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VIRTUAL CAMPUS

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RESEARCH PROJECT THIRD-TERM REPORT

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## Abstract

Advanced multimedia technologies and Internet technologies are at the forefront of teaching and learning. However, most distance-learning or virtual-learning sites still limit the dissemination of teaching materials. Neither the strength of Internet have been maximized the functions have been fully utilized in instances supporting interactive, customized or collaborative learning.

Virtual Campus technology can customize study in your own pace. Providing the up-to-date demanding learning materials and personal study guide, virtual Campus is a study environment for life-long learner. The major goal of virtual Campus is to deliver the low-pace materials at high speed in your own time.

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## 1 Introduction Motivation

The World Wide Web (WWW) being seen as a new strong medium and undoubtedly, students take in this technology in an interesting new communication mode. They can easily use their personal computers or using the computer laboratories to surf the Web to do things that are different from the traditional kind of learning. They can get the most updated all kinds of information around the world or other brands of e-learning resources which make their teaching life more interesting and adapting to the fast-moving technology.

The Web provides a platform for delivering not only text materials but also multimedia requirements like video streams, lectures. In addition, the WWW technology provides transparent access to information ignoring the geographical penetrating power is inadequate to enable on-line learning systems. Special learning sites where regular academics may reach for instance adult education centers, company-trained schools for students with learning physical disabilities, prisoners. Learners can view the live lecture anywhere anytime [2].

In applying such a new technology to education, the learning process under the Internet environment is the classroom interaction between teacher and student. The utilization of the Internet to deliver the information through the right channels. After investigation, it is found that the classroom stuffs like blackboard and written notes, there will have much to improve the education flow model in the learning process as well as magnifying the

educational technology. Every employee connected to the Internet or facilities. When friends which are learning in school. They can shortly use the Internet and deciding how to solve their trouble.

It is not only student including audio and video provides the distribution. This system can deliver materials hardly in a classroom, special public libraries, even through the Internet.

we are wondering that the traditional question is how fully the student can only translate the Internet into sufficient. The new definition of the Internet.

We have a learning environment, Virtual Campus, which can customize the learning progress for each student.

customizing the

In Virtual Campus, students can fully engage in an interactive, dynamic environment. The non-linear materials are scheduled personally depending on his/her studying pace. Hopefully, with this/her learning relevant material, students can understand (or understand) the material.

learning process through for each student are the student known material, some

Customization is a key to bringing the existing teaching materials and non-dynamic order of 20-40 people to improve the effectiveness and what constitutes "quality education", much controversy. Effectiveness can be defined in terms of course achievement and learning goals for each student, and how to design it.

educational system. Most and delivered in a class. How to measure the effectiveness of subjects of the extent to which 3) generate a person

From a practical point of view, customization is a place where pressure on instructors/teachers. They have to select before class based on their experiences from the syllabus to meet the learning goals for each student. The lesson, instructor/teacher prepares students while receiving different responses and queries. Handling those questions immediately in the situations, most students always just passively, "tune out" [3].

not a burden and the teaching materials student scheduled difficult to customize for entering these materials to for students in course in these and may be ready

Fortunately, customization can be brought by the Internet. Given the information provided to each student and his/her intelligence, schedule self-produced period preliminary student, which is a labor-saving. After reviewing by experienced consultants and interchanging opinions with the particular student, customize

technology automatically. academic records the study plan for each experience consultant and mized tailor-made

timetable generated. Together with the flexible learning environment, delivering high material through personal realization of the mixture.

individual study  
right time

It is important that allowing the receiver (student) learning based on his abilities and interests at the end of instructor/teacher. This information is hardly surviving if stopping learning thing. That pushes people life-long learner. Although not self-discipline and continuity customized study plan in learners' convenience. In addition, consultant acts extra advise to students.

t/learner) adjusting their  
he that totally controlled by  
positive people, persons  
means the society  
a task requiring  
service promote the  
personal support giving

Other than individual learning, virtual campus supports a well collaborative facility allows students to discuss the knowledge. Web chat restricts students but provides forums for exchange. When group and their knowledge, the knowledge base increases and benefit. This is real-time communication in interaction (student/student). The active participation the shared seeking understanding and apply concepts characterize the subject area. [3] shorten the distance instructor.

group-paced learning  
accomplish group project and  
to transmit information  
members participate  
members continue  
restricted the peer  
student and instructor  
and technique that  
between student and

In summary, virtual campus provides a platform for students supports both individual and group learning through (details show in figure 1). It is a way that utilizes the internet conveniently without knowing much that interface of virtual campus needs to be friendly concern student personal requisites if a fulfilling and gratifying.

instructors/consultants  
Internet  
teachers/instructors fully  
technical details so  
for the virtual campus  
during the study in more

