Proceedings of the 5th WSEAS International Conference on Telecommunications and Informatics, Istanbul, Turkey, May 27-29, 2006 (pp46-50)

The Construction of Course Management System with Portfolio

HSIEN TANG LIN, CHI HUANG CHIU, SHYAN MING YUAN
Department of Computer Science
National Chiao Tung University
1001 Ta Hsueh Road, Hsinchu, 300
TAIWAN

Abstract: - A web-based learning management system helps teachers to present lecturing material to students. Students can get learning materials, communicate with classmates and teachers, and recognize own learning status with such a system. In this paper, a web-based learning management system is introduced. The system also provides real time learning feedback messages in a real-time manner which allows students to check their own learning status and make necessary adjustments. At the end of the course, both students and teacher can pack their own portfolio files which contain score trends, lecturing content, the course syllabus, discussion content, collected files, homework, self assessment, and teacher's comment. The system completely records every detail related to student's learning, then packs these details in an organized structure. Students may then carry their own portfolios to the next learning stage. This is the optimal way to evaluate student's learning progress and level.

Key-Words: - Course Management, Portfolio, XML, Open source, ICT,

1 Introduction

The activity in school is versatile. If all aspects shall be well taken care, all participants such as teachers, students, and administrative shall pay tremendous efforts. How to incorporate information and communication technology to assist teaching activity, then all participants who attend teaching activity may relieve loading, and retain presetting goal or even having better result is one of major objectives anticipated to achieve in this information and communication era.

In traditional learning environment, the communication or interaction between teacher and student relies on dialog and interaction at classroom, or score and comment on homework and test sheet. From the student's point of view, to understand own learning performance is by way of own homework or test score, and the position above or below average score in the whole classroom. If teacher wants to provide such information on every homework assignment or test, then shall repeat these routine works. It means teacher shall pay a lot of efforts to take care of it. Furthermore, at a specific event, say 3rd homework assignment, if teacher does not give previous score to student, and student does not retain own previous score, then may not capture what student's learning trend is.

In current network learning environment, to handle the above situation, teachers sometimes post all information on network publicly to let all students view it. In this situation, all students or everyone can view own and others' all information due to the information makes public by teacher. Because of not everyone wants to make information public, this may brother someone. If teacher wants to give a special assistant to an individual student, email is a most popular way. In this situation, teacher will incur a lot of burdens.

To satisfy teacher's such requirement, some commercial web sites provide service to fulfill this requirement, such as MyGradeBook [1], WebCT [2], and Blackboard [3]. From this point, it is necessary to provide student and teacher such kind of networked based services. In general, such kind of system is called Course Management System. But since long-time being, for the functional requirement, design specification, and user interface of such kind of systems are still quite difference. Unless becomes more useful and provides more services, such kind of systems can not be incorporated with portfolio [4].

Portfolio has being a teaching activity and assessment approach in educational society for a long time. The objective of portfolio in education is to break the traditional "quantitative" or paper and pencil test approach, and reflect a student's learning process, progress, personal ability, and works historical record. To implement portfolio and portfolio assessment, more time, manpower, and efforts must be invested. The research found teachers incur most burdens, except normal teaching task, they must spend a lot of extra time and effort on portfolio and assessment [5]. How to relieve teacher's burden on portfolio task by information and communication technology is one of objectives of the system presented in this paper.

Recently, to overcome the inconvenience of storing and retrieving portfolio in printed paper style, more portfolios are stored in digital format and presented by web page style. In this paper, such kind of portfolios is referred to digital portfolio. In Taiwan, there are some researchers focus on the research of portfolio such as in [5] [6] [7].

Summarizing from these researches, some networked based portfolio system have been developed, and the effectiveness on promoting student's learning performance has been analyzed and approved. But the content of portfolio stresses on assessment items which are dedicated for system design. For traditional classroom activity, it just has limited record which is not easy to incorporate with digital portfolio. The student's score record and teaching schedule on course management system may be included in portfolio [5]. Furthermore, system may become more intelligent by the functionality of analyzing score historical trend [8].

From the viewpoint of function and content of course management system, it is quite similar to the record and collected information needed for portfolio. The difference is that course management is teacher-/coursed-centered, while digital portfolio is student-/user-centered. It has some Insufficiency and need that migrating traditional course management system to implementation of portfolio with digital content. First of all, digital portfolio must easily unfold student's learning outcome and efficiency; secondly, digital portfolio must have highly integration and exchange ability with other systems. To fulfill the requirement of standardization and exchangeability, Electronic Portfolio Consortium was established in 2002, and issued the first version of Electronic Portfolio White Paper [4].

