NEAR EAST UNIVERSITY LEARNING MANAGEMENT SYSTEM BASED DISTANT EDUCATON

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ABSTRACT

In order to establish a distant education system, it is first required to create a virtual learning system environment. A detailed literature search has revealed the existence of some *Open-Source* systems such as *Claroline, Moodle etc*. Each system has been investigated in detail and it was found that *Moodle* is the one closest to the NEU education system. A study has shown that the instructor-learner relationship is poor in existing systems. The *Grewptool* collaborative editor has been used to create various additional features in order to satisfy the group work requirements. This paper is about a pilot study which has been carried out at the Near East University during the 2004/5 Fall Semester using the Moodle together with Grewptool. The system has been tested with 40 students taking the *Java* and the *Pascal* programming courses and the results of the research and a survey are given in the paper.

Keywords: Web-Based Education, Learning Management System, Collaborative editor.

INTRODUCTION

Web-based learning (also known as "E-Learning") is currently one of the major applications of the Internet. Generally distance education has been delivered using the technology such as video conferencing, videotape, satellite broadcast, TV broadcast, Internet, and so. Web-based learning is to be a new and sophistically tool of the distance education.

A learning management system (LMS) provides the platform for the online distant learning environment by enabling the management, delivery, and tracking of learning. LMS are often viewed as being the starting point of any distant learning program. Some of the important issues when evaluating a learning management system are [Hall, 2003]: high availability, scalability, usability, interoperability, stability, and the security. A good LMS should be 100 percent web-deployable, requiring no additional client applications. It is also important that the LMS should support various sources from different manufacturers and it should be based on open industry standards for web deployments (XML or SOAP), and support the various learning standards, such as Instructional Management System(IMS), the Institute of Electrical and Electronics Engineers, Inc.,(IEEE), and the Sharable Content Object Reference Mode (SCORM).

Some of the best known commercially available LMS systems are *Blackboard*, *WebCT*, and *Desire2Learn*. There are also many open-source and free LMS systems, such as *Moodle*, *Segue*, *Interact*, *CourseWork*, *Atutor*, *KEWL* and several others. Open source usually means that users have access to the source code of the software. Anyone can download and use the open source code, and more importantly users can write new features, fix bugs, improve performance, or learn how a particular problem has been solved by the others.

Moodle (Dougiamas and Taylor, 2002) is one of the popular learning management systems. It is coded in *php* and supports feature such as chat, assignment management etc.

Collaborative learning is one of the important topics in distant education. There are several benefits to giving students assignments that they can work on collaboratively. The benefits of collaborative learning are well known and a recent study of students in Introductory Computer Science courses demonstrated that those working in pairs performed significantly better on programming projects than students working alone (McDowell et al., 2002). Chase and Okie (2000) describe that introducing collaborative learning to the curriculum of their Introductory Computer Science courses decreased the combined rate of withdrawal and failure from 56% to 33%. It is also a well known fact that giving students assignments that they can work on collaboratively allows them to undertake more complicated problems and complete the work in a shorter time scale (Roschelle, 1992). The advantages of collaborative learning using a computer tool has been analyzed (Hickey, et al., 2002) in the computer science laboratory and the results have been reported to be very successful.

In this paper we will describe the use of the *Moodle Learning Management System (LMS)* for teaching programming languages [Cole, 2004]. A highly interactive and collaborative teaching environment has been created by supporting Moodle with the collaborative learning tool *the Groupware Research in Education and the Workforce Project (GREWPtool)* [Taneva, et al., 2004]. Moodle enables the students to follow the course notes on the web, to carry out quizzes and surveys, and to provide communication outside the classroom by means of chat tools. GREWPtool supports the LMS based learning activity by providing a high level of collaboration amongst students. Students and the instructor can meet and exchange information using the GREWPtool. The paper describes a pilot study which has been carried out at the Near East University using the Moodle together with GREWPtool.

THE METHOD USED AT THE NEAR EAST UNIVERSITY

Near East University (NEU) is a private international institution of higher education founded in Nicosia in 1988. Today Near East University consists of a select student population from eighteen different countries. One of the recent interest and activities of the University has been to invest in distant education. The first application in this field has been the teaching of programming languages using distant teaching methods as described in this paper.

Distant education course materials have traditionally been printed lecture notes, books, web sites, e-mail, radio and television programs, and videos. When we examine the properties of distant education we notice that although it has many advantages, the distant education suffers from the lack of interactivity that exists in traditional face-to-face education. This is perhaps one of the points that are stressed when we say that distant education can not take the place of traditional education. Our purpose at the Near East University has been to bring the distant education to a level so that both distant educated and traditionally educated students have very little or no differences in the level of education they take. This was also necessary so that the equivalence of both types of education can be accepted by the local education authorities. I.e. the diplomas of both types of students can be accepted on an equal basis.

