A Web 2.0 Based
Computer Knowledge Learning Platform

Yuanxin Ouyang[1], Chao Li[1], Huan Li[2], Pingan Zhang[2], Zhang Xiong[1]

School of Computer Science and Technology

Beihang University

Beijing, China

[1]{oyyx, licc, xiongz}@buaa.edu.cn, [2]{lihuan101516, zhangpingan2005}@163.com

Abstract—**Traditional web-based online learning systems usually focus on the dispatch of knowledge, and lack of ways for students to get involved. Introduction to Computer Basics (ICB) is one of the first professional courses for freshmen majored in computer science, as well as information technology. To make the learning platform of ICB more helpful, a Web 2.0 based computer knowledge learning platform is presented, which changes the focus from course content to the students' participation. Web2.0 elements including personal and group spaces, wiki cyclopedia, interest mining and personalized recommendation, and RSS resource subscription are integrated. The platform has been put into use already, and got satisfaction from both teachers and students.**

Keywords-learning platform; Web 2.0; blog; wiki; RSS

I. INTRODUCTION

With the development of web techniques, distance education and web-based online learning system have become more and more popular, and can be found every where. While all these existing systems are lack of ways for students to get involved. In traditional distance education systems, knowledge is dispatched in one-way, and feedbacks can be hardly collected in time. Introduction to Computer Basics (ICB) is one of the first professional courses for freshmen majored in computer science, as well as information technology. This course is designed to make a detail and systematic preview of relevant fields. A successful ICB course can even make positive and effective influences on the students' occupation programming. To make the learning platform of ICB more helpful for the students, a Web 2.0 based computer knowledge learning platform is presented.

The rest of this paper is organized as follows. Section 2 analyzes the aims of computer basic education. Section 3 summarizes Web 2.0 technology. Section 4 presents the architecture of the learning platform. Section 5 discusses the key components of the platform. Finally, some conclusions are drawn in section 6.

II. CHARACTERISTICS OF COMPUTER BASIC EDUCATION

Both computer science and information technology are new and developing academic subjects. Being the introduction course of these subjects, ICB has the following characteristics.

Timeliness: Computer software and hardware products are upgrading with high speed. The ICB course should keep updating with the leading edge of the relevant fields. Otherwise, it will be ignored by the students.

Comprehensiveness: Computer has become an irreplaceable tool in every field of the society. To meet the development requirement of this information age, the ICB course can not keep restrict to computer knowledge itself.

Difference of student ability: In China, the education condition of computer are various in different provinces and regions. As a result of which, the computer basis and operational ability of students are unequal. Some of them even do not have much opportunity to browse internet before coming to university.

Influential: Being the introduction course of computer specialty, the teaching effect of ICB course directly influences the students' idea and comprehension of the specialty, even their occupation programming and job selection in the future.

III. ABOUT WEB2.0

Web 2.0 is a term describing the trend in the use of World Wide Web technology and web design that aims to enhance creativity, information sharing, and, most notably, collaboration among users [1]. These concepts have led to the development and evolution of web-based communities and hosted services, such as social-networking sites, wikis, blogs, and folksonomies. The term became notable after the first O'Reilly Media Web 2.0 conference in 2004[2, 3]. Web 2.0 has numerous definitions. Tim O'Reilly regards Web 2.0 as business embracing the web as a platform and using its strengths [3]. Technologies such as weblogs (blogs), wikis, podcasts, Really Simple Syndication (RSS) feeds (and other forms of many-to-many publishing), social software, and web application programming interfaces (APIs) provide enhancements over read-only websites.

Web 2.0 websites allow users to do more than just retrieve information. They can build on the interactive facilities of "Web 1.0" to provide "Network as platform" computing, allowing users to run software applications entirely through a browser [3]. Users can own the data on a Web 2.0 site and exercise control over that data [3, 4]. These sites may have an

"Architecture of participation" that encourages users to add value to the application as they use it. This stands in contrast to very old traditional websites, the sort which limited visitors to viewing and whose content only the site's owner could modify. Web 2.0 sites often feature a rich, user-friendly interface based on Ajax [2, 3], Flex or similar rich media. The sites may also have social-networking aspects [3, 4].

IV. PLATFORM ARCHITECTURE

Traditional web-based learning platform usually just focus on information publishing, e.g. download service of teaching materials. Personalized elements like interactive learning are omitted, which makes the platform cannot attract the students and offers limited help to the course study [5, 6]. To deal with the issues above, Web2.0 technology is adopted in the implementation of our learning platform.

In the design of our platform, the following principles should be considered.

- The learning platform should be a supplement part of the classroom teaching, and should have benefit in improving teaching effect.

- Knowledge teaching should be combined with occupation programming, and focusing on the problem concerned by the students.