In order to carry teaching activity on with information and communication technology, such that teaching activity goes smoothly, student get real time learning feedback, and student may pack own learning outcome as well as teacher may pack own teaching experience into portable format at the end of course, a system called course management system with portfolio functionality was developed and presented in this paper. The objective of this system is to let teacher processes score and gives student recommendation and help on learning more effective, meanwhile student may understand own learning status and past learning performance in real time. When such an effective system was established, student can fully grasp learning status during learning, revise own learning direction, and finally preserve and use own portfolio as need. The system also provides an authentication mechanism to improve the credibility of portfolio package.

2 System Design

The system described in this paper in a web-based system. The system uses an open source as the solution, with MySQL as backend database, PHP as the scripting language for dynamic web pages, Apache as the front-end web server, and FreeBSD for the operating system underlying. The database, scripting language, and the web server can run on Microsoft Windows® under the open source development environment of GNU license, this making the system easier to promote without any licensing or legal issues. For teachers tend to use such a system can easily download and build the necessary software systems. The system has the following features:

- It contains a record of student's on-line learning records.
- It keeps a weekly learning record for every course that a student takes in a semester.
- It has a tool to maintain close communication with students.
- It focuses on the ability of using instant feedback for learning.
- It displays a student's learning progress graphically, making it easier for students to acknowledge his or her progress.
- It displays student's progress relative to his/her classmates graphically, e.g. giving at any point in time, a student's highest, lowest, and average grades. This positive comparison can be used as a motive to inspire learning.
- It displays student's learning and progress graphically, so that student can adjust his/her ways of learning during the course.
- It is capable of storing data on-line. This functionality not only allows students to store their learning results, but also share them with other students, achieving cooperative learning among classmates.
- It has an instant messaging functionality in which students can leave messages on the Internet and the system will notify the receiver by e-mail immediately. Therefore, the students can send their questions to the teacher and get necessary help instantly.
- Data, such as students' grades inputted from the Internet can be outputted in standard format, so teachers can create standard reports. At the end of a semester, teachers can hand in the class grade sheet straight from this system.
- It lets teachers input their teaching schedule and teaching material, which will be displayed weekly according to the schedule.

- At the end of semester, teacher and students can pack the course outline, teaching materials, grades, learning progress, all kinds of learning files, student's self assessment, and teacher's assessment into one portable file, making it available to students for the next stage of their learning or employment.
- The digital portfolio is in the form of an XML file, so its content can be browsed by an ordinary browser or any environment that can read XML files.
- After packaging, the digital portfolio is digitally signed using MD5, ensuring the integrity of the data.

The system classifies users into three groups: students, teachers, and administrative personnel. Each group has different user interfaces. The system's primary function will be for teacher and student use. This system lets students know how well they are doing at any give time which helping teachers turn simple test scores into meaningful analysis, e.g. current progress, total scores of the tests done so far using high, low, and average scores. It also compares a single student's grades with class average, letting students know how well they are doing within the class.

3 Result Packing

After the student has completed the course, all records will be kept at the server. The student may copy, download, retrieve, or access his/her records for continuing education or job employment. Since the packaged records can be used as a pass along portfolio or part of a resume for a job application, they will have to get a certificated copy for accountability and highly credible if they are to be presented as an objective reference. In our system, we chose MD5 (Message Digest) to accomplish this goal. MD5 [9] was developed by Professor Ronald L. Rivest at MIT. The algorithm can transform a data chunk of any length into a 128 bit fingerprint or message digest. The basis of this algorithm comes from the following assumption. Two chunks of data will never produce the same message digest, and given a message digest, it is impossible to reverse it back to the original data. MD5's primary purpose is to be used as a digital signature. Basically, MD5 is a way of checking data integrity and is more reliable than other methods, such as Checksum.

To demonstrate the possible usage, a pictogram is showed in figure 1, where there are three actors: the course management system with portfolio, the student, and the interviewer. The scenario is as follows:

1. Student packs and downloads the portfolio at the end of semester. At this time, the system generates the MD5 hash and stores it in the system.
2. Then the student goes on an interview, providing the interviewer with the portfolio. The interviewer can use any MD5 validation tool (there is such a tool provided in this system) to obtain the file's hash string e.g. 43b49a3b8ded5da1dd5e6f6136e509ad
3. Next, the interviewer goes to the system's website, and types in the account access code of the student being interviewed without needing a password. The hash string of the student will be displayed.
4. After comparing the hash string for correctness, the interviewer can be sure that the portfolio provided is the one generated by the system without any modification.

Besides packaging the portfolio for students, our system also enables teachers to pack their teaching materials. The packaged data has many useful applications, such as teacher's evaluation and references for transferring to another institute. The system packs different items of data according to whether the user is a teacher or a student. The system defaults to pack everything into the portfolio, but the user can choose specific items they want to pack.

