

Virtual Campus: A Web-based Customized Learning Environment [†]

Ka-po Ma, Michael R. Lyu and Wing-kay Kan
Department of Computer Science & Engineering
The Chinese University of Hong Kong
Shatin, N.T., Hong Kong

Abstract *Virtual Campus is an Internet application in education. It combines the advantages of both group and individual learning approaches based on advanced network technologies. Virtual Campus models the new learning environment where students can customize their study in their own pace. Providing up-to-date learning material and personal study guide, Virtual Campus is an ideal study environment for the 'life-long' learners. The main purpose of Virtual Campus is to deliver the 'self-paced' material to the right person at the right time. In this paper we describe the features, design, architecture, implementation and appearance of Virtual Campus.*

Keywords: Web-based education, customized learning schedule, and Internet application

1 Introduction

The World Wide Web (WWW) is widely used as a modern and ubiquitous educational media [1]. When students surf the Web, they learn new things and meet new friends. This capability allows them to enter a novel learning mode different from the traditional one in school. They get the most updated information around the world quickly. Moreover, teachers also benefit from abundant resources provided in the Web, where they can make use of this treasure to enrich their teaching life.

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In spite of the existence of this awesome technology to education, most people will ask the question: "How can we fully utilize the Internet in order to delivery the right information to the right student at a right time?" In the traditional education system, the learning process can hardly be customized. Most of the teaching materials are planned in a non-dynamic order and delivered to a small class of 20-40 people in order to improve the effectiveness. The issue, "How to measure effectiveness and what constitutes a quality education", however, is a subject of much controversy. Effectiveness can be defined in terms of the extent to which a course achieves a set of learning goals for the learner [2]. In general, each person can have his/her own desired goal.

From a practical point of view, customization places plenty of burdens and pressures to the instructors/teachers. They have to select the teaching materials before the class and try to meet the major learning goals. It is difficult to customize the teaching materials for each individual student. During the lesson, the instructor/teacher presents these materials to students, while she may receive different responses and queries from the students [3]. It is hard to handle all those questions immediately when the course is running. In such situations, most students may just sit there passively, and some may be already "tuned out" [2].

Fortunately, customization can be brought by the Internet technology automatically. In

this paper, we describe our system, Virtual Campus, a Web-based customized education environment which concerns students' personal study goals and learning process so that their student life can be move fulfilling and rewarding. We address the main features, design architecture and implementation issues of the system.

2 The Main Features of Virtual Campus

Virtual Campus has three main design features in order to enrich the studying life of a student: customized learning cycle, interactive learning environment and ease of use.

2.1 Customized Learning Cycle

In Virtual Campus, given the information provided from each student and her academic record, an intelligence scheduler systematically produces a periodic preliminary study plan for each student. After being reviewed by an experienced consultant and interchanging opinions with a particular student, a tailor-made timetable is generated for that student. It offers a clear learning orientation so that the student always knows what she should be doing, what needs to be done next, etc. Together with the flexible individual/group-paced learning Internet environment, delivering right material to the right person at a right time can be realized by Virtual Campus.

It is very important that a learning environment allows the receivers (students/learners) to adjust their learning rate based on their abilities and interests, rather than being totally controlled by the senders (instructors/teachers). In this information explosive era, a person can hardly survive as if she stops learning new things. That means the society pushes people to be a life-long learner. As it is not an easy task to require self-discipline and continuity, a customized study planning service in Virtual Campus promotes the learners' mo-

tivation and learning progress. In addition, the consultant acts as a personal supporter giving extra advises to students.

2.2 Interactive Learning Environment

Virtual Campus provides a place for parties, instructors/consultants and students. It supports both individual and group learning through the Internet. While attending the real-time on-line lecture, students can ask questions and receive replies directly from the lecturer. On the other hand, students can seek help via Virtual Campus once the corresponding lecturer or tutor is online. Moreover, Virtual Campus can carry out group projects or discussions for the students in a highly interactive fashion [4].

