

BLEND E-LEARNING MANAGEMENT SYSTEM FOR THE TECHNOLOGICAL UNIVERSITY GRADUATE PROGRAMS

Gisela V. Rolluqui

Technological University of the Philippines (gvrolluqui2003@yahoo.com)

ABSTRACT

The Technological University of the Philippines as the premier technology education university of the country, offers graduate programs in different areas in technology and engineering. Professionals both from the academe and the industry who want to upgrade themselves through higher education choose the Technological University of the Philippines. However, due to work schedule and distance, the students cannot attend regular classes in the university. The University offers extension classes wherein the professors go to a consortium university to teach in the off-campus graduate programs but this created a lack of manpower in the campus. Thus, to lessen the problem of manpower and at the same time cater to a much wider populace, an E-Learning system for the graduate programs of the University was developed. The system evolved to a blended system, synchronous and asynchronous, to make it more interactive and in real-time for those who can afford to be online while the class is in session. First, a study was done on the capability of the University to offer E-Learning system in terms of resources and technology. Further, before the actual design and development of the system, a study was conducted on the existing systems available in the country as well as those used in other countries. After these studies the Blended E-Learning Management system was developed and initially tested. Modules for the system are being developed to further test the system and its interactivity. The results of the tests showed that the system is very satisfactorily functioning as designed and can be implemented in the coming school year, 2011-2012, for some basic subjects in the Graduate Programs of the University.

KEYWORDS

E-learning, Synchronous, Asynchronous, Learning management system, Blended e-learning, Graduate programs, Interactive, Real-time

INTRODUCTION

The Technological University of the Philippines (TUP) is a state university known to be the premier university in technology education. It offers a variety of courses in engineering, technical education, sciences, architecture, engineering technology and graduate programs. These graduate programs are in the fields of engineering, technical and science education, technology and architecture. Professionals from the industry and the academe need to upgrade in terms of educational attainment for professional advancement would enroll in graduate programme in universities for higher education. In the field of technology, based on enrollment records, these professionals choose to enroll in the Technological University of the Philippines. The University, to cater their needs offer extension graduate programs, off-campus programs aside from classes held in its campuses, the Manila campus, Taguig campus, Cavite campus and the Talisay campus in Visayas. Those who wish to enroll come from different parts of the country and even from other countries such as China, Singapore, Middle East to name a few. In the off-campus programs, professors in the graduate programs are sent on site to teach. This is done during weekends or school holidays. This, however, is gradually posing problems to the University in terms of manpower.

Another problem is the schedule of classes. The students and the professors must have a common time to meet for their classes. Professionals who are enrolled in the graduate programs are working and they have different work schedules. Even if they live or work near the University, their work schedules cause them to be absent or late to classes, missing important discussions.

A solution to ease these problems is the development of a system that the students and their professors can meet in real-time through the use of the internet. The professors can teach and the students can learn without leaving their work places. For the graduate programs of TUP, a Blended E-Learning Management System was developed.

Objectives of the Study

The study aimed to develop an online system as a learning management system. The teaching-learning strategy is of a synchronous and an asynchronous system. This Blended methodology is used to make the system interactive, real-time and can be used offline when the students are ready to attend the class. The system was tested and evaluated for its functionality, effectiveness and efficiency.

Scope and Delimitation

The study is the development and evaluation of the Blended E-Learning Management System of the Graduate Programs of the Technological University of the Philippines. This system is for graduate students who are unable to come to school regularly due to geographic and time constraints. For the purpose of testing and evaluation of the system, courses which are common to the graduate programs will be used. Modules will be launched at the same time face-to-face lectures are given. The live tests will be done in the school year 2011-2012.

The system will be tested based on its performance and functionality while it will be evaluated in terms of its effectiveness and efficiency.

METHODOLOGY

As input, a study was done on the capability of the University to support an E-Learning system. The University was found to be highly capable in terms of technology, human resources, facilities and financial resources. The University is found to be ready to adapt to the system. The design and development of the system started after an investigative study of the available system in the country and in a technologically advanced country, Japan. This study was on the efficiency and effectiveness on the implementation of an E-learning system and how a system can suit the needs of the implementing University.