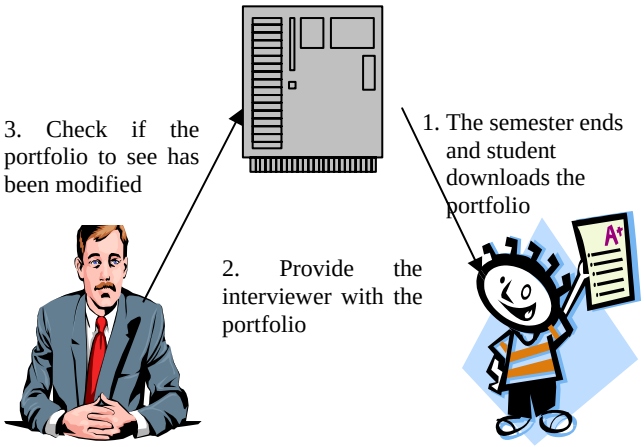

Figure 1, Packaging and application of portfolio

4. Conclusion

The difference between this system and some famous commercial systems such as WebCT [2] and Blackboard [3] is that the commercial system focus on the integration with whole campus wide

administrative system, therefore all relative departments may use this platform to perform activity management such as student's information management, lecturing content management, and administrative management. Some systems even cooperate with publisher or library to provide students the reference material in convenient way [3]. But such commercial systems sometimes need campus wide budget and manpower to support. For some schools which not yet establish such system, if teachers who anticipate enhancing teaching quality with such kind of systems can not satisfy. The system introduced in this paper is based on open source concept; anyone may use it free of charge under GNU agreement. Besides, this system focus on real time interaction with students, especially student can recognize current learning status in real time fashion, and adjust learning attitude accordingly. Teacher may adjust own teaching strategy if necessary. Finally as stated at last section, this system focuses on recording of student's learning portfolio, aggregation, packing and authentication that are the different aspects compare with other commercial systems

Besides assisting teachers in managing the basic work associated with course management, the major aim of this system is to include every part of student's learning and teacher's teaching into the portfolio, thus making it a reference for the next phase of education or as a supplement for job applications. Compared with most portfolio systems, which are more focused on the cross evaluation of students, and portfolio assessment, our system is more focused on assisting teacher and students in correcting learning attitudes and changing direction during the course. We have also focused on allowing the teacher or student to pack and download the portfolio at the end of semester, and achieving the portfolio's accountability through verification-which is one goal we accomplishment that other systems have yet been able to achieve.

On the grade management side, our system focuses on grade management, and provides students with current grades and grade analysis, letting students know their learning status. We also implemented the creation of analysis graphs, so students can see their status within the class easily while viewing their relationship to the class's highest, lowest, and average grade. They can then adjust the pace of their learning, thus increasing the effectiveness of their studies. Finally, the system provides the packaging and downloading function for a portfolio, so that students can preserve a semester's work, which includes course information, teaching content, course announcements, course discussions, grade analysis, teacher's assessment, and files collected with ease. With the verification mechanism designed into the system, providing portfolio for future reference is the first proposed application in portfolio related researches.

Some of the functions of the system described in this paper will be improved in the future and new ones will be added as they are developed.

1. The system now focuses on the simple tools needed by teacher to integrate with a school's administration system. The system will be further developed to use agent technology to integrate with existing campus-wide administrative systems currently used in schools, so that teachers can utilize some of the information acquired from the campus-wide administrative system, i.e. class lists, handing in final grades, etc.
2. In the current design of the system only the simple method of checking student scores is used to give learning advice. In a more advanced design, the decision would be more intelligent. For example, if two students get the same score at the same time, based upon their learning history, the advice should be different. This requires checking the differences between the two students' records, and using multiple criteria to identify a student's strengths and weaknesses. This part of system requires further research and more complex design to give students intelligent feedback that more closely matches their individual needs.

References

[1] MyGradeBook. Retrieved from www.mygradebook.com dated 3/1/2006

[2] WebCT. http://www.webct.com access dated (01/16/2005)

[3] Blackboard. http://www.blackboard.com access dated (01/16/2005)

[4] Electronic Portfolio White Paper. http://eportconsortium.org/ accessed date 01/16/2006

[5] Lin, H. T., Liu, Z. F., & Yuan, S. M. Networked Portfolio with Real Time Learning Monitoring System. Proceeding of The 4th IEEE International Conference on Advanced Learning Technologies (ICAL2004). Joensuu, Finland, 2004

[6] Chen, G. D., Liu, C. C., Ou, K. L., & Lin, M. S.. Web Learning Portfolios: A Tool For Supporting Performance Awareness. Innovations in Education and Teaching International, 38, 1, 19 – 30, 2001

[7] Chang, C. C. Construction and Evaluation of a Web-Based Learning Portfolio System: An Electronic Assessment Tool. Innovations in

Education and Teaching International, 38, 2, 144 – 155, 2001

[8] Karjunen, M., Sutinen, E., & Tarhio, J. Towards intelligent portfolios on the Web. In: Proc. SSGRR 2000, International Conference on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet (ed. G. Reiss Romoli), Scuola Superiore, Italy, 2000.

[9] MD5. http://www.faqs.org/rfcs/rfc1321.html access dated (01/16/2005)