THE LEARNING PORTAL FOR IMPROVING THE E-LEARNING ENVIRONMENT

Hiroshi NAKANO[1,2,3], Toshihiro KITA[1,2,3], Kenichi SUGITANI[1,3,4], Junko NEMOTO[2,3], Shiro KITAMURA[2,3], Katsuaki SUZUKI[2,3], Ryuichi MATSUBA[3,2], Masahiro MIGITA[1,2], Yasuo MUSASHI[1,4], Norio IRIGUCHI[1,2,4], Tsuyoshi USAGAWA[1,2,4]

[1] Center for Multimedia and Information Technologies,
[2] Instructional Systems Program, Graduate School of Social and Cultural Sciences,
[3] Institute for e-Learning Development,
[4] Department of Electrical and Computer Science, Graduate School of Natural Science,
Kumamoto University, 2-39-1 Kurokami, Kumamoto, 860-8555 Japan
E-mail: nakano@cc.kumamoto-u.ac.jp

Abstract. The learning management system (LMS) is the most popular e-learning system, which normally provides course centered managements and is rather weak at learner centered managements. The LMS normally does not manage school register and imported automatically or even manually from the school information system. Several excellent open-source LMSs are now available as the Sakai and the Moodle, and therefore, it becomes necessary to support not only one LMS. In changing situations, it is very important to improve the e-learning environment by connecting related systems and adding supplemental functions. We tried to solve these problems by constructing the learning portal with the single sign-on environment. This paper shows the implantation of the learning portal by cooperating with several e-learning systems and by adding learner centered functions.

Keywords: E-learning, Portal, Learning management system, Distance education, Single sign-on

1. INTRODUCTION

As information technology based higher education becomes increasingly common, and many courses use e-learning systems. The learning management system (LMS) is the most popular e-learning system and there so many commercial and non-commercial LMSs, especially, excellent open-source LMSs are recently available as the Sakai [1] and the Moodle [2]. Commercial LMSs already have so enough history that they are stable and have many functions.

The LMSs normally provide course centered managements and they are relatively weak in learner centered managements. The online portfolio systems are remarked to compensate this weak point by cooperating with a LMS as the Open Source Portfolio Initiative [3]. It is however not so easy to connect to any existing LMSs.

The school information systems (SISs) have been used for longer years than LMSs, and they manage mainly school registers. Usual LMSs import or synchronise the data of courses and registered courses for each student automatically or even manually from the SIS. It is not so easy to support several LMSs connecting to the SIS of the university.

Several excellent open-source LMSs are now available as Moodle and sakai project, and university therefore should support not only one LMS but also several kinds of LMSs or provide some standard interface (I think that there are no complete standard interfaces yet.). In changing situations, it is very important to improve the e-learning environment by connecting the related systems and adding supplements. We tried to solve these problems by implementing the learning portal with the single sign-on environment.

The Kumamoto university portal started since 2006 and it provides customizable portal environment and supports single sign-on. In the same time, Instructional Systems Program, Graduate School of Social and Cultural Sciences was established in our university. The school educate the e-learning professionals by e-learning, and students can finish without face-to-face courses. The learning portal started for the e-learning school based on the university portal.

2. THE UNIVERSITY PORTAL

We started the Kumamoto University Portal from the beginning of the 2006 school year, and it is not specialized for learning but for general use; administration, school information, and so on.

The portal is implemented based on uPortal [4] which is a free, sharable portal under development by institutions of higher-education using Java, XML, JSP and J2EE and is developed by JA-SIG. The uPortal supports the portlet (JSR-168) [5]. Portlets are pluggable user interface components for a portal and are useful to add functions to uPortal. We therefore add some functions to provide appropriate information and functions for each role, position, department, and so on, for all members of university (10,000 students and 1,000 staffs).