2.3 Ease of Use

Virtual Campus acts as a web-based education gateway allowing teachers/instructors to fully utilize the Internet conveniently without worry too much about technical details. To subscribe an on-line lecture delivered in Internet [5], a general web-browser (e.g. Netscape or IE) and a simple media player (e.g. Real Player) are good enough. In general, a browser is essential to view, respond to, and interact with Virtual Campus.

3 The Design and Architecture of Virtual Campus

Virtual Campus consists of both individual and group learning in an online environment. Figure 1 shows an overview of the campus. There are five main components:

- Online/replayed lecture - using the component MWPS (Multimedia Web Presentation System) [6], students can attend a lecture in real time. The lecture can also be replayed at anytime for customization purpose.

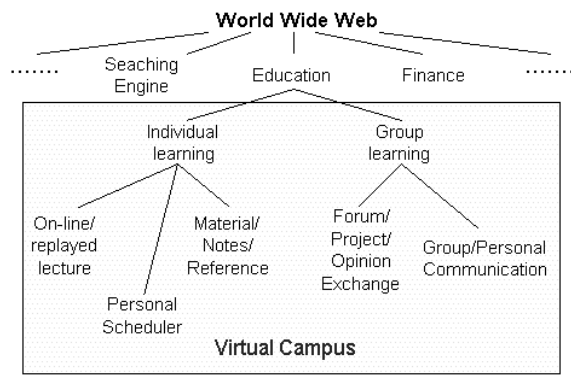


Figure 1: Overview of Virtual Campus

- Personal Scheduler - This intelligent scheduler is a tool to adjust the studying plans for each student objectively. Each student has her own set of scheduled studying material and activities. The sequences of the online course materials are designed to fit personal studying pace. In this way, the student will not waste her time learning irrelevant or already-known material. Similarly, the student will not be provided with too advanced material difficult for her to learn.
- Material, Notes and Reference - These reading materials are used to help the students to revise the course, which also follow the learning schedule.
- Collaboration - Taking the advantage of the Internet, Virtual Campus carries out opinion exchanges easily. Chatting room and discussion board are the essential and useful communication components.

For simplicity purpose, the architecture of Virtual Campus is divided into two sides: the server side and the client side. The former can be viewed as “the school” and the latter can be regarded as individual students.

There are several processes in the server side. They are marked in Figure 2 and described as follows:

1. Gathering of the course material based on the demand of students - Learners pass

learning requests to the server side, which are collected and analyzed by the course author before she prepares a new course material.

2. Course generation and storage - After the contents are gathered, teachers convert them into a presentable form by MWPS [6] that is clear to students. Teachers deliver the lecture in a real-time mode or in a playback mode. A course database is used for the storage and retrieval of the course material.
3. Customized reorder of course material - A personal scheduler rearranges the order of the material in order to fit the pace of the learners depending on their learning ability and other factors. The scheduler updates the timetable for each student periodically.
4. Real-time communication - Three kinds of communication mode are provided here: interaction between learners and teachers, interaction between learners and the personal scheduler, and interaction between teaches and the personal scheduler.
5. Student profile storage - A student database is used for the storage and retrieval of the students' information.

In the client side, learners plan their study according to their personal time scheduling. Whenever learners log-on the Virtual Campus, they can attend the lectures, study their course notes, work on their assignment, chat with others, negotiate with the personal scheduler for their learning progress, and send queries to the teacher about the course material. The flow in the client side highly depends on the preference of each learner.

