VIRTUAL CAMPUS

RESEARCH PROJECT SECOND-TERM REPORT

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Abstract

Advances in multimedia technologies and Internet technologies lead to new types of teaching and learning. However, most distant-learning or virtual-learning sites are still limited to the dissemination of teaching materials. Neither the strengths of Internet have been maximized nor the functions have been fully utilized, for instance, supporting interactive, customized and collaborative learning.

Virtual Campus is a place that you can customize your study in your own pace. Providing the up-to-date demanding learning materials and personal study guide, Virtual Campus is an ideal study environment for the 'life-long' learners. The major goal of Virtual Campus is to delivery the 'own-paced' material to the right person in any time.

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1 Introduction & Motivation

The World Wide Web (WWW) is being used as a strong educational technology undoubtedly. Learners can easily connect to Internet with their personal computers or using the computer laboratory facilities.

The Web provides a platform for delivering not only the text materials that a class might need, but also the multimedia requirements as well, including audio and video streams of instructor lectures. Learners can view the on-live presentation from the instructor by the web browser in real-time. Since the WWW technology provides the transparent access to anywhere for information ignoring the geographical distribution.

Virtual Campus makes use of the Internet to reach its students.

In the Campus, student can fully engage in the learning process through an interactive, dynamic environment. The on-line materials for each student are scheduled personally depending on his/her studying pace. Hopefully, the student won't waste his/her time learning irrelevant or already known material, and some student fail to understand (or misunderstand) the material.

In addition, Virtual Campus supports group-paced learning as well. The collaborative facility allows student to accomplish group project and discussion. The Web not only uses to transmit information to the student, but also provides forums for exchange. When group members participate and share their knowledge, the knowledge base increases and members continue in benefit [1]. This kind of real-time communication is not restricted to peer interaction (student/student), it can be the active participation of students and instructor in the shared task of seeking to understand and apply the concepts and techniques that characterize the subject area [2].

In the existing traditional educational system, customization hardly brings to reality. Most of the materials are planned in a non-dynamic order and delivered to a class of 20-40 people, which to improve the effectiveness. However, how to measure effectiveness and what constitutes a quality education, are subjects 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.

On the other hand, instructors/teachers get plenty of burdens and feel pressure. They have to select the teaching materials beforehand. The choice may be based on their experiences from their students or the scheduled syllabus that try to meet the mass learning goals. It is difficult to be customized for each student. After preparation, instructors/teachers present these materials to students, in the same time; they receive response and queries from students. It is hard to handle all those questions immediately when the course is running. In these situations, most students always just sit there passively, and some may be already "tune out" [2].

Virtual Campus tries to make the learning at a rate adjusted by the ability of receiver (student) rather than by the sender (instructors/teachers). In the same time, instructors/teachers may act as an individual supporter to each student giving advice and planing for them.

There are totally 9 sections including Introduction and Motivation, Aspects of Learning Process, Paradigm Shift, Features of on-line education, Basic Architecture of Virtual Campus, Components of Virtual Campus, Problems encountered, On-going research and Conclusions.

2 Aspects of Learning Process

Before implementing the Virtual Campus, it is necessary to address the fundamental theory of learning. Gagne [3] gave a precise definition of learning.

> "a process of which man and the animals are capable. It typically involves interaction with the external environment (or with a representation of this interaction, stored in the learner's memory). Learning is inferred when a change or modification in behavior occurs that persists over relatively long periods during the life of the individual."

In other words, learning is an interactive, dynamic, and active feedback process with imagination driving action in exploring and interacting with an external environment [4]. That simply means effective communication between the instructor and students is crucial.

Besides providing an effective communicative channel between instructor and students, there are still some more area needed to pay attention on.

There are totally three sub-sections, namely, "Type of learning", "Participated roles in learning process" and "Students' needs". In the following sub-sections will show how these components affect the learning environment.

2.1 Type of learning

There are two major learning styles: group learning and individual learning. In addition, using Internet and WWW to support teaching or learning has become a trend in modern higher education – Web based education.

2.1.1. Group learning

It is used to the traditional classroom learning. Teacher and students communicate in real time manner (technical term, synchronous communication). Leader always exists in group-learning, and teacher usually is the leader, so this kind of learning named as teacher-centered form of education.

The major advantage is the directed communication. In traditional classroom situations, feedback usually takes the form of two-way communication between teachers and students.

However, it costs relatively high transaction and opportunities costs. If it is face-to-face class, both learner and students need to overcome the geographically distribution by mean of transportation. Although conferencing facilities can be used, it still requires high operational cost (or transaction cost) [5].

2.1.2. Individual learning

It is opposite to group learning. Learners study the material individually; most of web education can be regard as individual learning. Instructor acts as a supporter to answer the question asynchronously (non real-time mode). This student-centered approach learning allows learner re-create the campus in home or whatever.

The advantages are mass access, low cost and personal flexibility. Learner can receive new information in anytime and anywhere [5].

Although asynchronicity makes interaction more convenient, it raises new coordination problems, such as information overload [6].

2.1.3. Web-based Education

Because of the rapidly grown WWW, classes can be existing over the networks. The major difference between the web-based and existing education flow is students can choose their own paces for learning. They can skip those materials that they have already learned or known and they can replay the course that they were not thoroughly understood.

Besides, there are many advantages of web-based education:

- Interactive;
- Multimedia;
- Just-in-time delivery;
- Multi-platform;
- Easy updates;
- Efficient distribution of information;
- Available on demand, when needed;
- Ignoring time differences;
- Available from any locations;
- Flexible presentation formats;
- Flexible (network) delivery systems.

On the other hand, the web-based education system needs to overcome the deficiency of face-to-face feedback from students to instructors. Instructors always scanning the audience and looking for tiredness, lack of interest, understanding and distractions. He may alter the pace and vary the contents in accordance with the feedback [7].

Many universities and private organizations offering on-line courses attest the value of the Internet in enhancing distance learning. However, most of these programs lack the real-time interactivity of a classroom, being essentially correspondence courses, which use email and web pages in place of printed material. In recent years a few interactive on-line programs have appeared.