- Enhance the vitality and extend the life cycle of the course, make the platform useful through the entire bachelor period of the students.

As shown in figure 1, our learning platform is based on Model View Controller (MVC) layered pattern, and designed according to the Spring/Struts architecture. To meet the personalized requirement of users, the framework is based on Portal technology, which provides a Presentation Layer to implement personalization, Single Sign On (SSO), integration of content from different resources, etc. All the platform functions are presented to be custom-made channels in different Portlet windows, and the appeared contents are defined by the users. On the basis of existing traditional learning platform, Web2.0 elements including personal and group spaces, wiki cyclopedia, interest mining and personalized recommendation, and RSS resource subscription are integrated.
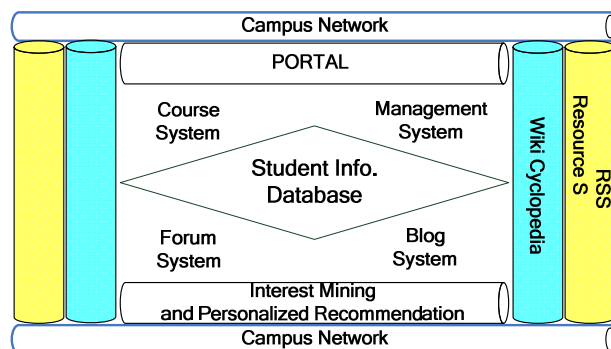

Figure 1. Platform architecture

V. IMPLEMENTATION KEYS

In this section, key components of the learning platform including course system, blog system, wiki cyclopedia, and RSS based push mechanism of content are introduced in detail.

A. Course System

The course system can be divided into two modules, respectively course management module and computer museum module.

Course Management Module: Focusing on the publishing and managing of course resources and information.

Computer Museum Module: Providing information library that covers evolution history of computer, leading edge technology, etc.

Considering that the knowledge of computer updating very fast, the computer museum module not only provides information download service, but also upload interface for students. That means the students can participate in the abundance process of information resources. The role of students is no longer only accepter but establisher and spreader of the platform. As a result of which, the interactivity of the platform has been improved, and the teaching effect has been enhanced unconsciously. At the same time, influx of large amount of knowledge provides more resources for other students. On the other hand, the freshmen of computer have been given an opportunity to practice, while both their responsibility-feeling and confidence can be strengthened in the operation.

B. Blog System

Blog system is an important component of the learning platform. It provides a personalized space for students to show themselves. The main object of blog system is to obtain feedback from students and establish organic connections with other courses, which keep the platform useful after the ICB course finishes. On the other hand, the blog system is not only network diaries of the students, their specialty growth procedures are also recorded, which are very important for teaching experience accumulation.

The blog system can be divided into two parts, respectively blog home page, and user personal page. These two kinds of pages can be presented according to several templates. Generally, the template of home page is called system template, and the template of user page is called user template. System template is adopted as the home page template of the learning platform. The home page is the entrance of blog system, and establishes the relationship among the users. All the important information of the learning platform should also be presented on the home page. Therefore, the system template should be simple and clear, with flexible navigation and linkages, to facilitate the operation for users.

To keep the architecture of learning platform compact, the blog system is integrated with the course system to provide Single Sign On. The data synchronization between these two systems is implemented through configuration file interface. The user interface style of the blog system is consistent with

the course system, to make the two components present to be a whole. The individuation of personal blog is implemented by the free-choice user templates. To improve the security of the learning platform, MD5 algorithm is adopted in encryption of user password and other private or important information.

C. Wiki Cyclopedia

Wiki is another Web 2.0 element applied to the learning platform. It has the following characters, which are the reasons why it is adopted.

Abundant Resources: Wiki is a digital knowledge library built by both teachers and students. Each member of this library can create, modify or delete corresponding pages. If a linkage object does not exist, a new page can be created automatically by clicking the linkage, so that the system resource can be expanded. This kind of new resources is not only abundant, but also very useful. Furthermore, different students have different viewpoints when facing one same problem, which makes wiki resource comprehensive, objective, and impartial.

Fast Publication: Simplified grammar is adopted by wiki, to replace complex HTML. The edit tool of Web interface makes content maintenance much easier, so that online publication has become possible. The operation is also simplified, even for the freshmen of computer. Students' interest of participate in wiki development is increased at the same time.

Collaborative Study: Since each member of wiki has the authority to modify pages, team spirit is demanded. Students should cooperate and consult with each other to acquire and share knowledge, when aiming at a subject matter.

Interactive Communion: Every student can publish his interested topic or unsolved problem onto wiki to discuss with others. The teachers can also participate in the discussion, and promote the communion. Wiki can also work with short message function provided by blog System, to realize personal dialog among members. Under such environment, teachers and students can communicate and cooperate equally.