4 The Implementation of Virtual Campus

Virtual Campus runs on a Windows Web server, *WebSite Professional 2.0* [7] and connects to a database *Oracle 8* [8] under Windows

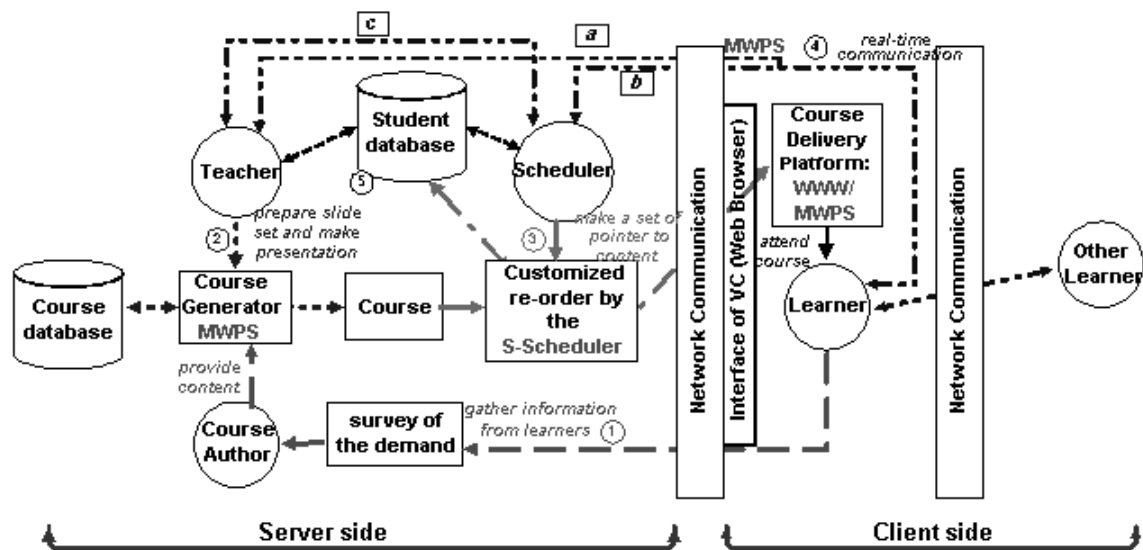


Figure 2: Logical Architecture of Virtual Campus

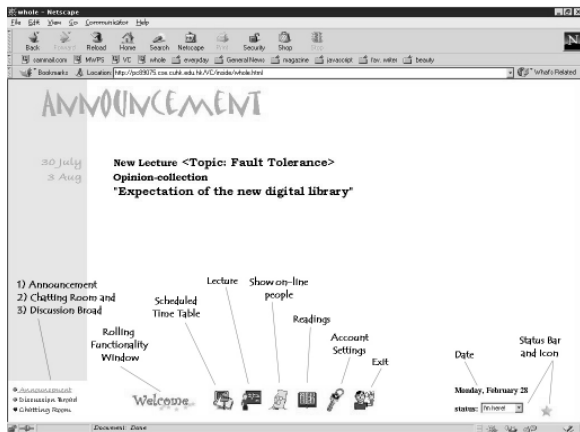


Figure 3: Virtual Campus Main Menu Window Showing an Announcement

NT. We use CGI Perl [9] script to perform on-line activities. In Figure 2, the scripts link the server-side processes while requesting by students.

Figures 3-11 show a series of screen dumps of Virtual Campus. Once a student logs in the Campus, the server will keep the student in a list. She can change her status which is viewed by others when checking who is online. An announcement broad will then be shown where an example is illustrated in Figure 3.

The upper part displays the latest announcement. The lower part is a menu which can be divided into three parts. The most left-hand side list allows the student to (1) go to a chatting room, (2) view the discussion board and (3) go back to the announcement board. The middle rolling bar shows other activities in Virtual Campus, including (1) check with the scheduled timetable, (2) attend a lecture, (3) check who is in the Campus, (4) revise the reference note, (5) modify the personal login information (e.g. nickname and password) and (6) log off. The most right-hand side list shows the login date of the student, and allows the student to change her status, e.g. "I'm here" or "Busy!", etc. Then the student can check her updated timetable.

Figure 4 shows an example of the timetable for a student. Her timetable indicates the times of lectures and the deadlines of assignments, which are not the same as other students. Note the sequence of the course has been provided according to the student's learning ability. On the other hand, she can attend lecture.