2.1.4. Design of Virtual Campus in learning style

Basically, Virtual Campus tries to mix the advantages of group learning and individual learning making use of the advanced network technology.

Supported and customized individual learning – Virtual Campus aids to provide a customized learning environment. It will provide clear orientation that students always know what they should be doing, what needs to be done next.

Real-time and non real-time group learning – By using the component MWPS (Multimedia Web Presentation System, described in the section 6), student can attend the lecture in Virtual Campus, which very similar as the traditional one. Moreover, the lecture can be re-played in anytime to achieve the customization.

Collaboration – By using the component JCE (Java Collaborative Environment, described in the section 6), student can collaborate with others with the shared board. Moreover, it supports audio communication, which is useful and simple.

2.2 Participated roles in learning process

There are mainly three roles in the traditional education: student, teacher and content provider (teaching/learning material provider). Sometimes teacher and content provider may be the same person. In general, students and content provider do not have any direct communication and teachers act as a middleman to present the material to student, which prepared and selected by the provider.

In particular, student has no choice to determine what material they are interested. If these students assume to be mature, they can make the reasonable decisions and know what they desire to learn.

Virtual Campus provides a channel to gather the demand from students and get those required and qualitative materials changing to the presentable form. And its target students should be those 'life-long' learners – adult learners.

2.3 Students' need

Virtual Campus tries to fulfill the students' need in order to achieve customization. Each of the following features has its own purpose to help and guide the student.

- Pre-entry educational and vocational guidance
  – Pre-test is given to each student to access their present level and re-schedule the materials for him/her. After some time, another test is given to test the acceptability of the student, then may need to change the content of material or re-arrange it again to optimize the learning efficiency.
- Orientation into learning methods
  – To enable students to gain the maximum from the variety of learning resources available
- Preparation and development in learning skills
  – Enable students to become independent (autonomous) learners
- Monitoring and support of student progress
- Study planning
- Personal support throughout study
- Confidence – especially in adult education
- Personal counseling
- Support for students with special requirements

3 Paradigm Shift

3.1 Traditional learning process

For a decent proportion of one’s life span, learning activities, to most people, are packaged in certain kinds of defined subjects in a confined environment. Although such schooling provides a mass education to the public to satisfy the social and economic needs, it may not be an ideal education pattern for mankind.

In fact, Hutchison [8] describes the traditional education style as perverse unnaturalness. Envisaging the rapidly changing world, in which new technologies relentlessly redefining the way people work and live, he suggests that

> “it may not merely be an anachronism to continue to embrace the model of the traditional residential university as the primary locus of learning – it may arguably be an impediment to appropriate learning and ultimately a threat to growth, both economic and personal.”

3.2 Changing trend of learning style

From Section 2, it is clearly shown that some notions about teaching and learning are changing drastically. Instruction-based learning pattern is being challenged. New learning paradigms are forming. A summary of the paradigm shift in education is as follows:

Educational focus is approaching to student-centered from teacher-centered.

Teaching approach is shifting to facilitating students’ autonomous and independent learning from lecturing monotonously.

Learning style is adapting to active and collaborative learning from passive learning.

Many learning institutes in North America and Asia understand technology can be used to support the education of the new era. They have started to use Internet and WWW (see the table below).

Table 1. Examples of research on Internet-Based Learning

The World Lecture Hall *University of Texas* [9]	The Virtual Classroom *New Jersey Institute of Technology* [12]
ElectronicCourse *The University of Connecticut* [10]	The Virtual Classroom *The University of West Florida* [13]
The Virtual Collaborative University *The University of North Texas* (UNT) [11]	

Some of above only enable dissemination of teaching materials. And inadequate facilities used to support student. Moreover these current web-based courses are not "flexible". Neither the teacher nor the delivery system can adapt the course presentation to different students [14].

3.3 New learning process

In this session, I would like to talk about the changed customized learning strategy, changed role behavior and content (learning/teaching material) providing strategy.

3.3.1. Customized learning strategy

In the section 2.1.4, it briefly shows some components of Virtual Campus. The following summary gives the strategic usage of these components:

Choice of individual/group learning ➔ Depend on personal style (selection of synchronized/ asynchronized mode lecture)

+ Collaboration ➔ Learn to solve problem together (social interaction)

+ Customized learning progression ➔ Instructor/scheduler advised pace (personal pace control)

+ Efficient personal support ➔ Establish closer relationship between instructor and students

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➔ Delivery the right knowledge to right people in right time

3.3.2. Changed role behavior

In the new era of learning environment, the role behaviors need to have significant different:

Role	Changes	Expected behavior
Students	From passive to active	- state out what they need and want - decide which learning mode fitting themselves - encourage participation

In the traditional learning, students always listen passively (or doodle or sleep or stare out the window). In Virtual Campus, students are encouraged to engage in learning. As there is more equality of participation than in face-to-face group interaction. This act helps the shy people to establish confidence. Although they may still afraid of people in social interaction, at least the instructor can listen from them in Virtual Campus's channel. Further consultation can be useful to follow up these cases.

Role	Changes	Expected behavior
Instructor	→ Instructor	- present the materials - answer the question from the students about the material - relatively less leader character - from "chalk-and-talk" role to "guide-on-the-sde" role
	→ Personal Scheduler	- analyze the learning pattern of each student - give study advice to him/her - listen from him/her - personal consultant

In order to reduce the load of instructors, role of instructor is split to two. The first one acts as the usual teacher in classroom. The second one acts as the personal scheduler to support each student individually. Some argument said that the web-based educational applications are expected to be used by very different groups of users without the assistance of a human teacher. However, education is an interactive and dynamic process. Even with the advanced information system, people still is the most important factor, so teacher role cannot be absent.

3.3.3. Content providing strategy

The networked learning environment enhances the linkage of students, teachers, schedulers and content providers. In the past days, the learning subjects are fixed and materials are used to be determined by content providers. The situations of demand over supply always occur. The table below shows the relationship between the demand and supply in education:

			Consequence	Status
Demand	>	Supply	Not fulfill the enthusiasms of learning	Present
Demand	=	Supply	Just in time delivery when knowing the demand	Hard to seek and prepare the material in time
Demand	<	Supply	Customize switching resource	Proposed

Nowadays, technology can use to balance the demand/supply requirements. The last column in the above table points out the independence of demand from supply is achieved "switching" to a combination of resources that best meets current demand requirements.