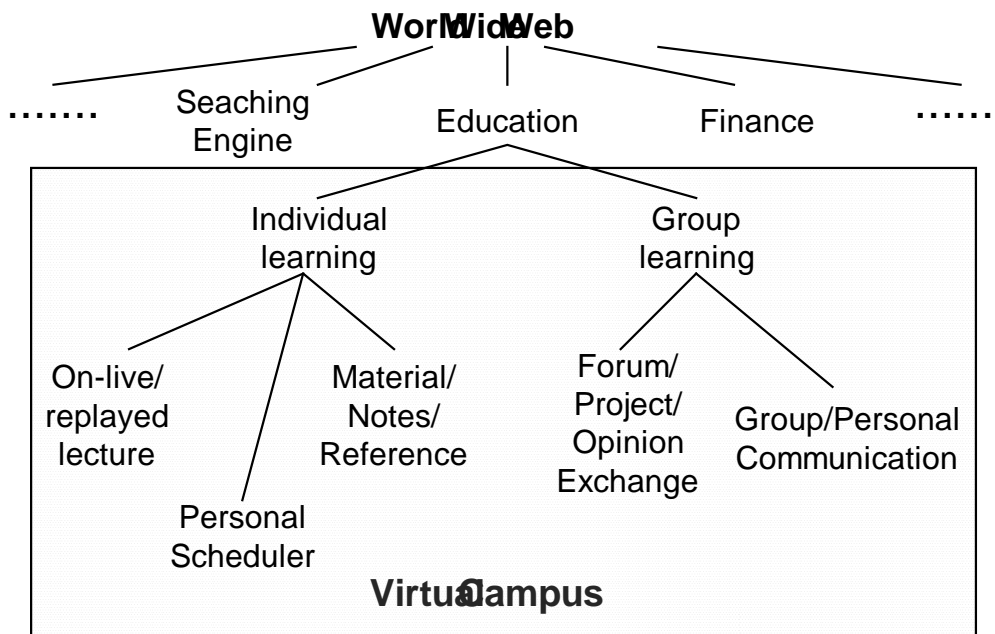


Figure 1: Summary of Virtual Campus

The total sections including Introduction and Motivation, Definition of Learning, Basic Learning Styles, Web-based Education, Changing Trends in Learning Process, Virtual Campus, Conclusions and Future Works.

In the section of Introduction and Motivation, we define the problem lack of customization in current education situations and state the importance of giving the definition of learning and discuss the basic individual learning in the two sections.

Followed by the section of Web-based Education and Changing Trends in Learning Process, we stretch both the new trends and a web-based education.

In the section of Virtual Campus, we will describe the implementation of logical architecture, basic interface design and technical flow. Finally, Conclusion and Future Works give the summary and direction of the ongoing search.

## 2 Definition of learning

"95% of people think learning is nothing but a waste of time" [5]	confidence [5]
"Several adults (71%) think learning is a waste of life" [6]	the quality of
"93% believe that we do not learn" [7]	[7]
"83% of us believe that learning will become more important in the next millennium" [7]	in the next
In this information age our ability to obtain similar knowledge effectively, become a successful competitor, adapt to future life, determine our ability which qualifications we gain in the past.	and apply the right capacity and ongoing judgment by
The new skills answer, "What is learning?" Gagne's definition of learning is all the fundamental	[8] gave precise theory of learning.
"A process by which an individual acquires capability to interact with the external environment. Learning modification in behavior occurs, persists, and is useful to the individual."	typically involves inferred change relatively long periods during
In the words of learning is an interactive, dynamic and with imagination driving action in exploring and interacting environment. [9] Effective communication between them is becoming an important and crucial factor.	feedback process with external structure and students
The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines lifelong learning as:	tion and lifelong
Learning Process Definition	for the 21st century [10]
"Learning is a process of active engagement with experience where they make sense of the ordinary skills, knowledge, understanding, values and the capacity learning leads to change development and self-awareness."	what people involve an increase in reflection. Effective more."



### 3 Basic learning styles

Usually, students learn through classroom lectures, discussions, and laboratory work in school. Each student's progress is monitored and tested by the instructor. There are two major learning styles: group learning and individual learning.

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#### 3.1 Group learning

In the daily-classroom learning, teachers and students communicate in the same manner. And each of the two kinds of learning is a teacher-centered education. In the group learning, it will be formed when the students are working in a learning group to perform a task. They are exchanging their discussions and opinions. Through the interaction, they have a chance to learn how to lead, understand how to give responses, and provide feedback to others.

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The major advantage of group learning is that it provides a face-to-face talking and interaction. This way can reduce distractions from the students and the teaching process. However, this two-way feedback interaction has high transaction and opportunity costs for both parties. It is geographically distributed because of transportation. Although conferencing facilities save much transportation time, it is relatively high operation cost [2].

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#### 3.2 Individual learning

Learners self-study the referential relevant examples. Learning efficiency strongly depends on the ability of the learner to understand new objects and concepts. The main advantage of individual learning is that it provides a high personal flexibility. Learners can learn in different times and specific ways.

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#### 4 Web-based Education

The Internet has been used for education for some years, and the growing participation in it has led to the popularity of web-based education. There are numerous advantages for delivering instruction through the Web, and the main ones are:

- High interactivity;
- High accessibility;
- Workspace orientation putting work place aside;
- All-around ability of multimedia presentation;
- Efficient distribution and update of information.

Web-based Education can be defined as a combination of individual and group learning which takes place on the Internet instead of a classroom. Adopting the highly flexible and interpersonal relationship for the above learning styles respectively, the Internet enables learners to choose their own pace for learning with clear direction and effective assistance. This student-centered approach allows learners to create a campus anywhere.

Hence many learning institutes in North America and Asia understand that technology can be used to support education. They have started to use Internet WWW (see table below).

The abundant on-line courses test the value of learning. However, most of these programs lack the real-time interactivity of a classroom. The generally small help pages and other words, they only enable dissemination of teaching material, and inadequate facilities are provided to support students. Moreover, the Web-based courses are not "flexible" neither are teachers nor the delivery systems and the course presentation different for different students [13].

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Internet enhancing distance learning. However, most of these programs lack the real-time interactivity of a classroom. The generally small help pages and other words, they only enable dissemination of teaching material, and inadequate facilities are provided to support students. Moreover, the Web-based courses are not "flexible" neither are teachers nor the delivery systems and the course

Type of organization	Providing service
Grass-roots volunteer efforts	<ul style="list-style-type: none"> <li>• BlueWebLibrary[4]</li> <li>• Netday[5]</li> </ul>
Academic institutions	<ul style="list-style-type: none"> <li>• SUNN Virtual Classroom[16]</li> <li>• Nova North Carolina State University[17]</li> <li>• The World Health University of Texas[18]</li> <li>• Electronic Courses The University of Connecticut[19]</li> <li>• The Virtual Collaborative University of The University of North Texas (UNT)[20]</li> <li>• Virtual Classroom Network Institute Technology[21]</li> <li>• The Virtual Classroom The University of West[22]</li> </ul>
Commercial sector	<ul style="list-style-type: none"> <li>• Zden University[23]</li> <li>• The Spectrum University[24]</li> </ul>
Company commercial product	<ul style="list-style-type: none"> <li>• The First Class[25]</li> <li>• WebCamp[26]</li> <li>• Misk.ed[27]</li> </ul>

**Table Example of search Internet-Based Learning**

Hence the numerous studies of students have undergone are a foundation for improved web-based education.