Figure 5 shows a sample lecture viewed by student. A video is recorded and played in the

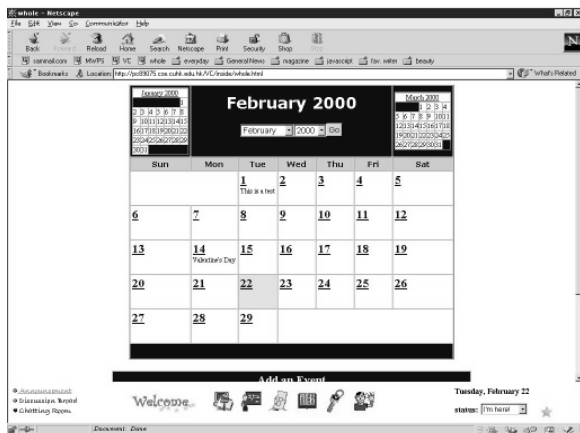


Figure 4: Learning Timetable for a Student

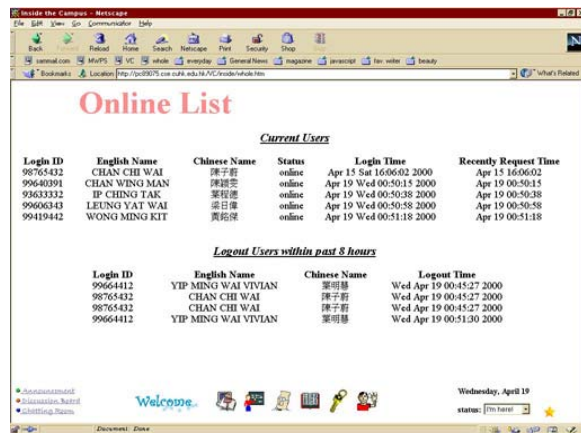


Figure 6: Lists of users' state currently in Campus

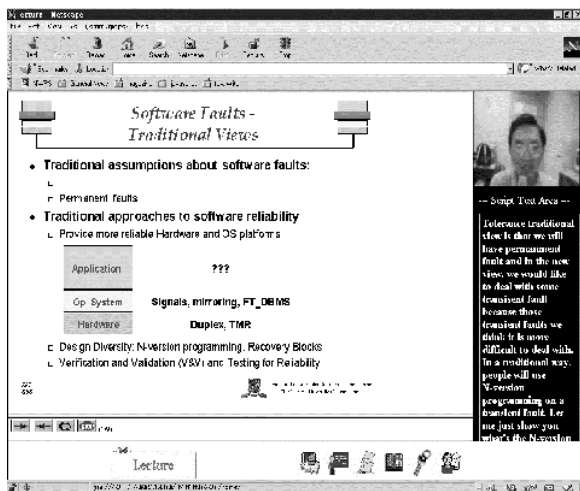


Figure 5: An Online Lecture Delivery

right-hand side of the screen, so the student can see the face of the lecturer as well as listen to his voice. There is a rolling caption, which automatically shows the text of the speech below the image of the lecturer. The slides at the left-hand side are sequenced in order and displayed according to the pace of the lecture. The current version of Virtual Campus can be seen in [10].

Figure 6 shows lists of users in Virtual Campus. The upper table indicates the current users in Campus: Login identity, English and Chinese names, current state, login and the most recently request time. All of above shows the activeness of login users.

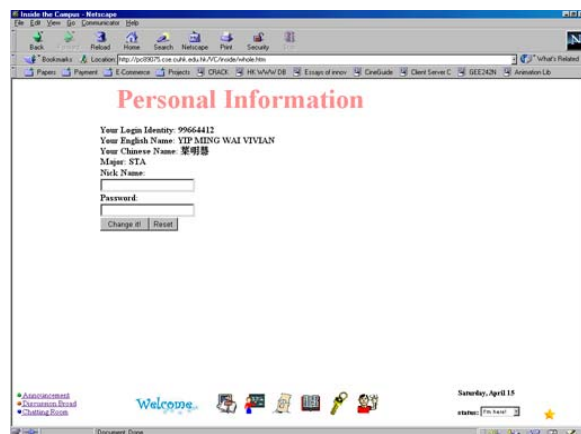


Figure 7: View and Update Personal Information

The lower table records the users who logout within the past 8 hours. This facility is specially for those who are finding someone for help. For instance, a student wants to seek an instructor asking questions. If he checks the logout list and finds the targeted instructor just left for a moment, he may need to find him next time.