4 Features of on-line education

4.1 Current situation

The rapid development of the Internet and most remarkable WWW technologies can use to build integrated learning and teaching environment which supports various modes o learning activities: self-paced learning, collaborative project team, teleconferencing, etc. Also, the penetrating power of the Internet is adequate to enable the on-line learning systems to deliver education to special learning sites where the academic can hardly reach, for instance, the adult education centers, company training rooms, the Internet cafes, special schools for students with learning or physical disabilities, public libraries, prison, selected homes [15].

Specifically, the Internet-based learning system comprises of the following components:

On-line lecture notes	- providing with learner-customized material
Messages exchange	- connecting the participants to achieve communication and collaboration purposes
Discussion	- enabling real-time chat or threaded discussions - connecting the participants to achieve communication and collaboration purposes
Interactive quizzes and self-assessment	- determining the learning ability of learner - real-time marked automatically
Course generation	- gathering material by content provider - allowing instructor to modify or re-sequence the material
Course management	- database management
Student management	- database management

Currently, some of these web-based learning systems have been developed to deliver real training or academic courses over the Internet.

Type of organization	*Providing service*
Grass-roots volunteer efforts	• Blue Web'n Library [16] • Netday [17]
Academic institutions	• SUNNY Virtual Classroom [18] • CORAL system of the National Chiao Tung University in Taiwan [19] • NovaNet of North Carolina State University [20]
Commercial sector	• Zdnet University [21] • The Spectrum University [22]
Company (commercial product)	• The FirstClass [23] • Topclass [24] • WebCT [25] • Misk.edu [26]

4.2 Design features in Virtual Campus

In addition, Virtual Campus would like to have some more characteristics in design and implementation.

First, it is found that many students feel overwhelmed when facing a new way of working and learning. Thus, the beginners need help to familiar ('learn how to learn') with the new media (Internet) [5].

Second, the web-based learning environment should be integrated. It can help relieve students of some of the burden of tool management by integrating different resources and media [5].

Third, it is required to establish and maintain new study habits and ways of working, explicitly for the 'beginning' student. As the learning system needs to allow the users great flexibility in finding their way through the knowledge, which is made available to them, but also allow an instructor to monitor and, if necessary, direct the progress of each individual student [4].

Forth, an ideal learning environment should be easy to understand, easy to use, and even fun. It is very important to help the students building up their confidence in using the system [5].

Fifth, students need easy mechanisms to keep track of their progress through the course, thus motivating themselves when thing get tough. Rowntree [27] pointed out that “feedback on one” actions are an important element in effective learning processes.

Sixth, in collaboration or on-line lecture, it is much convenient to provide a private typing area for user to drop personal notes.

Considered factor in design	*Motivation*	*Proposed implementation*
Orientation	Let the students understanding the relationship between tasks and resources	Dynamic pointer structure of the course so that students always know what they should be doing, what needs to be done next [4]
User-friendly	• Dynamic control of applications with regard to connections, interactions, and quality on demand combined with user-friendly and transparent human/machine interfaces [4] • Helpful, with quick and efficient access to relevant information [4]	Provide a friendly and consistent user interface designed according to strict ergonomic criteria. Such a user interface is necessary to present the information in convenient and comprehensible formats [4]
Privacy	Giving personal area to users	Preserve some separation between public and private workspaces [28]
Feedback	Providing some forms of feedback to learners/instructors	Provide at least one feedback channel

5 Basic Architecture of Virtual Campus

In Section 3.3, new learning process is discussed. There are totally three areas: customized learning strategy, changed role behavior and content providing strategy. Virtual Campus brings this new learning process into reality. Its basic architecture is shown in the figure 1.

All the components can be disturbed geographically. For simplicity, the architecture is divided into two sides: server side and client side. The former can be viewed as "school" and the latter one can be regarded as an individual student.

5.1 Server side

There are several processes in the server side:

1. Gathering the course material based on the demand of student

   Learners pass the request to server side, which is collected and analyzed by the author before he/she prepares a new course materials.

2. Course generation

   After the content is gathered, teachers convert them into a presentable form that is understandable and clear to students. Making use of MWPS, teacher can delivery the lecture in a real-time mode (learner can attend the lecture just like in traditional classroom and ask questions as usual) or in a play-back mode (replayed by learners anytime).

3. Course storage

   Database is used to storage and retrieval of the course materials.

4. Customized re-order course material

   Personal scheduler re-arranges the order of the material to fit the pace of the learner depending on the learning ability and other factors. Scheduler sets the "content pointer" in each student profile and updates it periodically. The system will alert the scheduler to update before the student's next login-on.

5. Student profile storage

Database is used to storage and retrieval of the student's information. Privacy is the most important implementing considerations.

6. Interaction between learners and teacher

   Learner can use MWPS to ask question in the real-time lecture, and JCE to have a personal communication with teacher individually.

7. Interaction between learners and personal scheduler

   Learner communicates with his/her scheduler by JCE.

