Research on the Integrated E-learning Based on Knowledge Management

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Abstract—With the development of Multimedia and networking as well as their extensive application in educational field, the web-based education has been concerned by educational researchers. Against this background, more and more E-learning systems have been established to encounter some bottlenecks of traditional learning. However, many shortcomings of existing e-learning platforms have been exposed out. In this paper, an integrated E-learning platform, providing many web-based, multi-platform tools, is introduced based on knowledge management. We present the architecture of the platform, and then try to analyze the development environment and application systems related to the integrated platform. The user evaluation and the application effects are also analyzed.

Keywords-E-learning; Integrated platform; E-learning environment; Knownledge management

1. Introduction

With the global communication and Internet connection speed, web content has grown richer and more interactive for users. It has certainly changed the way we acquire knowledge. Learning is no longer the same as before that limited to lessons in the classroom. E-learning is seen as a future application worldwide as it promotes life long learning by enabling learners to learn anytime and anywhere. And E-learning platform is becoming a field of research that deserves the attention of the teaching and research community, so more and more universities have been invested a huge amount of resources to implement their e-learning platform or environment [1]. However, the traditional E-learning system, which is used to deliver and management contents and learning, can no longer provide the processes required to sustain the interest of a student as he learns. As a result many e-learning facilities ended up as merely file servers [2].

Recently, blogs and personal pages have recently emerged as popular uses of the Internet for people to learn, share and interact with people from all walks of life across the world. And with the popularity of E-learning increasing among academic and training institution, learning and knowledge building have become a highly integrated and interactive global process. For this reason, integrated E-learning platform appears as a result of the efforts to make a step forward towards a more effective and quality E-learning, which presents an opportunity to enhance learning as to create virtual environments where students and teachers can share knowledge. It is very important to design an efficient E-learning platform for teaching, learning, resources, and administration [3-4].

From the beginning of this century, Ningbo University has established many web-course learning systems, teaching affairs management systems, roll management systems and digital library systems. But the E-learning environment has not been built up, because these systems related to E-learning are mutually independent with inconvenient software. Teachers are more willing to build a network classroom based on a personal website with security risks for interaction with students [5-6].

In this paper, we present our integrated E-learning platform focusing the attention on the design, development and implementation. The platform supports the creation of a self-learning and innovative learning environment with the aim of providing new ways of user interaction and data representation in a knowledge-based environment in which teachers and students cooperate to share knowledge when each one has his or her own relevance within the entire learning process.

The rest of this paper is organized as follows. Firstly, some details of the architecture of the e-learning platform system are described. Secondly, application environment of the integrated E-learning is then presented. Thirdly, application systems of the platform are introduced. Fourthly, the platform integration with other systems is described. Fifthly, the application effects of the platform are analyzed. Lastly, this paper concludes and presents areas for future work and improvement.

2. Architectural design of the platform

The integrated E-learning platform architecture is composed of four layers, namely data infrastructure layer, data collection layer, teaching service layer and application layer, as shown in Figure 1.

The infrastructure layer, made up of all the basic network support environment devices and systems, is responsible for providing some software tools for teachers to complete WEB courseware and streaming media courseware, which can be very convenient and effective for accumulating teaching resources.

The network storage services based on the collecting layer of digital resource are established to provide document
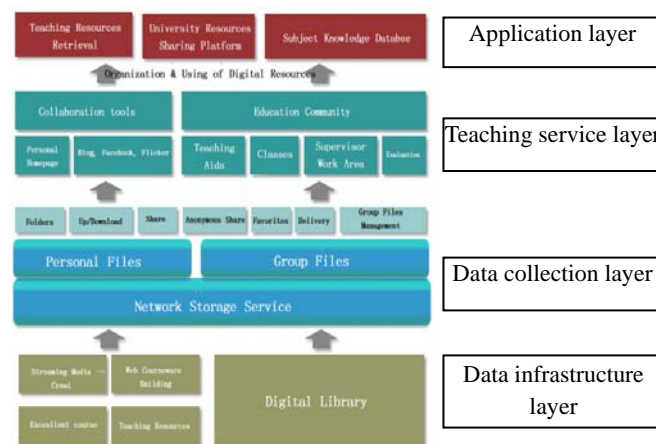

Figure 1. Architecture of the e-learning platform

retrieval services for teachers and teaching teams. And the resources can be shared and collected by residing in an E-learning system or a learning management system and can be used to store and manage its content.

The teaching services layer includes the following two aspects.

It provides a sharing platform with a set of software tools for teachers and students to publish a variety of information through personal home pages or blogs. The design makes use of standard existing hardware and software so that new computing resources can joint the platform easily to reduce cost and complexity.