In the Philippines, to suit the different learning styles of the students as well as the teaching styles, a customized system was developed. This system uses the blended style of independent learning or asynchronous learning, real-time or synchronous learning and collaborative learning. In the developed system, the students can have lessons during their free time, off line or in real-time, that is, at the same time the class is being held in the University. However, with the system, the learning is highly managed and there is collaboration among students and their professors. The students will experience studying as in attending a class in the University without leaving their place of work.

Project Design

The Blended E-Learning Management System was designed based on the Context Diagram as shown in Figure 1. This shows how the system operates with the input and output data from the different entity involved in the system, such as the System Administrator, the Professors and the Students.

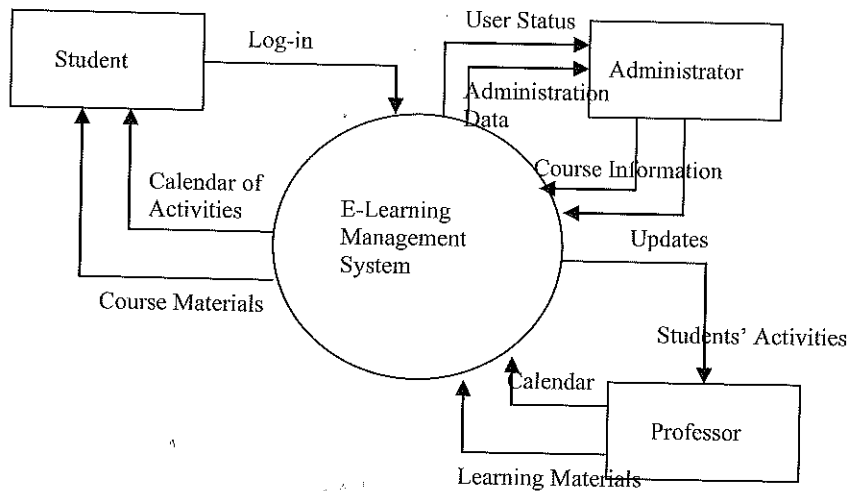


Figure 1. Context diagram of the e-learning management system.

The Professor inputs all the lessons through the video camera in real time and modules in any format with requirements for online submission with the set deadline. Also, the modules are with the calendar so that the attendance of the online students is recorded. Each lesson is viewed in professor specified time duration only. The students can log-in to the system for a class in real-time (i.e. the same time as the class in the University) or at his/her convenient time within the specified time of the lesson. The Administrator controls the flow of data within the system and issues updates and grants access to the system.

This E-Learning Management System is a client-server Web-based system with a three-tier architecture. Its major components are the database server that stores all the information and data needed including the means to link to the learning content repository; the application server that controls the communication and the client that is used by the users in order to access data from the server.

Testing and Evaluation Procedures

The system was tested for its performance and functionality. After satisfactorily being tested, courses were loaded and tested for a local network. Users were asked to evaluate the system for its usability and functionality as a medium in teaching and learning in the graduate programs.

The system will be enhanced according to the results of the tests and evaluations. The enhanced system will then be re-evaluated in terms of its efficiency and effectiveness.

RESULTS AND DISCUSSIONS

System Description

The Blended E-Learning Management System (BELMS) is an online application designed to manage the delivery of self-paced and real-time e-learning courses. The BELMS lets the publication of courses and place them in an online catalog. Learners log into the system using the browser then select the courses from the catalog and launch them. The system tracks the learners' activities in the courses. It provides online reports for each learner per course.

System Structure

Use-Case Models

The focus of this system is to provide the users with the necessary IT tools for accessing the educational materials and communicating with and among themselves. In each role, the Use Case model is used to summarize the external interactions between them. Shown in Figure 2 is a summary of the basic functions that all the users can perform with the system.