[12] The following

environment

- Pre-entry education and orientation guidance
  - Pre-test to students to assess their preparedness for the material from the Afternoon to another acceptable student then may change the arrangement to optimize learning efficiency.

in a self-schedule test to the content material ncy.

- Orientation learning methods
  - To enable students to gain the maximum from the variety of resources available

learning

- Preparation and development of learning skills
  - Enable students to become independent (autonomous) learners

rs

- Monitoring and support of student progress
- Study planning
- Personal support throughout study
- Confidence especially in education
- Personal counseling
- Support for students with special requirements

## 5 Changing Trends in Learning Process

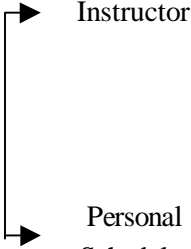
Clearly shows that teaching and learning is changing drastically. Instruction-based learning patterns are being challenged. New learning paradigms are forming. A summary of paradigm shift in education follows:

- Education focus is approaching student-centered from teacher-centered;
- Teaching approach is shifting from facilitating students' autonomous and independent learning to constructing autonomously;
- Learning styles are adapting to active and collaborative learning from passive learning.

When the learning process is different from the traditional one, First, customized learning strategy outlines the whole picture. The entire learning components for delivering the knowledge are highlighted. This will be more effective in learning. The behavior of each role would have significant differences compared with the traditional paradigm. This is shown in Table 1.

<i>Components of Learning strategy</i>		<i>Expected achievement</i>	
	Choice of individual/group learning	→	Depend on personally selected (synchronized or asynchronous lecturing mode)
+	Collaboration	→	Learns to solve problems together (social interaction)
+	Customized learning progression	→	Instructor/schedule advises the pace (personal control)
+	Efficient personal support	→	Establishs close relationship between instructor and students
→ <i>Delivery of knowledge</i>		<i>highlight people highlight time</i>	

Table 1. Learning strategy

<i>Role</i>	<i>Changes</i>	<i>Expected behavior</i>
Students	From passive to active	<ul style="list-style-type: none"> <li>- State what they want</li> <li>- Decide which learning mode fits themselves</li> <li>- Encourage participation</li> </ul>
Instructor		<ul style="list-style-type: none"> <li>- Present the material</li> <li>- Answer questions from the students about the material</li> <li>- Relatively inflexible</li> <li>- From chalk-and-talk to guide-on-the-side</li> </ul>
		<ul style="list-style-type: none"> <li>- analyze the learning pattern of each student</li> <li>- give advice to the student</li> <li>- listen to the student</li> <li>- personal consultant</li> </ul>

**Table 2. Changes in behavior**

In order to do this, the instructor's role is split into two parts. The first is the traditional role of the instructor as a personal scheduler who supports students individually. Some based educational applications are expected to be different with the assistance of machine in view and dynamic processes. Even with the advanced information human teacher's role cannot be eliminated.

The instructor is split into two roles. The first is the traditional role of the instructor as a personal scheduler who supports students individually. Some based educational applications are expected to be different with the assistance of machine in view and dynamic processes. Even with the advanced information human teacher's role cannot be eliminated.

There are mainly three roles in the traditional education: content provider (teaching/learning material provider), content provider on the personal level, and direct communication and teaching materials to students where the materials are prepared by the teacher. On the other hand, students have a choice to be interested.

student teacher and meta-teacher and content provider middle person present and selected by the learner what material

The network learning environment enhances the linkage of schedules and content providers that are

teachers, learning subjects and the

content providers solely determine the material (interest topics students expected) versus providers) way occur in day environment, however, to balance requirements between demand and supply.

situations demand chooses content technology used

Table 4 shows the relationship between demand and supply in particular points of their independence of each other, achieved by switching to combination of sources that demand requirements.

education system. and from suppliers streets current

Condition	Consequence	Status
Demand < Supply	Not fulfilling enthusiasm of learning	Present
Demand = Supply	Just-in-time delivery	Ideally hard to achieve
Demand > Supply	Customized switching of source	Proposed

**Table 4: The relationship between demand and supply in education**

In general, the trending schooling operation provided by the system comprises the components shown in table 5, which customized.

internet-based learning inadequate

Component	Purpose
On-line lectures	• providing teaching material
Message exchange	• achieve communication and collaboration purposes
Discussion	• enabling real-time chat or threaded discussions
Interactive quiz and self-assessment	• determining learning ability • real-time marked automatically
Course generation	• gathering material by content provider • allowing instructor to modify pre-sequenced material
Course management	• database management
Student management	• database management

**Table 5: The current components provided in internet-based schooling**

## Virtual Campus

Virtual Campus is an Internet application in education. It provides advantages for individual learning making good use of the technology. Virtual Campus models the learning environment to customize the study for each person. Providing top-to-personal study guides and study environment for the main of the Virtual Learning Environment. The materials are available to the person anytime.

Figure 10 shows a sample lecture viewed by an individual. The right-hand side of the screen displays the lecture as well as the audio. The user can follow the speed below the lecture. The sequence of the self-moving according to the left-hand side. The user can switch the activities by the system menu, which includes the lecture presentation.

is composed of the network that students can use learning materials and the life-long learners. The 'down-paced' learning materials are available to the user.

The recorded content of the lecture is available to the user. The user can click the left-hand side of the screen to view the lecture. The user can click the right-hand side of the screen to view the lecture. The user can click the bottom of the screen to view the lecture.