8. Interaction between teacher and personal scheduler

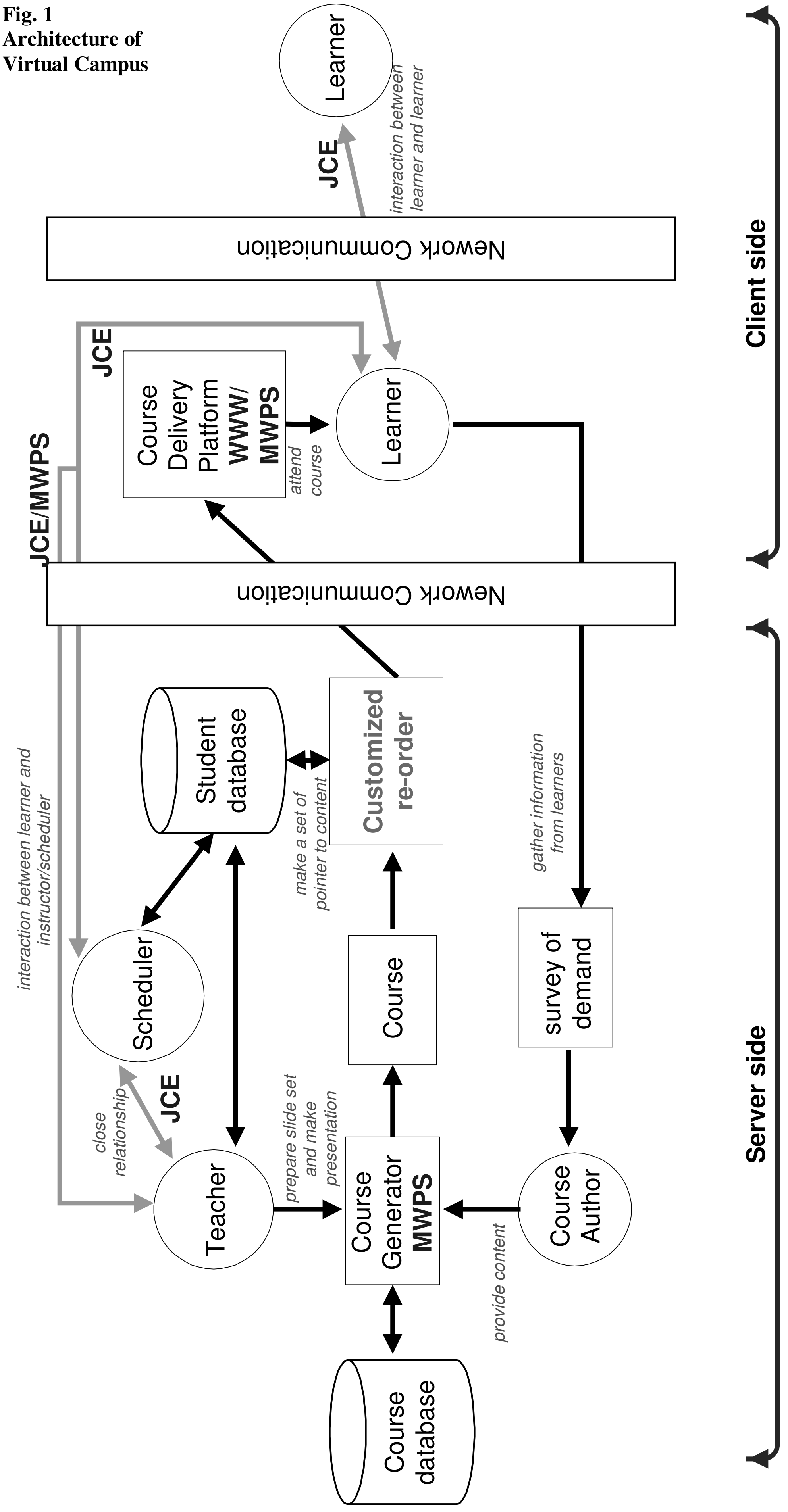
   Same as learner interacting with scheduler, they use JCE to collaborate.

5.2 Client side

In the client side, learners master their study within personal time scheduling. They receive the course delivery through the Web. Whenever, they log-on the campus, they can attend the lectures, study their course notes, work on their assignment, chat with other, negotiate with personal scheduler on the progression or queries to teacher about the course materials.

On the other hand, learner can communicate with other learner using JCE. They can work on group project, collaboration, brainstorming or even just chatting.

Fig. 1
Architecture of Virtual Campus


Learner
JCE
interaction between learner and learner
Nework Communication
JCE
Course Delivery Platform WWW/ MWPS
attend course
Learner
JCE/MWPS
Nework Communication
interaction between learner and instructor/scheduler
Student database
make a set of pointer to content
Customized re-order
gather information from learners
Scheduler
Course
survey of demand
close relationship
JCE
prepare slide set and make presentation
Teacher
Course Generator MWPS
provide content
Course Author
Course database
Client side
Server side

6 Components of Virtual Campus

6.1 MWPS (Multimedia Web-based Presentation System)

MWPS is a Chinese version of NCSU Web Lecture System (WLS, see http://renoir.csc.ncsu.edu/WLS), that supports construction, editing, and management of Web-based presentations, and synchronous and asynchronous capture and delivery of classes and lessons. The presentations consist of HTML documents with streaming synchronized audio and video. The video can be of the low-bandwidth variety or it can be MPEG-2. Low-bandwidth MWPS lesson can be received over ordinary modems and telephone lines. MWPS contains an on-line editor that allows instructors to prepare slides for delivery. The system captures audio and timing data during live presentations and automatically creates a web-deliverable version of the presentation. All of the details of the underlying system are hidden from the users, both instructors and students. MWPS allows users view a presentation using a standard Web browser, such as Netscape, and listen/watch to the accompanying streams via a RealSystem player. The system also has the ability to deliver live presentations with student interaction. Its home page (http://www.cse.cuhk.edu.hk/~lyu9804) is shown in Fig 3.

6.1.1. Layout of MWPS

As mentioned before, MWPS is an Internet Application built on top of the web environment. It allows instructors/lecturers conducting presentation/lectures to those students through the Internet using web browser.

We focus on the synchronous mode of MWPS, which the “classmates” attend the class in real-time. The students can interact with the presenter directly giving instantaneous feedback.