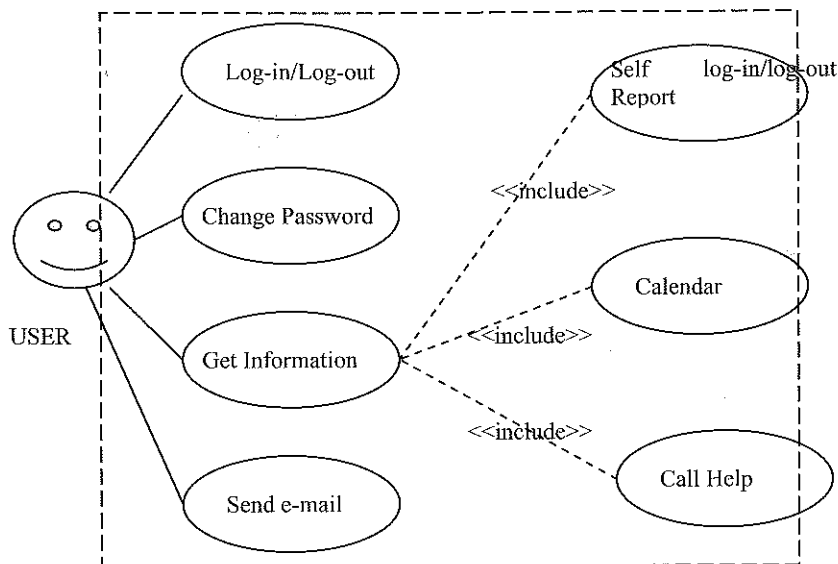


Figure 2. Use case diagram for all user roles.

The users of the system, the students, the faculty members or professors, the administrator and other guests, can perform the basic functions such as Log-in into the system, Log-out, change password, call help for the functionality of the system, access the provided calendar, view self log-in report, send e-mail to other users and view the course catalog. On the other hand, the Use Case Diagram for the Student and Professor roles is as shown in Figure 3.

The BELMS will provide students with learning materials and communication with other users, the Professors and other students, through e-mail and chats (text and/or video). Each student can participate in more than one registered subject and can access its subject materials. Registered students can perform the following specific functions in the system:

- a) View and/or download learning materials.
- b) View and/or download assessment questions/case studies.
- c) Submit answers to assessment question/case studies and other requirements.
- d) View performance reports.
- e) Communicate with group mates and/or professor.
- f) Participate in classroom discussions in real-time.

On the other hand, the registered professor can upload learning materials, assessment questions and answers, case studies, requirements in their area of specialization as well as the calendar for his/her subjects. Specifically, the professor has the following functions:

- a) Upload, view, download, edit learning materials, assessment questions, case studies, requirements.
- b) View students' log-in history.
- c) View students' activity in the course and interaction with other students.
- d) Communicate with the student(s).
- e) Make a schedule or calendar for each course learning materials and submission of requirements.

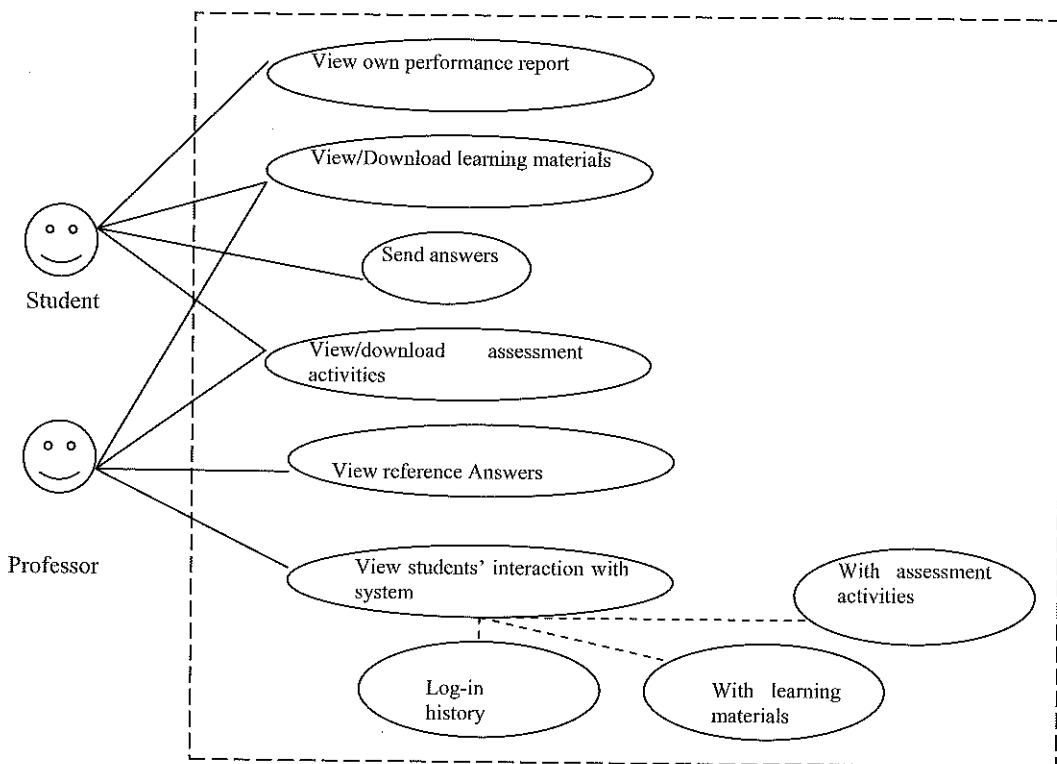


Figure 3. Use case diagram for student and professor roles.