One of the most important functions is providing links to web services which are available for the login user and can

be accessed without any more authentications; the single sign-on as shown in Fig. 1.The single sign-on service is implemented based on the CAS (Central Authentication Service) [6] which is an open-source authentication system originally created by Yale University and became a JA-SIG project in 2004. The university-wide LDAP is used as authentic data source for the CAS, users therefore can login wireless LAN, PCs for IT classrooms (1,300 PCs over the university with exactly the same usability), emails etc. with the same user ID and password as CAS.

The uPortal supports the CAS by itself and some other web server applications were modified or adapted to support the CAS for convenience; our university's original SIS named SOSEKI, WebCT Campus Edition 4 (WebCT CE4), WebCT Campus Edition 6 (WebCT CE6), Moodle [2], the library system (original), the university scheduler, the Computer Assisted Language Learning (CALL) systems, the network and application registration system (original) have supported the CAS within 2006. The CAS provides many libraries of clients for Java, .Net, PHP, Perl, Apache, uPortal, and others, and it is therefore not difficult to adapt existing web applications with their programming source codes. Even if some commercial systems do not open their source codes, there are some possibilities to adapt by developing adapters or connectors. We developed some applications for adapting the CAS, for example, we made adapters using the portlets for WebCT CE4 and CE6 [7].

3. THE LEARNING PORTAL

New program for e-learning professionals

In 2006, Kumamoto University established new master program; Instructional Systems Program, Graduate School of Social and Cultural Sciences. This is the first and innovative program in Japan which cultivates e-learning professionals by e-learning. Students are learning the fields of instructional designs, information technologies, intellectual properties and instructional managements mainly by asynchronous on-line education using LMSs, SIS, and the learning portal. Actually more than ninety percents of students are living far from Kumamto city (more than fifty percents nearby Tokyo) and are learning through the Internet. Almost all of the students have already been active in employment and many of them are concerning to the industrial trainings or higher educations. The school is therefore very suitable for developing new and reformist e-learning systems and contents, and we started developing the learning portal just since its establishment.

The learning portal aims to help students to learn in the comfortable and efficient learning environments over the Internet. We try to connect several e-learning systems as LMSs and SIS, and to add some functions into the portal to compensate existing systems. Specially, learner centered functions are emphasized, because LMSs generally provide course centered managements and SIS normally treat only school registers and the results of credits.

Outline of Construction

The learning portal is constructed by adding functions to the university portal, and is placed before entering e-learning courses as shown in Fig. 2, where the learning portal is named as GSIS (Graduate School of Instructional Systems) Portal. In the program, students use WebCT CE6 as the main LMS and Moodle for exercises as contents creators, as instructors and as administrators. Each student has his or her own Moodle system on university site. We also provide VOD (Video On Demand) server, video conference system, and some original web applications (on-line computer programming exercise [8], file manager for VOD server and so on.) for the program.

Implementation and development

The learning portal is built on the university portal based on the uPortal which has extensive functions as a Channel and a portlet. The Channel works only within the uPortal, however, the portlet is a pluggable user interface component with interoperability between different web portals enabled by the Java Portlet Specification (JSR168) [5]. The uPortal is a web portal and of course can show other servers' web pages as inline frames or as proxies. We developed additional pages to the university portal as external web pages and portlets using Java and JSP programming with portlet APIs which allow accessing the portal's database including login user
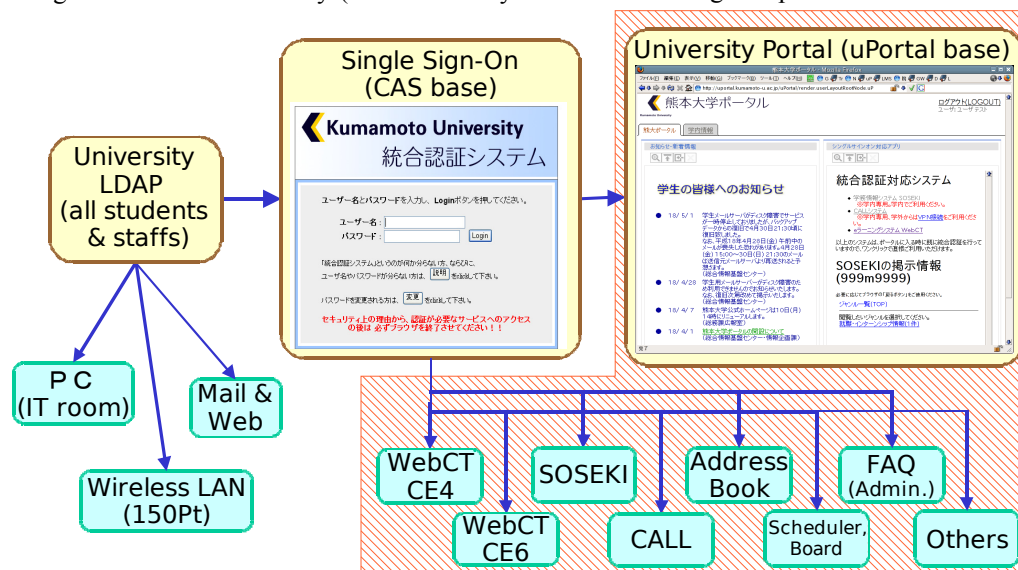