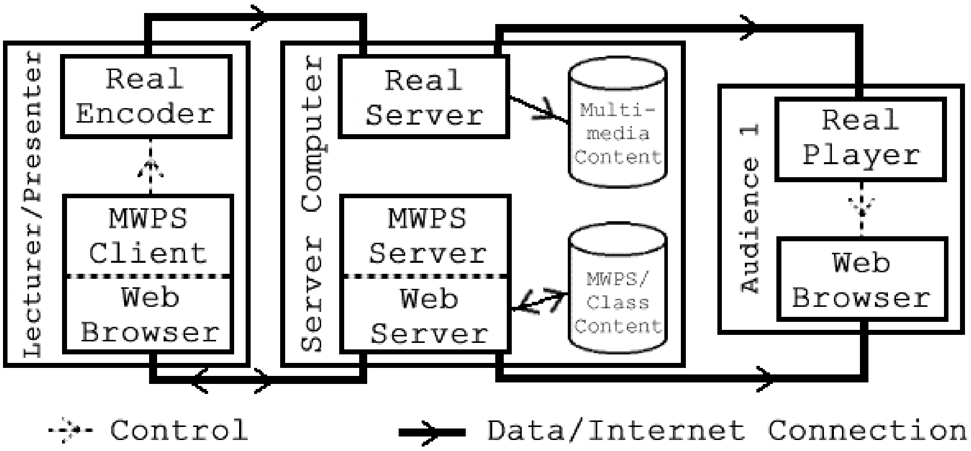

Lecturer/Presenter
Real Encoder
MWPS Client
Web Browser
Server Computer
Real Server
MWPS Server
Web Server
Multi-media Content
MWPS/ Class Content
Audience 1
Real Player
Web Browser
Control
Data/Internet Connection

Fig. 2 MWPS live presentation in synchronous mode

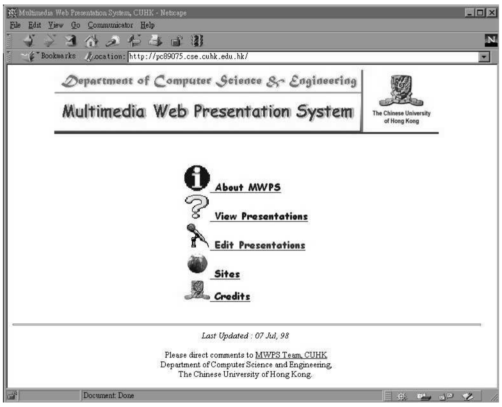
The above figure illustrates the connection of MWPS System during synchronous mode public presentation. On the left-hand side is the presenter's MWPS client machine and MWPS server is in the middle. Students are placed in the right-hand side as audiences.

The server is comprised of three parts: Real Server, MWPS Server and Web Server. The Real Server handles all aspects of multi-media contents, says audio and video. The Web Server provides access of slide of course materials, which containing mainly images and text, to Internet. It also uses to prove the authentication to access and sets the environment of web browser for running CGI and JAVA programs. The MWPS Server coordinates the other two servers and functions the whiteboard application.

Once the lecturer starts the presentation, signals will be sent to the MWPS Server through the Internet connection, MWPS Server will then retrieve corresponding lecturing material (HTML view graphs) back to the client machine and coordinates it to control the Real Encoder in order to start recording. This multimedia content is directly transferred to the student/audience machine through the Real Server and the view graph sequence is also transferred from the MWPS Server. Afterward, Real Server will store the multimedia content captured from the Real Encoder, while

MWPS Server will capture the sequence of view graphs and generate the presentation.

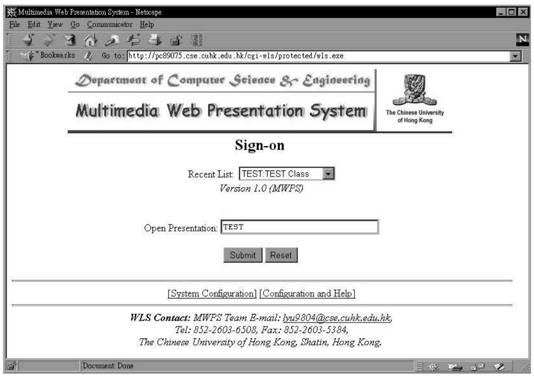
Fig 3: Multimedia Web Presentation System Home Page


Multimedia Web Presentation System, CUHK - Netscape
File Edit View Go Communicator Help
Bookmarks
Location: http://pc89075.cse.cuhk.edu.hk/
Department of Computer Science & Engineering
Multimedia Web Presentation System
The Chinese University of Hong Kong
About MWPS
View Presentations
Edit Presentations
Sites
Credits
Document: Done

Last Updated : 07 Jul, 98

Please direct comments to MWPS Team, CUHK
Department of Computer Science and Engineering,
The Chinese University of Hong Kong.

Fig 4: The Sign-on page for the lecturer


Multimedia Web Presentation System - Netscape
File Edit View Go Communicator Help
Bookmarks
Go to: http://pc89075.cse.cuhk.edu.hk/cgi-wls/protected/wls.exe
Department of Computer Science & Engineering
Multimedia Web Presentation System
The Chinese University of Hong Kong
Sign-on
Submit
Reset
[System Configuration] [Configuration and Help]
Document: Done

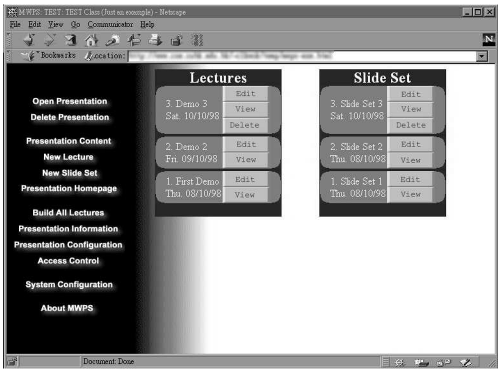
Recent List: TEST:TEST Class

Version 1.0 (MWPS)

Open Presentation: TEST

WLS Contact: *MWPS Team E-mail: lyu9804@cse.cuhk.edu.hk,*
Tel: 852-2603-6508, Fax: 852-2603-5384,
The Chinese University of Hong Kong, Shatin, Hong Kong.