Introspective Study: Version control and history record are implemented in wiki with text file or database. When comparing with the history version records, students can make self-examination, review the study process, keep self-improvement, and learn from others' experience.

The wiki cyclopedia system is implemented as follows. As shown in figure 2, students use wiki language to create or edit a wiki page, which is translated into a HTML page and sent to the clients by the wiki engine. At the same time, the edit version of the wiki page is recorded to build the wiki knowledge library.
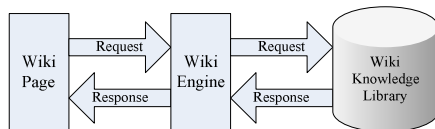

Figure 2.   Implementation of Wiki

D. RSS based Push Mechanism of Content

RSS is the most significant advance in the fundamental architecture of the web. It allows someone to link not just to a page, but to subscribe to it, with notification every time that page changes [3]. RSS feed itself is a structured XML, and is simple standard, universal and easy to be created automatically. Therefore, more and more web sites use RSS to publish dynamic update information [7]. To help the student understand the leading edge of computer subject betimes, RSS is also applied in the learning platform.

Our platform collects the RSS feeds of information web sites or other learning system in computer science field, monitors their RSS information update, aggregates these study resources, and provides personalized information push service. The RSS based push mechanism of content is shown as figure3.
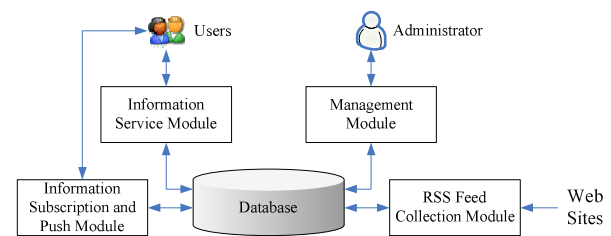

Figure 3.   RSS based push mechanism

The functions of modules are listed as follows.

RSS Feed Collection Module: Parses the RSS information of the RSS feeds submitted by the teachers and students, and records it in the database.

Management Module: Implements the examination, modification, deletion, classification and update of RSS feeds.

Information Service Module: Provides classified browsing and retrieval service of RSS information.

Information Subscription and Push Module: Provides RSS feed Subscription and personalized push service for the users.

The above four modules build up an organic pushing system of study content. As shown in figure 3, the users submit RSS feeds needed to be aggregated. After being examined by the administrator, these feeds are recorded in the database. The aggregated resources will be updated periodically by the platform. Users browse or retrieve the study content from the aggregated web sites by the information service module, or subscribe some RSS feeds to accomplish personalized reading.

To achieve personalized information pushing, the focus is to establish the model of user interest. Aim at the resource characteristics of the learning platform, our model is designed to be a three level structure, as shown in figure 4. The first level is the identifier of user model, which is a virtual node. The second level describes the classification of information. The third level describes the subset of user interests.
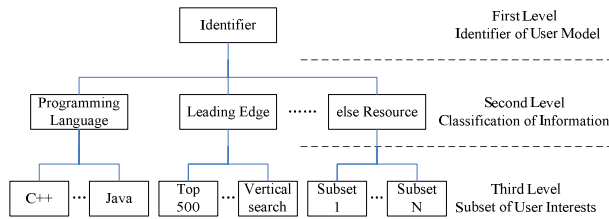
Figure 4. User model

VI. CONCLUSION

Web 2.0 is a term describing the trend in web design that aims to enhance creativity, information sharing, and collaboration among users. To change the focus of online learning platform from course content to students' participation, a Web 2.0 based computer knowledge learning platform is presented. To meet the personalized requirement of users, the framework is based on Portal technology. Web2.0 elements including personal and group spaces, wiki cyclopedia, interest mining and personalized recommendation, and RSS resource subscription are integrated. The learning platform has been put into use already, and got satisfaction from both teachers and students.

REFERENCES

[1] Web 2.0. http://en.wikipedia.org/wiki/Web2.0

[2] Paul Graham. Web 2.0. http://www.paulgraham.com/ web20.html

[3] Tim O'Reilly. What Is Web 2.0. http://www.oreillynet. com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

[4] Dion Hinchcliffe. The State of Web 2.0. http://web2.wsj2. com/the_state_of_web_20.htm

[5] Baruch O., Yossi L., Rachel B. Surface and deep learning processes in distance education: Synchronous versus asynchronous systems, J. of Computers & Education, 2007.10

[6] Zhang L., Zhuang Y.T., et al. A Web-Based Examination and Evaluation System for Computer Education, Proc. Of ICALT'06, IEEE, 2006, 120-124

[7] Hu Yi. RSS Message Recognition and Analysis of Behavior Characteristics of RSS Website. Beijing Jiaotong University, 2007.