In addition to teaching outside the classroom, the daily interaction between teachers and students is also essential. The purpose of the establishment of classes and mentors' work areas in the teaching service layer is to meet the needs of students and teachers interact daily. Extra-curricular learning and sharing content between the groups are recorded, such as notification, discussion, job, courseware, documents and web conferencing. And the school evaluation system is used to monitor and control the teaching process.

The function of education application layer is to enhance the teaching service to the university level by accumulating digital resources and teaching knowledge.
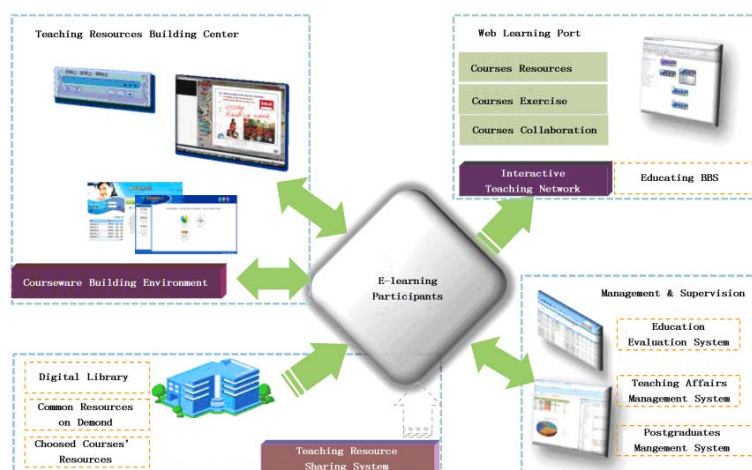
Figure 2. Application environment of the integrated e-learning

3. Development of the E-learning environment

Figure 2 shows the integrated E-learning environment of Ningbo University, which is divided into five parts, Teaching Resources Building Center (TRBC), Web Learning Port (WLP), Teaching Resources Sharing System (TRSS), Management & Supervision System (MSS) and E-learning Participants System (EPS).

TRBC takes central place in our hierarchical model and gives teachers various tools to build teaching contents. Students and learners can access WLP to get the teaching contents and involve online discussion board with their instructors and peers upon their own convenience. TRSS give well-structured information support to teachers and students. For the admin personnel, they act on administration roles of online matters via the MSS.

With the flexible and easily extensible model, which is constructed in a way that its five main parts are strongly independent one from another. Thus, any changes or extensions of one of them do not reflect in others one. It allows easily to add new requirements and to improve the adaptation engine without necessity to change the model.

4. Application systems of the platform

The integrated platform is a teaching assistant and collaborative platform to implement online teaching and learning use of advanced network technology. It can provide network storage space and a certain corresponding production tools for teachers and students, with which teachers can settle teaching resources, show their best courseware and exchange each other's learning experience.

With the platform teachers can use various types of resource of the sharing system, such as producing outstanding courseware in the production center, interactive teaching with students in the learning portal, and discussion and Q & A in the community forum. Students can acquire knowledge from the teaching resources sharing system, and communicate with teachers and students. In addition, students can also help teachers create courseware and evaluate teachers and management. And managers can supervise and manage the process of teaching and learning.

The advantages of the platform and its features can resolve many issues and problems related to the use of current e-learning system. However, related systems included in the integrated platform are described as follows.

4.1 Portal system

The E-Learning Portal, sits on top of a variety of application system, is not only the unified access point for all application systems, but also the information platform where and all kinds of information from the e-learning platform can be released and collected. Information integration and releasing, application integration, single sign-on, content customization and personalized services are included in the portal to demonstrate the application information of the digital learning platform for teachers and students, which can

effectively fill the gaps between various applications and also provides many valuable added features, such as security, search, personalization and so on.

4.2 Virtual Classroom System

The virtual classroom system, which enables inter-school academic lectures and video conferencing, has the function of interactive video teaching. When teachers go abroad on a business or a meeting, remote instruction between teachers and students, for example, video exchange, text dialogue, voice answering, PPT presentations, desktop sharing, document and file transfer, etc., will be achieved through the Internet-based "video class". In addition, it also has the function of simultaneously recording class content that can be automatically changed into courseware for students to download.

4.3 Learning Management System

Generally, learning management system includes curriculum resources management, curriculum training, curriculum collaboration, a variety of academic information and student data management.

4.4 Resource Management System

Resource management system allows teachers to achieve issuing and collating of teaching resources. In this way, accumulating, sorting and sharing of curriculum resources will become easier. Resource management system is connected with the digital library of Ningbo University so that students can retrieve and use digital resources more easily.