In Figure 7, user can view her personal information: Login identity, English and Chinese names, Major subject and nickname (if added before). User only allows changing or adding the nickname used in chatting room and login password. Other items are not allowed to change.

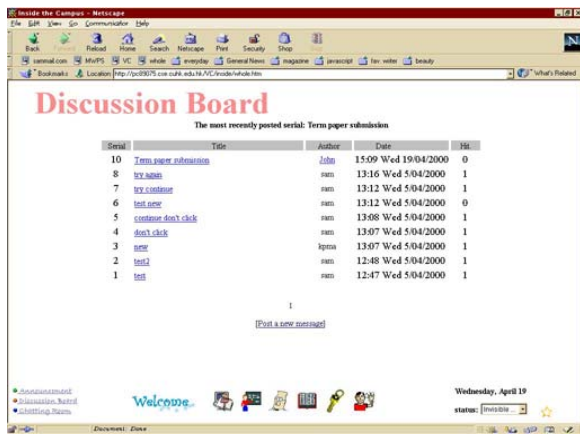


Figure 8: A discussion area



Figure 10: Chatting room facility interface

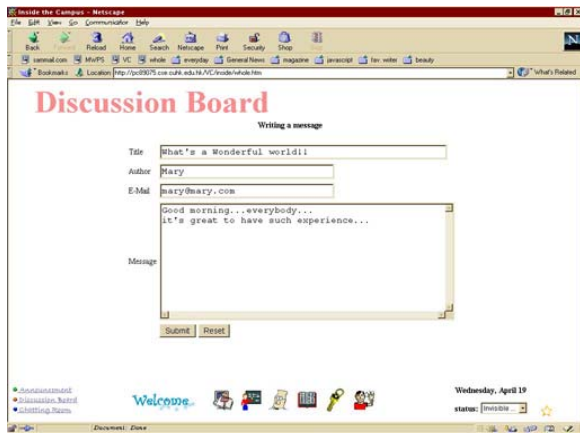


Figure 9: Users are posting new messages



Figure 11: Users are chatting with each other

In Virtual Campus, user can change her on-line state. Currently there are three states provided to users:

1. "I'm here!" - let others know the user is logged in the Virtual Campus;
2. "Busy!!!" - let others know the user is busy. It would be better not disturbing her;
3. "Invisible ..." - Invisible to others. It gives private space to user logged in the Virtual Campus.

In Figure 8, discussion board facility is allowed user to share experiences and opinions. Users can post a new message thread shown in

Figure 9.

Figure 10 shows the chatting room page in Virtual Campus. Users are allowed to make a new room or freely join the public chat room. Specially, there is a facility called private room, which is only allowed the user and invited chatting partner carrying private chatting. There is a public general chatting shown in Figure 11. It is easy to use and simple to user.

5 Conclusions

Future education and training schemes demand proper tools such as Virtual Campus which is capable of overcoming space, time,

and performance demands. Moreover, continuous update in technology-related information is required for modern learning environment. On the one hand, the integrated use of multiple forms of information enhances the learning effectiveness. On the other hand, effective collaboration between the instructor and students is crucial. These essential factors determine the fate of future Web-based education. In Virtual Campus, both learners and instructors do not need to be familiar with high technology, although they can communicate with each other freely. Moreover, Virtual Campus provides the developmental guidance and support, which are concerned with the learner's overall progress across all courses and study programs. In conclusion, Virtual Campus is an interactive, dynamic, active feedback-studying environment which provides a customized education process for all the students to fulfill their personal study goals and achievements.

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