Another user of the system or the person who manages the system is the System Administrator. Shown in Figure 4 is the Use Case Diagram for the System Administrator. He/she is in charge of the BELMS, thus, has complete access and monitors the system database. He/she manages the system resources and maintains it by adding new system functions and enhances its functionality when needed.

The system administrator will perform the following specific functions in the system:

- a) Register users of the system.
- b) View and/or update university and user information.
- c) Delete users of the system.
- d) Get the list of all users.
- e) Get the list of all subjects/ courses.
- f) View system's log-in.
- g) View students' interaction with the system.
- h) View the professors' interaction with the system.
- i) Maintain system's functionality.
- j) Update system's functionality.

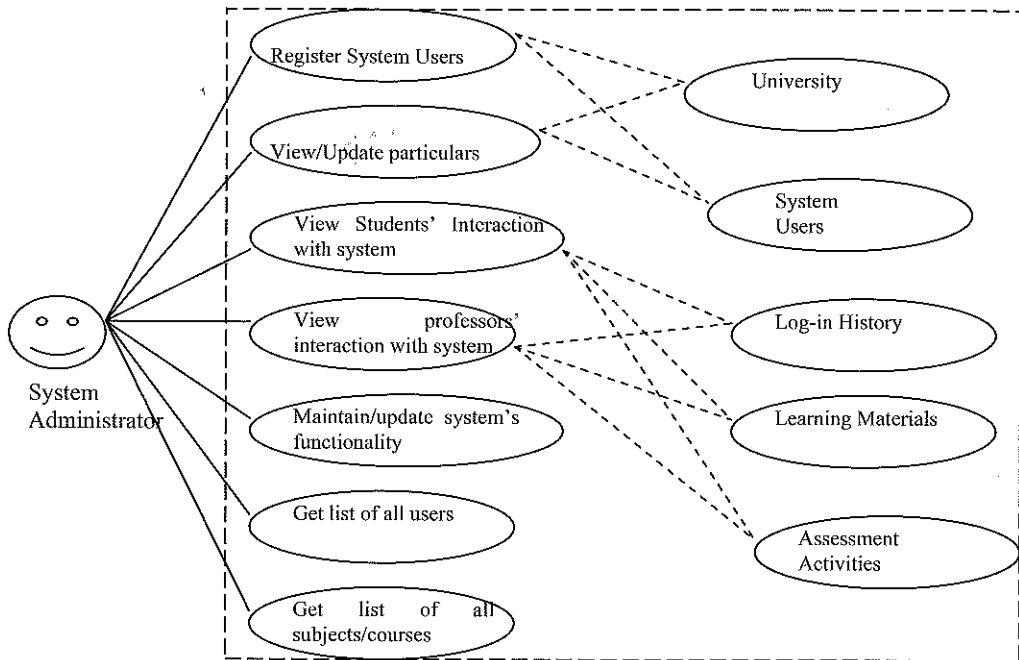


Figure 4. Use case diagram for the system administrator roles.

System's Capabilities and Limitations

The developed BELMS has the following capabilities:

- a) Register learners and professors.
- b) Maintain administrator, learner and professor profiles.
- c) Maintain class term/schedule.
- d) Maintain catalog of courses.
- e) Manage classes and classroom resources.
- f) Store and deliver learning courses.
- g) Download eLearning modules and tools.
- h) Track and record progress of the learners and assessment results.
- i) Provide reports.
- j) Provide online and offline chat and video chat.
- k) Schedule class activity through calendar.