Fig. 1. The Kumamoto university portal and the single sign-on system with several web applications.
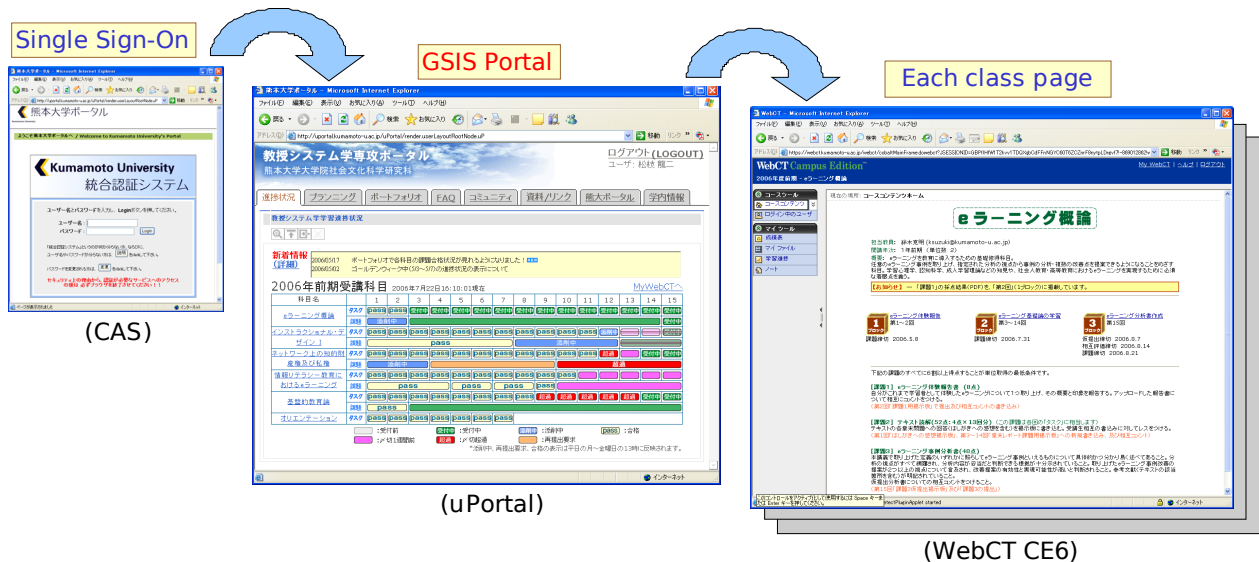
Fig. 2. The learning portal for distance education.

information. We developed the CAS adapter using the portlet for WebCT CE6 [7] in order to realize single sign-on from the learning portal to the main LMS.

The pages for learners (student)

The learning portal compensates learner centered functions lacked in LMSs, and followings pages were developed and provided to all users; not only students, but also instructors (professors) and administrators.