Fig 5: MWPS Lecturer Editing Main Menu


MWPS: TEST: TEST Class (Just an example) - Netscape
File Edit View Go Communicator Help
Bookmarks
Location:
Open Presentation
Delete Presentation
Presentation Content
New Lecture
New Slide Set
Presentation Homepage
Build All Lectures
Presentation Information
Presentation Configuration
Access Control
System Configuration
About MWPS
Lectures
Slide Set
Edit
View
Delete
Document: Done

Lectures	Slide Set
3. Demo 3 Sat. 10/10/98	3. Slide Set 3 Sat. 10/10/98
2. Demo 2 Fri. 09/10/98	2. Slide Set 2 Thu. 08/10/98
1. First Demo Thu. 08/10/98	1. Slide Set 1 Thu. 08/10/98

Fig 6: Presenting Screen

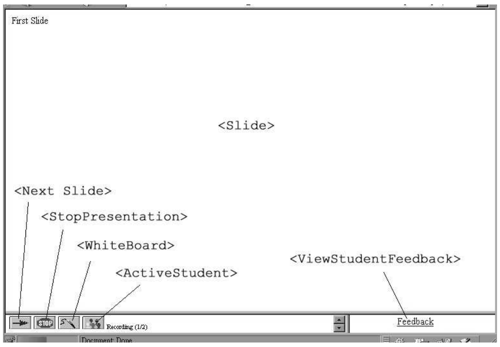
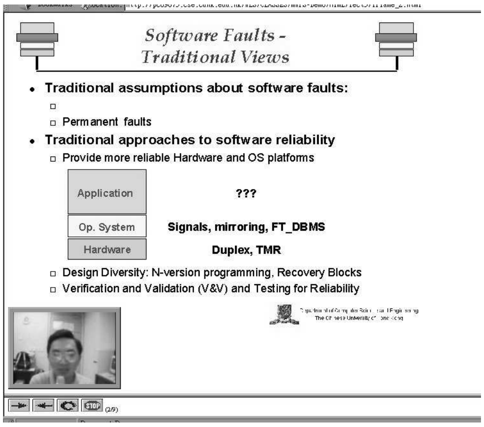

First Slide
<Slide>
<Next Slide>
<StopPresentation>
<WhiteBoard>
<ActiveStudent>
<ViewStudentFeedback>
STOP
Recording (1/2)
Feedback
Document: Done

Fig 7:Review presentation in playback mode


Application
Op. System
Hardware
Department of Computer Science and Engineering
The Chinese University of Hong Kong
STOP
(2/9)

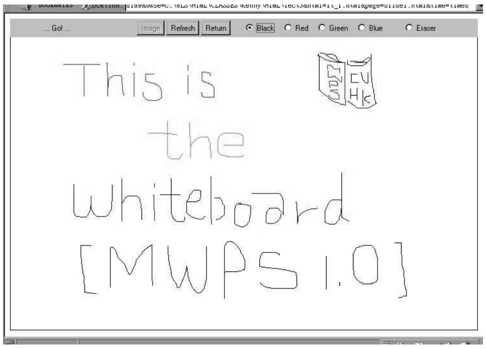
Software Faults -
Traditional Views

- **Traditional assumptions about software faults:**
  - ☐
  - ☐ Permanent faults
- **Traditional approaches to software reliability**
  - ☐ Provide more reliable Hardware and OS platforms

Application	**???**
Op. System	**Signals, mirroring, FT_DBMS**
Hardware	**Duplex, TMR**

  - ☐ Design Diversity: N-version programming, Recovery Blocks
  - ☐ Verification and Validation (V&V) and Testing for Reliability

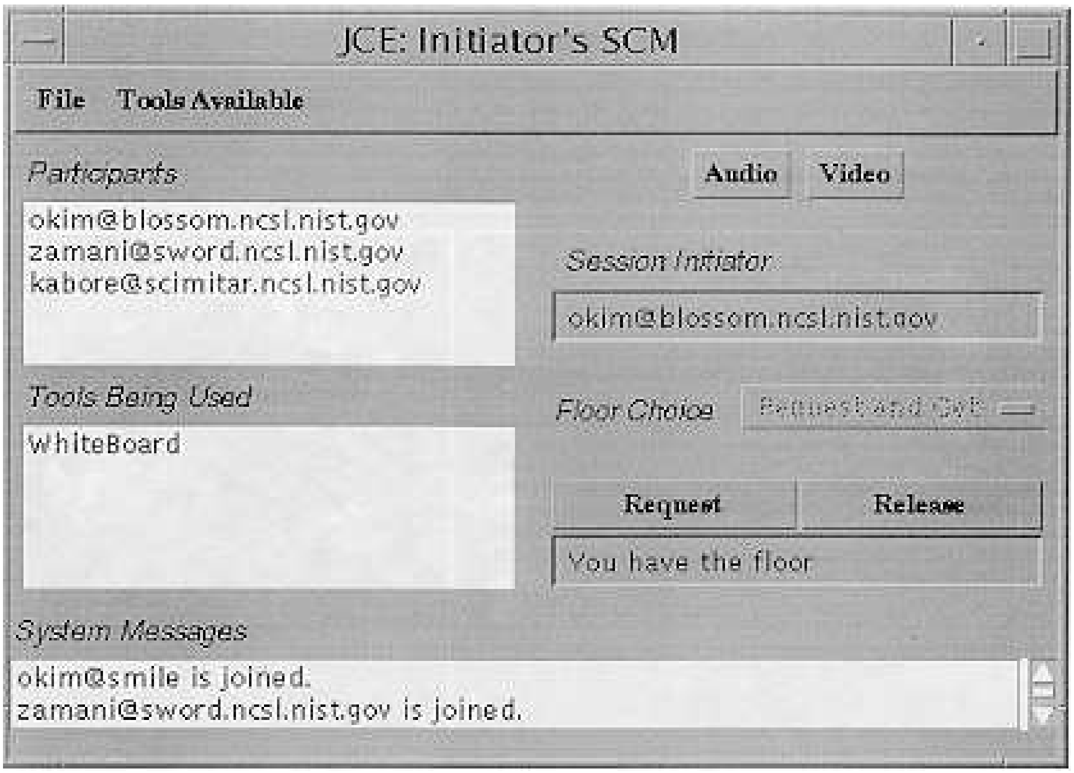
Fig 8: whiteboard


... Go! ...
Image
Refresh
Return
● Black
○ Red
○ Green
○ Blue
○ Eraser
This is
the
whiteboard
[MWPS 1.0]
CU
HK

6.2 JCE (Java Collaborative Environment)

JCE (Java Collaborative Environment), which is developed by the NIST and in collaboration with Old Dominion University, uses Java-based collaboration mechanisms that provide solutions to overcome the platform-dependency problems for collaborative computing in heterogeneous systems. Java's main feature, which is making it an increasingly popular programming language, is that the bytecodes that are produced can be run on any platform that has a Java Virtual Machine. This enables application developers to write the application once and have it run anywhere. [29]

JCE allows the participants to share any application written in Java using its Abstract Windows Toolkit (AWT). And the audio and video components of JCE are based on the new Java Media Framework (JMF).