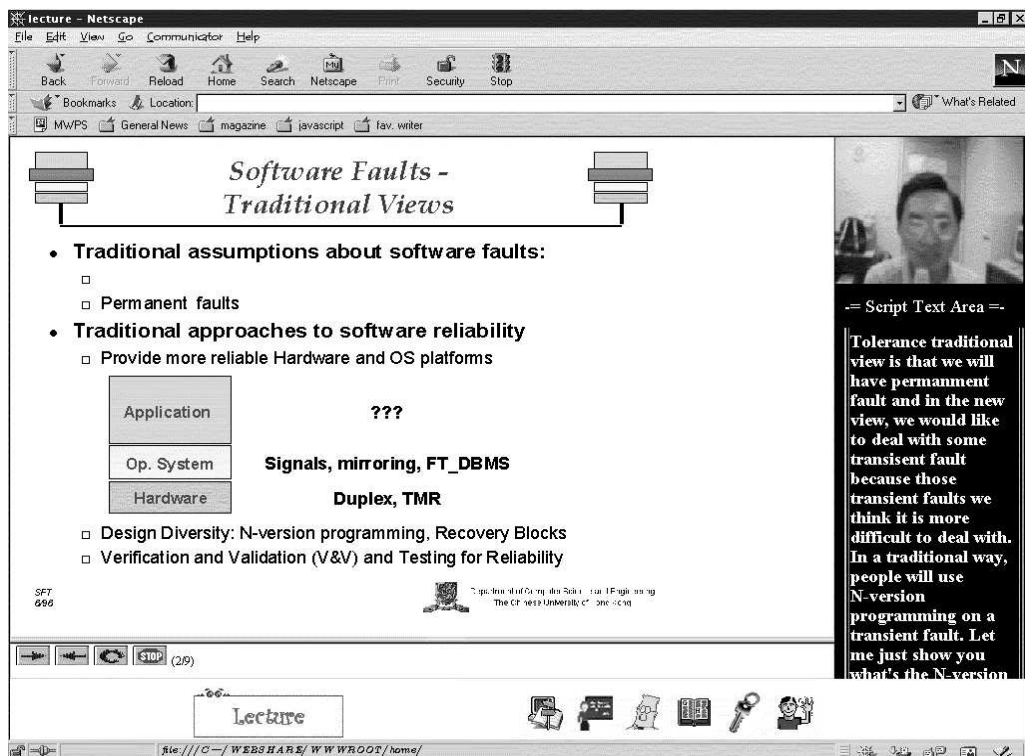


Figure 10. Screenshot of Virtual Campus

The totally characteristic for

the Learning Environment:

Supported and customized individual learning

The Virtual Learning Environment

provides customized learning environment

offer a clear orientation

students always know what they should be doing, what

to do next, etc.

Real-time and non-real-time group learning

By using the environment

(Multimedia Web Presentation System, described in

section 6.3.1), students can

attend the Virtual Learning Environment similar

to the traditional class

lecture. Moreover, the lecture can be re-played any time

to achieve the

customization need.

Collaboration. By using the component ICAV (collabor

ative Environment), also

described in section 6.3.2), students can collaborate with

other students.

Moreover, it supports simple and useful communication.

## 6.1 Logical Architecture

All the components in the Virtual Learning Environment can

be distributed

geographically, as shown in Figure 6.1 for simplicity

the architecture is divided into

two sides: the server side and the client side.

meanwhile, the

school and the teacher regard individual student

as

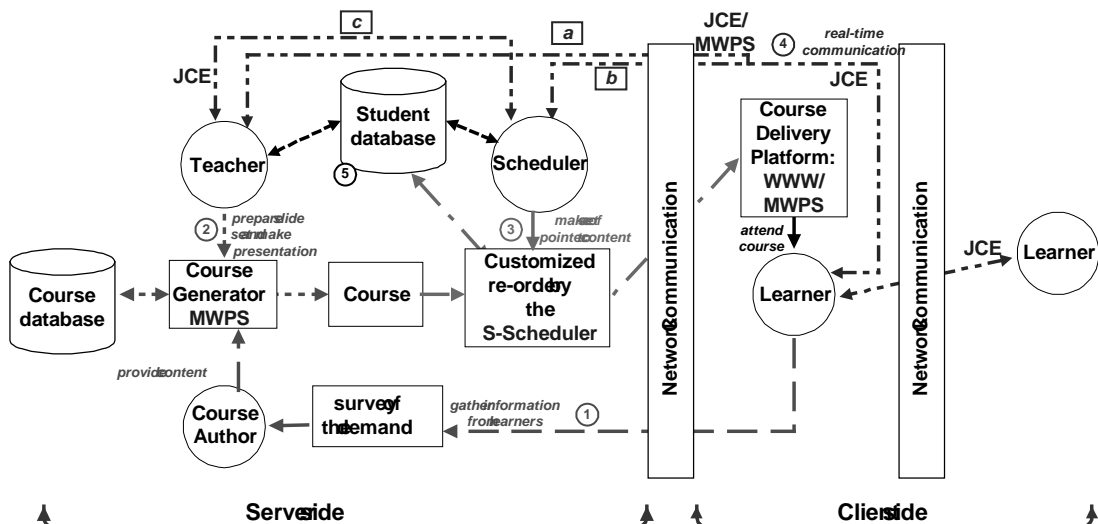


Figure 6.1: Logical Architecture of the Virtual Learning Environment



### 6.1.1. The Server Side

The reverse process in the server side they described follows:

#### Gathering of course materials from the students

Learners pass learning requests to the server, which the course author before/she prepares course

market figures and

collected and analyzed material.

#### Course generation and storage

After the content is gathered, teachers convert them into understandable and least students. Making self WPS deliver the content in a time mode (learners sit traditional classroom and ask questions usually can play the content anytime).

into presentable form that the teacher can tend to justify in a back mode (learners

Course database is done for storage and retrieval

the course material.