4.5 Bulletin Board System

BBS in this platform has a "campus community" feature. Using this system, faculty or department managers can not only issue notices and manage information resources, but also design a home page with faculty / department's features. In addition, BBS can also be used for a certain unit or groups of students to improve the efficiency of the daily work.

4.6 Teaching Evaluation System

The teaching evaluation system includes teaching assessment subsystem, student learning assessment subsystem and teaching management evaluation subsystem. The purpose is to evaluate the performance of teachers, students and administrators in the integrated digital learning platform.

4.7 Multimedia Rrecording System

In order to construct the Multimedia recording system, many recorded components have been added to the original equipment in the school multi-media classrooms, conference rooms and lecture halls. Without teacher intervention, teaching process, including teachers, audio, video, and screen and writing on the blackboard, has been recording into courseware directly. Recorded Multimedia files can be easily embedded in the Web pages and courseware.

5. Integrated with other systems

The platform is integrated with the unified authentication platform. The user name and password of the E-Learning platform are consistent with the school's unified authentication platform.

After integrated with the common data platform, teachers, students, organizations and other basic information of the E-Learning platform are extracted directly from the common data platform.

Digital library resources and services are integrated with the E-Learning platform to build all kinds of teaching test database.

Integrated with the Educational Management System, courses, classes and other information of the E-Learning platform are taken from the educational management system.

E-Learning platform are integrated with the Graduate Management system to ensue that the graduate courses, instructors and other information are the same with that of the Graduate Management system.

6. Analysis of the application effects

6.1 Satisfaction Survey

Defining actual benefits from the use of learning environments is a meaningful matter. After a period of application and practice, this paper uses the user evaluation and the statistics of the integrated platform to analyze the application effects. A total of 208 questionnaires were issued, and 201 were recovered, of which 195 were valid with 100% effective rate. Table 1 shows that the platform has stimulated the interest of learners and improved the efficiency of the E-learning. Students and teachers of Ningbo University generally hold a positive attitude on the platform, and actively participate in various learning activities.

TABLE I.   THE EFFECT SURVEY OF THE PLATFORM APPLICATION

No.	Question	Strongly agree	Agree	Disagree	Indifferent
1	The platform increased interest of learners	28.3%	63.6%	3.2%	4.9%
2	Content of the platform is very complete and systematic	19.8%	58.4%	12.3%	9.5%
3	The problems in the learning process can be solved in time	23.6%	62.8%	12.5%	1.1%
4	Learning resources can be quickly and accurately found through the platform	32.8%	56.3%	6.1%	4.8%
5	Sufficient resources improved the learning efficiency	29.3%	54.7%	10.7%	5.3%
6	The platform can enhance exchange and communication between the teachers and students,	26.3%	52.6%	11.6%	9.5%
7	Write a log on the platform will help learning summary	24.6%	53.1%	19.8%	2.5%

TABLE II.   STATISTICS OF LEARNING ACTIVITIES (OCTOBER, 2010)

Learning Activity Classification	Search	Browse	Read	Writing	Administration	Communication	Service	Total
Participant number	636	2059	744	177	99	406	64	4185
%	15.2%	49.2%	17.8%	4.2%	2.4%	9.7%	1.5%	100%

Through tags students can quickly find a common interest with their peers, discussing topics of interest and sharing of resources.

With the digital resources of the platform, teachers and students can receive the resources conveniently and need not look at every page of a web. Moreover, learners can maintain control of their own learning to find problems and correct their own learning goals.

The integrated E-learning platform based on network promote personal knowledge accumulation and group knowledge sharing, which can improve learning efficiency, facilitate the innovation of knowledge, and then enhance the core competitiveness of individual and group.

6.2 Statistical Learning Activities

Student learning activities on the platform can be divided into search, browse, read, writing, administration, communication and service. As shown in table 2, students engaged in the platform mainly for cognitive learning activities, with small part of students for meta-cognitive and emotional exchanges.

7.   Conclusion

Compared with school education, wed- based education makes a great change in its space, time, method of teaching and learning. The integrated E-learning platform is considered to be a good way to support teaching and learning activities based on knowledge management. In this paper, we have presented an integrated E-learning platform interacting and participating in the educational process, which can be the answer to the many challenges faced by today's E-learning administrators and implementers. The goal is to build a comprehensive teaching, research, service, innovation and network interaction platform through further integration of the school and outside of teaching, research, country, industry, policy, demand and other digital resources and learning courseware.

And the users survey results of the learning platform show that the vast majority of users are satisfied with the platform. However, there are still some problems in the design and application. Therefore, research efforts to improve the features of the E-learning platform will be continued. And we believed that the services and functions would be continuously extended to cover users' requirements.

8. References

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