JCE: Initiator's SCM
File
Tools Available
Participants
Audio
Video
Session Initiator
Tools Being Used
Floor Choice
Request
Release
System Messages

okim@blossom.ncsl.nist.gov
zamani@sword.ncsl.nist.gov
kabore@scimitar.ncsl.nist.gov

okim@blossom.ncsl.nist.gov

WhiteBoard

Request And Get

You have the floor

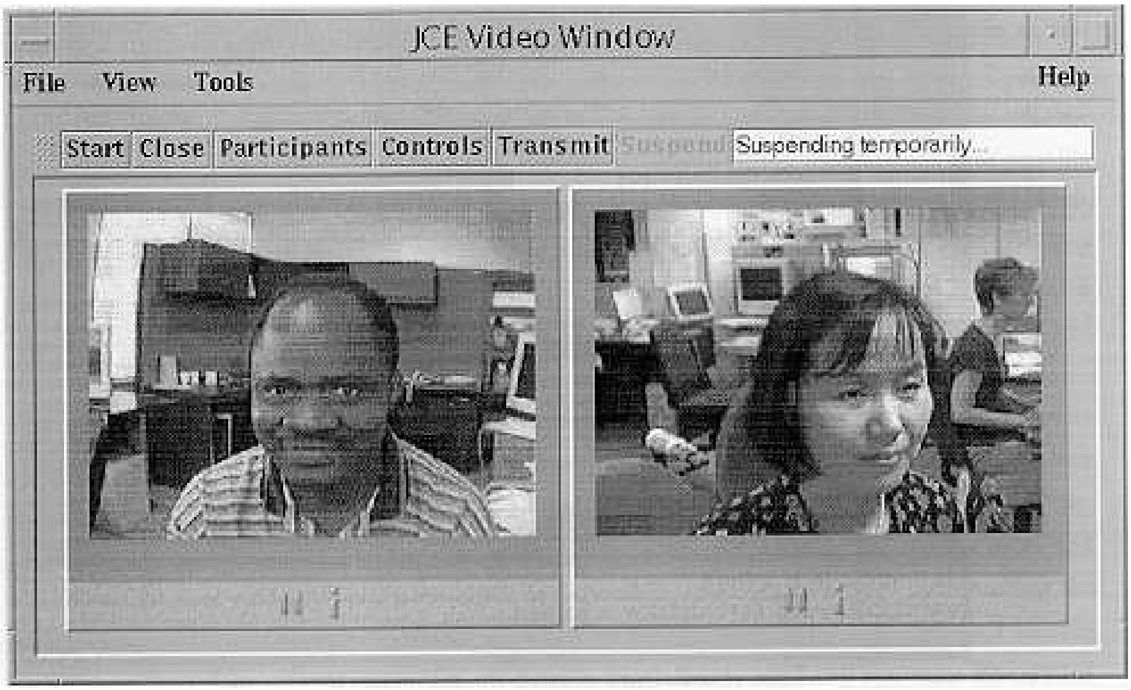
okim@smile is joined.
zamani@sword.ncsl.nist.gov is joined.

Fig. 9 Screen Dump of JCE Main Interface

6.2.1. Requirements for Collaborative Environments

Making use of JCE, the collaboration taking place in Virtual Campus [30]:

- ✓ Create customized collaborative environment (user interface) with the appropriate access;
- ✓ Add collaborative features to specialized applications;
- ✓ Incorporate distributed multimedia functions;
- ✓ Exploit the state-of-the-art audio, video and network technologies;
- ✓ Enable open collaborative applications (sharing documents, images);
- ✓ Set of separate modules (audio, video, whiteboard, etc).


JCE Video Window
File
View
Tools
Help
Start
Close
Participants
Controls
Transmit
Suspend

Suspending temporarily...

Fig 10 Screen Dump of JCE Video Interface

7 Problems encountered

Since Virtual Campus re-creates the "schooling" in web-based environment, the major challenge will be the responses and acceptance of learners.

Besides, there are still some other difficulties need to handle in the same time:

1. Demand of high performance networks

   Even mediocre quality of both audio and video, users reported that the system was moderately useful for sharing culture and maintaining relationships across the two sites. However, the 56-kbits/s digital video channel was considered insufficient for crucial aspects of joint work, such as detailed collaboration or delicate negotiation [31].

2. Traditional concept of classroom

   Many of today's WBT (Web-based training) courses do not take advantage of the full power of the Internet. For example, many contain just skeletal materials – a syllabus, assignments, or instructor notes. The most part, these types of courses are still held in the traditional setting – a physical classroom – and the Web becomes a way for students and teachers to communicate out of the classroom [32].

3. Debugging in students' computing environment

   If learners access Virtual Campus at home, at least he/she has a modem and a computer. Sometimes, they may consume bit of time to configure the computer, which making barrier to access Virtual Campus.

4. Learners' enthusiasm

   It is possibly to stop "attending class" when busy with other things, which postpone attendance easily, and eventually learners turn into falling seriously behind [6].