#### Customized order of course material

Persons schedule rearrange the order of material learned depending their learning ability and for the content pointer in each profile and updates will be the schedule on date to be before the

and the pace of the schedule sets periodically. The system student to log-on.

#### Real-time communication

a. Interaction between learners and teachers

Learners use WPS question in real-time use ICE component adopted for Virtual Learning Environment to conduct personal communication with teacher individually.

They also environment to conduct communication with teacher individually.

b. Interaction between learners and the scheduler

scheduler

Learners communicate with the scheduler by

CE.

c. Interaction between teachers and the scheduler

er

Teachers interact and collaborate with the scheduler activities.

using ICE for course

## Student profile storage

Student database file storage and retrieval  
Privacy and security the most important imple

the student's information.  
things to consider.

### 6.1.2. The Client side

In the client side learner plan their study according to their personal time scheduling. They receive the course delivery through the Web. In the virtual learning environment they attend the course notes work on their assignments chat with their personal schedule for their learning progress and query the course material.

the personal time  
Whenever learners  
lecture study their  
negotiate with the  
it to each about

On the other hand, learners can communicate with their  
can work on group projects perform collaboration conduct  
meetings simply and formally. The online  
the preference of the learner.

learners using ICT they  
brainstorming  
client side highly depend on

## 6.2 Basic Interface Design

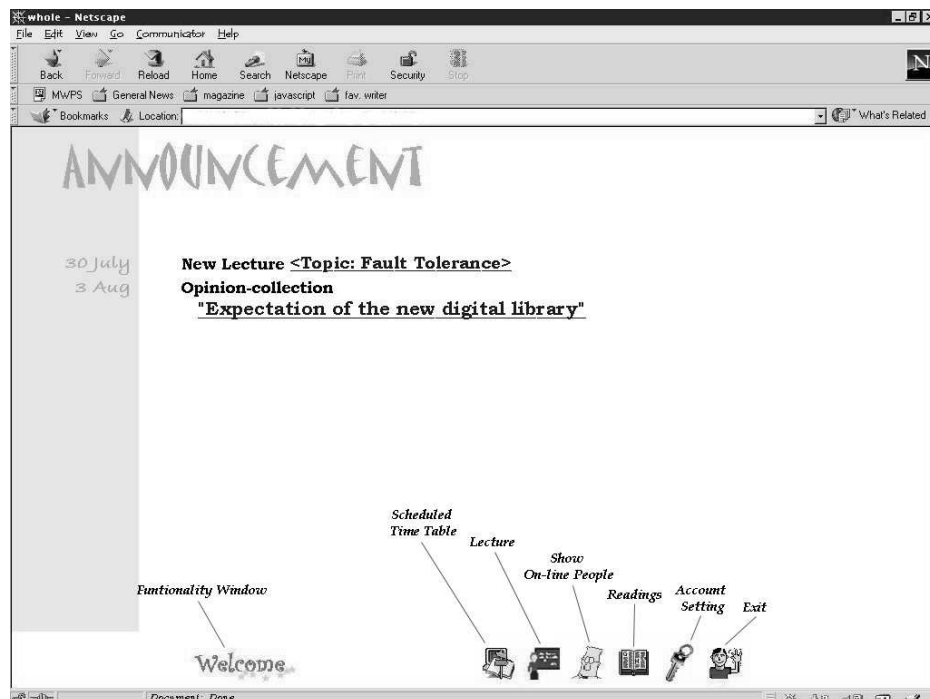


Figure 6.1: Description of a practical design

The figure shows the features of the system. The main window indicates the function chosen by the user. The main window is divided into two parts: the left part shows the main menu and the right part shows the content of the selected function.

- 1. Schedule a table (give a person a learning schedule);
- 2. Lecture (give a lecture);
- 3. Show on-line people (learn what status of a lecturer);
- 4. Reading (give a reference for a course);
- 5. Account setting (allow a person to change a personal password);
- 6. Exit.

An example of a lecture is shown in figure 6.3.1.1, which gives a live/recorded lecture. Other features will be implemented in the future.

rtuCampusThepper  
 itsystemerhathe  
 learnerDifferentbutton

schedule);  
 otherstudentsatargeted  
 rners);  
 detailsexamplelog-in

play-backlectureto  
 mingsemester.

### 6.3 Components of Virtual Learning Environment

#### 6.3.1. MWPS (Multimedia Web Presentation System)

MWPS (Multimedia Web Presentation System) is a Web Lecture System (WLS) that supports construction, editing, and management of Web-based presentations. It is a synchronous and asynchronous capture and live of class sessions.

hinesversionofCSU  
 WLS)that supports  
 ationsaswell  
 aslessons.