- **Visualizing the state of learning progress:** Each course has fifteen modules, and each module has a task to prove studies, and several modules are grouped to a block with subject to check achievement. The top page of the learning portal shown in Fig. 2 indicates states of all tasks and subjects as in/out of date, passed, requiring resubmission, etc. for each course. Each task, subject and course is directly linked to the corresponding place on LMS by single sign-on. The page is developed by the portlet.

- **Designing own curriculum:** All courses dependencies are shown as a chart where students can design their own curriculums by selecting or deselecting allowable courses, and the total units is calculated in real time. The page is written by html with Javascript.

- **Portfolio:** The competencies are listed with their required subjects. Each competency requires several subjects from several courses, and each subject is shown as a course icon indicating the particular subject explained by hovering a mouse cursor. The icon color changes when the corresponding subject is passed. The page is developed by the portlet.

- **Community Salon:** There are introductions of all professors with vide clips, web pages and email addresses etc., and also all students introduce themselves by web pages created as exercises in an introductory course before starting program. The page has a direct link to the discussion board and the chat function on LMS by single sign-on. The page consists mixture of the portlet, html and the embed video streaming.

- **FAQ, related documents and LINKs:** These pages are for convenience and are written in html.

The pages for instructors (professors)

For instructors (professors), following pages are modified or added to the learners (students) page.

- **Visualizing the state of learning progress in the course (added):** It is similar to the "Visualizing the state of learning progress" for learners. The listing type is only different and it makes a table of the learners' state of the course members, where the instructor can notice easily who has a problem. The page is developed by the portlet.

- **Visualizing the state of learning progress (modified):** It is modified to add a leaner selection function in order to check the leaner's total state including other courses.

- **Portfolio (modified):** It is also modified to add a leaner selection function in the same reason.

The pages for administrators

For administrators, following new pages are added to the instructors (professors) page.

- **Managing the course information:** The administrators can make a new course and can modify course information including the tasks and the subjects with this page. The page is developed by the portlet.

- **Managing the learners and instructors information:** The administrators can add more information to the portal with this page. The fundamental user information is managed on the uPortal and CAS (referring LDAP), and the page can manage additional information required in the program. The page is developed by the portlet.

- **Managing the learning states:** Some learning states of the learners can be changed automatically by reflecting the other data, although, this page provide more flexible treatments. The page is developed by the portlet.

Developing the interactive pages for the administrator is not so easy and requires rather heavy programming by the portlet in spite of only for a few administrators use. We think that this is the biggest problem in development, and we are trying to solve the problem for applying customizable and remote database accessible applications such as the OpenOffice.org Base [9].

<u>Practical use more than a year</u>
The learning portal has been used in the instructional systems master program since April 2006. There are more than thirty fulltime students and twenty part-time students, and almost all students are learning through the Internet. We have already done more than twelve pure online courses by more than ten instructors. Three instructors are the specialists of the instructional design and concentrate e-learning courses, and others have not only online courses but also many face-to-face courses. In every course, the professor rolls as an instructor, although, does not fully roll as a contents designer, because all of the contents outline have already been designed depending on the total curriculum by using the instructional design. Following the outline, some contents are fully written by the instructors (professors), and some others are written by contents creators ordered by professors. The system has not been simple yet, however, we are reviewing contents every month before serving them to students at the meeting of the related members. As we are developing the learning portal by ourselves, we can fix bugs, revise, improve and modify in nearly real time, however it is not easy to stop the portal because some students are using it in twenty four hours. We should realize a mission-critical system and support.

4. CONCLUSION

We developed the university portal for all students, professors and staffs based on the uPortal, the CAS and the original tools for connecting several university-wide systems since 2006. The learning portal has been developed based on the university portal for the distance e-learning program mainly implemented by the portlet. The learning portal compensates the weak points of LMS and provide learner centered functions as visualizing the state of learning progress, designing own curriculum, portfolio and so on. The learning portal has been practically and successfully used for more than a year.

5. REFERENCES

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