8 On-going research

There are plenty of areas to continue the research work:

1. Building a integrated Virtual Campus with a user-friendly interface;
2. Implementing the component of customized re-scheduler, by adding pointers to course material and stored in learner's personal profile;
3. Providing the status of log-on people, which enables others know who are available;
4. Hacking the source codes of MWPS and JCE in order to optimal the facilities of Virtual Campus;
    i. Improve the communication channel of MWPS;
    ii. Add more related and helpful components, written in Java, to JCE to increase the efficient of collaboration;

8.1 Proposed modification of MWPS

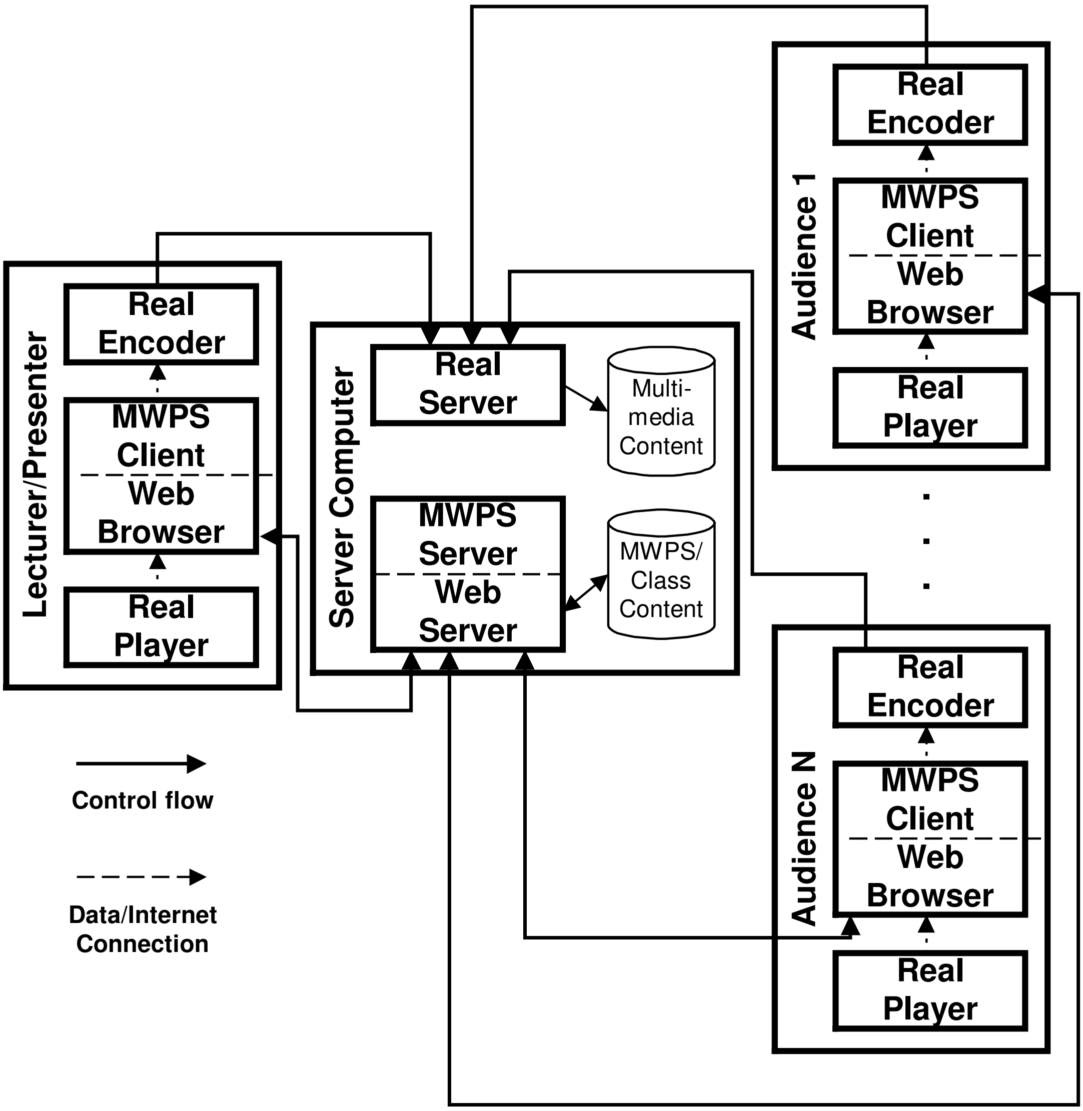
The below figure purposes the outline of the two-way communication architecture. On the left-hand side is the presenter's MWPS client machine and MWPS server is in the middle. Students with their client machines are placed in the right-hand side as audiences.

Basically, the components of client machine and server have changed. But the passive audiences gain the opportunities to join the presentation and express opinions.

This time, the lecturer starts the presentation, signals will be sent to the MWPS Server through the Internet connection, MWPS Server will then retrieve corresponding lecturing material (HTML view graphs) back to the client machine and coordinates it to control the Real Encoder in order to start recording. This multimedia content is directly transferred to the student/audience machine through the Real Server and the view graph sequence is also transferred from the MWPS Server. On the other hand, students can give feedback and follow the same procedures to broadcast to others.

To provide a good policy for activating the client machine can minimize the high demanding of bandwidth. Those idling machines should be ignored until any responses are triggered. Facilities will be added to achieve the collaborative environments. Extra training is needed to provide to students in the installation and debugging his computing environments.

Fig. 9 Collaborative Conferencing architecture



Lecturer/Presenter
Real Encoder
MWPS Client
Web Browser
Real Player
Server Computer
Real Server
Multi-media Content
MWPS Server
Web Server
MWPS/ Class Content
Audience 1
Real Encoder
MWPS Client
Web Browser
Real Player
Audience N
Real Encoder
MWPS Client
Web Browser
Real Player
Control flow
Data/Internet Connection

9 Conclusions

Future education and training is in need of proper tools able to overcome space, time, and performance demands, which are pointed out by the increasing geographical distribution of education and training centers. Moreover, it is required to continuous update in technology-related information. The integrated use of multiple forms of information enhances the learning effectiveness. [4]

On the other hand, effective collaboration between the instructor and students is crucial. This essential factor determines the fate of future web-based education. However, the existing campus wide educational environment on top WWW is basically a weak “two-way” interaction between teachers and students. Moreover, the instructors must be familiar with the related Internet technologies that support effective communication and collaboration [14].

Virtual Campus provides a place that the learners can customize the study in his/her own pace. Providing the up-to-date demanding learning materials and personal study guide, Virtual Campus is an ideal study environment for the ‘life-long’ learners. The major goal of Virtual Campus is to delivery the ‘own-paced’ material to the right person in any time.

In Virtual Campus, both learners and instructors do not need high technology. But 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 programmes. In all, Virtual Campus allows an interactive, dynamic, active feedback in a studying environment.

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