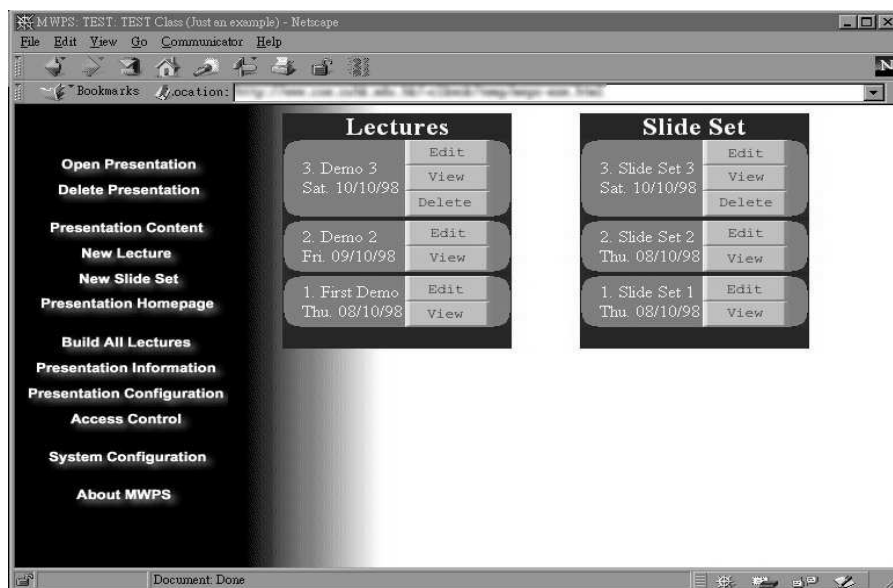
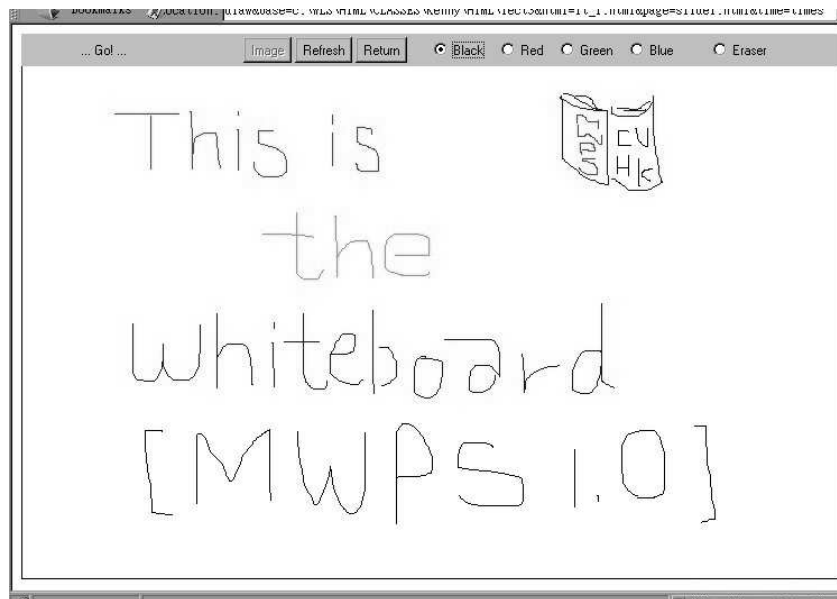


Figure 6.3.1.1 Managing lectures

The presentations consist of HTML documents with a multimedia rich interface. The ideal bandwidth is 128 kbps. MPEG-Low-bandwidth MWPS can be received over a telephone line. MWPS contains non-linear editing prepared for delivery. The system captures audio and presentations and automatically creates a Web-deliverable presentation.

multimedia rich interface  
 based on ordinary modems  
 allows instructors to  
 interact during live  
 versions of the



**Fig. Whiteboard another feature of MWPS**

All the underlying system is hidden from instructor and students. MWPS allows users to view presentation using standard Web browser such as Netscape and watch/listen streams. Real System player. The system also has presentation with student interaction.

these including both  
 tation using  
 the accompanying  
 the ability to live

### 6.3.2. JCE (Java Collaborative Environment)

JCE (Java Collaborative Environment) (30) which is developed by National Institute of Standards and Technology Group (NIST) and Old Dominion University. It is a Java-based collaborative solution to overcome the platform-dependency problems for a computing heterogeneous system. JCE intercepts, distri-

oped by National  
 collaboration with  
 channels that provide  
 collaborative  
 but and create the

use events to allow Java applications to share data transparently. Using JCE, students can join an on-going conference or start a new conference. Available tools like whiteboards allow participants sharing common writing places for conferencing.

Using JCE, students can start a new conference. Available tools like whiteboards allow participants sharing common writing places for conferencing.

### 6.3.3. S-Schedule (Smart Scheduler)

Applying knowledge based rules, the S-Schedule (Smart Scheduler) acts as an intelligent advisor or consultant. It provides the human tool assistance in adjusting the studying plan for The Scheduler gathers pre-test results for each suggested individual study plan according to the knowledge in the knowledge base. The smart scheduler sets the result determined customized study strategy, which is tailor-f

As an scheduler with powerful each student objectively. students can work with their own criteria as reference and attach to student.

## 6.4 Technologies Behind Virtual Campus

### 6.4.1. World Wide Web

The World Wide Web (WWW) is accessible to everyone through the Internet. It is sometimes referred to as the "information highway" [31]. Due to its universal nature, WWW has sought to combine methods of network information navigation and retrieval" distinctive features that are flexible and adaptable in giving an example:

using Web browsers to access "information world" existing [32]. It has many changing rapidly [33].

1. Ability to retrieve and display digitized multimedia images, audio and video;
2. Ability to create hypertext linking the resources together as large and interconnected information space;
3. Ability to create communication channels.

documents, text, web browsing

Hence, an integrated learning and teaching environment on the Internet which supports various modes of learning activities like collaborative projects, teleconferencing etc.

to provide self-paced learning,

### 6.4.1. Web Technology

Web technology built on existing computer networks, services and protocols and convention. Five essential components of WWW: describing the architecture of WWW:

- **URLs** naming/identifying particular source;
- **HTTP**: communication protocols simply define a request-response "conversation" between server and client;
- **HTML** data format for publishing hypertext on the WWW;
- **Web Clients** software capable of accessing Web resources by issuing requests and rendering responses containing Web resource manifesting stations; Example: Web browser
- **Web Servers** software that provides access to Web resources and Web resource manifestation to the requestor.

One of the most common ways that Web servers store data is in a database. Since the database holds useful historical data, companies often organize their data in a way that can be retrieved with a Web browser. Web browser clients access Web servers through a Web browser.

### 6.4.1. Web Server

A Web server is a computer that provides access to Web resources. The job of a Web server is to receive requests from Web browsers, determine which files are needed, and deliver those files to the browser over the network connection. For example, a Web server might have a database of software documents. When a browser requests a document from the network, the server finds that document in the database and delivers it to the browser over the network connection.

In addition to delivering documents, a Web server can also execute programs to dynamically generate information. On the client side, a browser requests a program (script) from the server. The server executes the program and lays the results out in a format that the client can understand. The client summarizes the results and translates the input from the client into a format that the server can understand. The server then returns the results to the client.