However, the system has the following limitations:

- a) Students are registered by the administrator
- b) Data are backed-up manually
- c) Enrollment system is not included

The home page screen of the system, as shown in Figure 5, can be seen once the Uniform Resource Locator (URL) or the website address is inputted. This consists of a window to choose the type of user accessing the system, the Student, the Administrator or the Professor/Teacher. Each user has their respective account identification and password. Each user has their respective screen with a menu that depicts their functions in the system. For the Administrator, he/she has two functions, the Maintenance and the Query. Each function has sub menus for the specific functions accorded to him/her in the system. For the Professor as the user, he/she has three main functions as given in the menu, the Class Management, the Assessment Management and the Profile and Security. For each main function, the specific functions for him/her are given in the submenus for easy access of the system. For the Student as a user, the screen contains also three main functions, Classroom, Online Assessment and Profile and Security. As in the other users, the specific functions that can be done by him/her are given through sub menus.

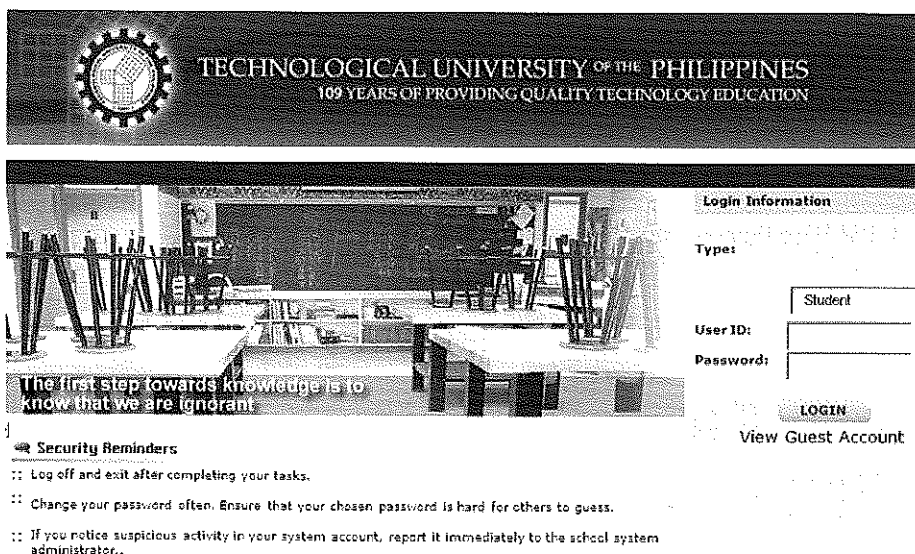


Figure 5. Home page screen.

Evaluation Results

The system was evaluated by experts on its functionality in terms of its Reliability, Usability, Maintainability and Functionality with the use of ISO/IEC 9126-1991. Table 1 shows the summary result of the test done. According to the rating given by the experts, the system is maintainable and is functioning as designed. On the other hand, the rating for reliability showed that the system has low fault tolerance and recoverability. This may be because of its manual operation especially in the data backup. However, the overall rating showed that the system is highly acceptable and technically efficient.

After the technical evaluation by the IT experts, the system was uploaded for evaluation of the users, the students and the professors. Since the University has various Graduate programs, common courses were chosen to be uploaded to the system. The content experts are doing the modules for these courses. A couple of these courses were uploaded into the system and being partially implemented for online, offline and classroom learning. The efficiency and effectiveness of the system will be measured at the end of the term through the assessment results of the learners and the perception of both the professors and the students. Based on the perception of the users, the system is Highly Acceptable in terms of its functionality and usability.

Table 1. Summary result of ISO/IEC 9126-1991.

Indicators	Mean	Description
Reliability	4.36	Very Acceptable
Usability	4.50	Very Acceptable
Maintainability	4.83	Highly Acceptable
Functionality	4.67	Highly Acceptable
Overall Mean	4.59	Highly Acceptable

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the foregoing findings, the following conclusions were drawn:

1. The Blended E-Learning Management System was designed devising the synchronous and asynchronous learning-teaching strategy. It consists of an integration of systems for interactive learning either online or offline.
2. The system was created as designed using ASP.Net and uses MS SQL Server 2005 to store and organize the data pertaining to the users and the courses.
3. The system was technically evaluated as Highly Acceptable in accordance with the ISO/IEC 9126-1991 and rated Highly Acceptable in terms of its functionality and usability.

Recommendations

On the basis of the findings and conclusions, the following are recommended:

1. The Blended E-Learning Management System can be implemented for online corporate trainings and seminars, online review and tutorials and web-based examinations and assessments;
2. The system may be implemented both in intranet and extranet environment and;
3. Integration of this system with the online enrollment system and other University systems.