading progress; it can restrict the size, quantity and type of uploading files; it is compatible with some JavaScript
libraries such as jQuery and Prototype; it supports Flash8, Flash9, and Flash10.

5.2 Resource Description and Package Standardization

Learning resource management system needs to meet the need that the resources of different systems can be shared and interoperable. Learning resource sharing refers to that one learning subject can be used in many learning systems; system interoperability means that different systems and modules can exchange and use information with each other. To describe and organize learning resources by standardized approaches is an essential way for resource sharing and system interoperability.

There are many standards to describe resources, but presently, the metadata description standard of resources is an important one for standardized learning resource description.

Since in reality learning resources presented to the users generally consist of learning subjects from various levels and with various granularities, the rules for organization, storage, correlation, restructuring and decomposition among learning subjects are very important.

In the resource description, this system adopts GB/T 21365-2008, Learning Object Metadata, and refers to the international standard for learning resource metadata ISO/IEC 19788-1 and 19788-5; in resource organization and package, this system refers to GB/T26222-2010 Content Packing and ISO/IEC 12785-1, 12785-2 and 12785-3.

5.3 Visualization of Knowledge Point Correlation

The visualization of knowledge point correlation shows that the system keeps to the principle of knowledge visualization. In learning resource management system based on knowledge management, in order to transform implicit knowledge to visible form, it is necessary to visualize the knowledge correlation between knowledge points.

In order to help students with different discipline backgrounds to intuitively understand knowledge point correlation of learning resources and to improve their understanding and enhance their capacity for the utilization of learning resources in the system, we connect internal expression of knowledge with formalized expression by using a group of visual objects, which means that we visually present the internal expression of knowledge to users by a group of visual objects such as icons and tree diagrams. This approach provides intuitive understanding for users to build up personal repositories, so that the efficiency of acquiring learning resources can be enhanced. This system uses concept map to describe knowledge relation among learning resources.

5.4 Semantic Retrieval of Resources

As an emerging technology, semantic web technology endows information with well-formed semanteme, and also enables people and machines to cooperate with each other with mutual “understanding”, so that a strong technical support for personalized and automatic learning can be provided. In order to realize genuinely personalized online learning, we should establish a personalized and active learning service system by using semantic web technology, active service technology and customized and timely teaching strategies that meet individual needs.

The semantic retrieval of learning resources is the trend for research and development of learning resource management, and it is also the direction for the future development of this system.

6. Conclusion

Beside the main process of learning resources management, we establish a two-version method to describe both the media attributes and knowledge attribute of learning resources. This method can demonstrate the correlation among resources for users to reuse or re-organize these learning resources.

We pay more attention in file transfer mode when uploading, and adopted SWFUpload, an open source JavaScript library based on Flash Player to support large files uploading.

We followed the international standard to describe resources, and choose the ISO/IEC 19788-1, 19788-5, 12785-1, 12785-2 and 12785-3 to solve the description and package problems.

We used visualization technology to demonstrate correlation among resources.

References