This is possible because interactive applications are served through a gateway access resource that connects to a database. The ability to script makes Web servers extremely flexible and the Web incorporates a range of services.

It permits Web servers such as Microsoft's Internet Information Services (IIS) to be extremely flexible and the

#### 6.4.1. Basic Web Server Database Flow

The figure below shows the mechanism for connecting a Web Server to a Virtual Campus database. The details discussed here are for a Web Server (WebSite Professional 2.0) with a database connection (Oracle) running on Windows NT.

#### Campus

abases the Web server using a window interface module for Perl, NT.

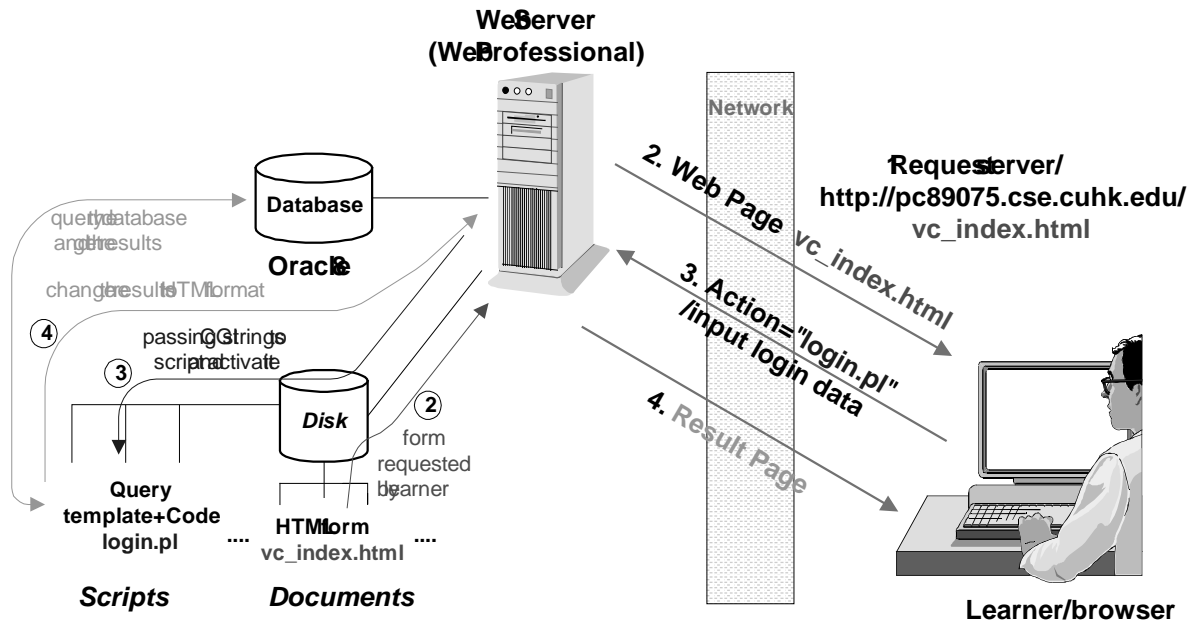


Fig 6.4.1 Basic Web Server Database Flow

The process of connecting a Web Server to a Virtual Campus database is shown above. The numbers indicate the basic steps that take place. In this section, the client (right-hand side) and server (left-hand side) are described in a simple example, the log-in process:

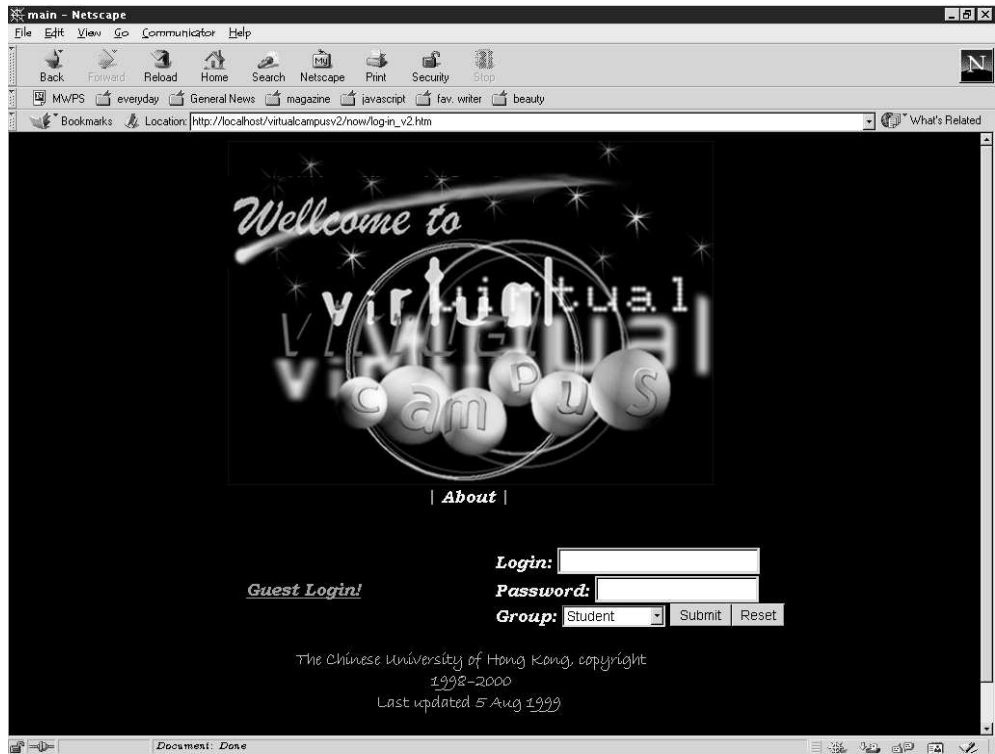
show above. The client (right-hand side) and server (left-hand side) are described in a simple example, the log-in process:

1. Server (vc\_index.html) is created first

and index server.

Client side: The form is requested by typing its address  
 ([http://pc89075.cse.cuhk.edu.hk/vc\\_index.html](http://pc89075.cse.cuhk.edu.hk/vc_index.html)) in the browser.

- Server side: The server looks for the file `vc_index.html` in the document tree. This is a single file on the server, which is a normal part of the operating system. The file is located at the ready the server and the server sends the learner.



**Fig. 3.1** Blog page of Virtual campus

Client side: The learner receives the above page).

- Server side: The server locates the script `login.pl` and confirms that it is an executable program of some kind. The server executes it correctly.

Client side: The learner enters his personal login information (login-name, password and belonging group). This is returned to the server and activated by the script written in Perl language.



4. Server-side script interface

The change the output from query HTML to display the results in a browser.

Client-side Am-the-fly page into

database and query.

rmahatbe

the server side.

## 7 Conclusion and Future Works

Future education and training need to cope with possible time and performance demands which are pointed out by the geographical distribution of education and training centers. To continue updating technology-related information, the multiplicity of information enhances the learning

On the other hand, effective collaboration between the crucial factors determines the benefit. Virtual Campus, both learners and instructors, do not only communicate with each other freely. Moreover, the development, guidance and support which are concerned with overall progress, cross courses and study programmes.

Continually implementing and undergoing provide a facility to make the Virtual Campus interactive, dynamic and environment specially intelligent schedule while semester.

overcome space, increasing. Moreover, it required integrated use of effectiveness [9]

instructors and students. In web-based education, technology. But Virtual Campus provides the learner's

the learner in order to provide feedback-studying implemented the

## References

- [1] Web Site: The World-Wide Web Virtual Library: Education, <http://www.csu.edu.au/education/library.html>
- [2] NCSU Web Lectures System WLS See <http://renoir.csc.ncsu.edu/WLS>
- [3] Porte Lynnette R. 'Creating the virtual classroom: distance learning in the Internet New York: Wiley, 1997.
- [4] Karen E Goeller, 'Web-based collaborative learning: perspectives for the future', *Computer Networks and IS Systems* 30(1998)634-635
- [5] National Adult Learning Survey DEE, 1998
- [6] Attitudes to Learning Campaign Learning/MORI 1996
- [7] Campaign for learning, About Learning, <http://www.campaign-for-learning.org.uk/abtlearn.htm>
- [8] Gagne M, Driscoll M (1998) 'Essentials of Learning Instruction', New Jersey: Prentice Hall
- [9] Constantine A. Papandreou, Dionisis X. Adamopoulos, 'Modeling a multimedia communication system for education and training', *Computer Communication* 21(1998)584-589
- [10] Campaign for learning, Definition of Learning, <http://www.campaign-for-learning.org.uk/learndef.htm>
- [11] Robert Walter, Computer-Mediated Communication: Multi-media Applications, Boston: Artech House, 1995, p. 27.
- [12] Marc Eisenstadt, Vincenz Knowledge Media Institute 'The Knowledge Web Learning Collaborating NetKog Page, 1998
- [13] Peter Brusilovskiy, John Klund, Edna Schwarzl, 'Web-based education for all: development of adaptive courseware' *Computer Networks and IS Systems* 30(1998)291-300.
- [14] Blue Web Library (<http://www.kn.pacbell.com/wired/bluewebn/>)
- [15] Netday (<http://www.netday96.com/>)
- [16] SUNNY Virtual Classroom (<http://137.142.42.95/west/SVC.html>)
- [17] NovaNET (<http://www.novanet.com>)

- [18] The World Lecture Hall University of Texas.  
(<http://www.utexas.edu/world/lecture/index.html>)
- [19] Electronic Course Reservers – The University of Connecticut.  
(<http://www.lib.uconn.edu/ECR>)
- [20] Kathleen M. Wigge, Robert Brazil, Victor Lopez and Alan Livingston, The Virtual Collaborative University Computer Education, No. 29, 2/3 pp. 55-61, 1997.
- [21] R. Hilt and M. Turoff, The virtual classroom: learning without limits, N.J. Norwood, Ablex Corp (1994).
- [22] The Virtual Classroom, The University of West Florida.  
(<http://www.vclass.uwf.edu>)
- [23] ZDU University (<http://www.zdu.com>)
- [24] Spectrum University (<http://www.vu.org/campus.html>)
- [25] First Class Systems Corporation (<http://www.firstclass.ca>)
- [26] WebCT (<http://homebrew.cs.ubc.ca/>)
- [27] MISK.ed ([http://www.misk.com/miskedu\\_slide1.html](http://www.misk.com/miskedu_slide1.html))
- [28] Charles X. Cheng, Jerome Yen, Virtual Learning Environment (VLE): Web-based Collaborative Learning System
- [29] Multimedia Presentation System <http://pc89075.cse.cuhk.edu.hk/>
- [30] Abdel-Wahab O. Kim, P. Kabore and J. P. Eavreau, "Java-based Multimedia Collaborative Application Sharing Environment for Francophones in Engineering Protocols (CFIP'99), Nancy, France, April 20-29, 1999.
- [31] Berners-Lee, 1994 Universal Resource Identifiers: Unifying syntax for the expression of names and addresses of objects in the World-Wide Web." RFC 1630, CERN. June. [URL: <http://ds.internic.net/rfc/rfc1630.txt>]
- [32] Jonathan B. Hardy, 1994 NCS Mosaic: The World Wide Web: Global Hypermedia Protocols for the Internet." *Science* Volume 265, 12 August 1995-901.
- [33] Nancy Yeager, Robert McGrath, Web Server Technology: An Advanced Guide to World Wide Web Information Providers" Morgan Kaufmann Publishers Inc 1996

[34] Architecture of the World Wide Web,  
<http://www.w3.org/Architecture/Outline.html>