One of the requirements of the distant education programme of the Near East University has been to increase the interaction between the instructors and the students to such a level that distant education becomes powerful enough to have all the benefits of traditional education. In order to establish a distant education system, it is first required to create a virtual learning system environment. A detailed literature search has revealed the existence of some Open Source Learning Management Systems (LMS) such as *Moodle* and *Claroline*. Each system has been investigated in detail and it was found that Moodle is the closest to the NEU education system. Moodle is a free, open source software package designed to help educators create online education programmes. The software is under the GNU Public License, which

means that the software is copyrighted, but the users have additional freedoms: users have access to the source code of the Moodle software and they can develop new features, fix bugs, improve performance, or customize the software to their own needs. The requirement is that the modified software should be made available to others and the original license and the copyright notes should not be modified. The word Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment. The software will run on any computer that can run PHP, and can support many types of databases, such as the popular MySQL. Moodle can be downloaded and used on any computer from a single-teacher site to a 40,000 student University. Moodle has a large and diverse user community with over 50,000 registered users from 120 countries.

A study has shown that the instructor-learner interaction is poor in existing LMS systems, including Moodle. The importance of interaction and group work in learning are well known to us at the Near East University and the poor interaction has been increased considerably by combining the Moodle system with a collaborative editor, such as the GREWPtool. The system developed has been called NEU-VLE (*Near East University Virtual Learning Environment*) and has been tested at a pilot study on students taking the CIS221 PASCAL programming language, and the students taking the CIS456 JAVA programming language. Students in CIS221 are typically sophomores in the age range 20-23 and the class had 15 students enrolled. CIS456 is aimed to teach the principles of object oriented programming with Java and the class had 25 students enrolled. The students have been grouped into two: those using the online NEU-VLE system, and those attending the traditional classes at the university. Pascal course had 30 students: 15 attending lectures in a traditional way, and 15 studying over the Internet. Similarly, Java had 50 students shared equally between both types of study. In order to remove any bias in the selection criteria, students were accepted to the groups based on their general average grades. Students in both groups have taken the same courses during the same semester, and the group results have been analyzed and compared to each other at the end of the semester.

NEU-VLE system, which is aimed to teach the computer programming languages, has the following features: Chat, Forums, Quiz, Resource, Grades, Logs, Glossary, Self-Test Questions, Groups, Scale, Calendar, Participants, E-Mail, Enrollment Keys, Login, User Manual for Learner, and User Manual for Teacher.

GREWPtool is composed of 3 integrated pieces of software in 4 frames: *IM-like chat*, a *public web browser*, a *synchronous shared editor*, and a *private web browser*. The chat frame enables communication outside the source code in the editor. The public browser serves as a common resource for students with links to web pages. Students can watch each other's browsing activities. The editor allows students to write to the same piece of code simultaneously. The private browser allows the users to visit any page of their choice. Users can traverse the web independently of their partners.

Students using the online NEU-VLE system access the system from their places of study at their choice of time and a typical session is as follows:

- Student registers on the NEU-VLE system using the username and the password assigned to them.
- The course notes are prepared in a weekly format and can be accessed by the students interactively at any time and from any place. The lecture notes are prepared interactively in SCROM standards.
- After studying the course material students attempt to solve the self-test quizzes. Instructors can create timed assessments that help the students take multiple times. The system automatically scores multiple choices, true/false and short answer type questions and can display instructor created feedback, explanations and links to relevant course material. Although we have only used text, questions can contain

images, video, and other multimedia files. The instructor can randomize the questions in a test so that alternative questions can be presented to the students.

- One of the innovative elements of the NEU-VLE system is that the students and the instructor can meet at pre-specified times using the GREWPtool collaborative editor. This feature has provided a highly interactive learning environment where the students could ask questions to the instructor in an interactive manner while all the students could participate in this interactive session. With the addition of the collaborative learning environment the students felt more like in a traditional class.
- The students should gain confidence at this stage and they attempt to solve the weekly assessment questions prepared by the instructor. The instructor and students can exchange information online about the solutions to the assessments.
- Before the mid-term and the final examinations, although not implemented in our study, students can access the various online quizzes, video and media files, sample exam questions etc so that they can prepare themselves for the real examinations.

NEU-VLE has given the opportunity to the instructor to analyze the progress of each individual student in detail. The students are given the opportunity to see their own activity and progress reports so that they can assess their status within the class.

The lecture notes have been prepared on a weekly basis and a typical Moodle screen layout is shown in Fig. 1. The lecture notes are largely in text format with audio enhancements at appropriate places. Students normally follow the lecture notes in the order shown on their screens which has been prepared carefully by the instructor. Sections of the lecture notes can be repeated as many times as required until the student is comfortable with the contents. It is recommended that the students attempt to solve the quizzes at the end of each section and a high grade is a requirement. A repeat of the lecture notes is recommended should the quiz results is not satisfactory. A section from the PASCAL lecture notes is shown in Fig 2. We have attempted to arrange the lecture notes in a simple, easy to follow format with simple and clear images emphasizing key sections of the notes. As described earlier, Pascal lecture notes have been prepared using the SCROM standards and then integrated to the Moodle by the instructor.

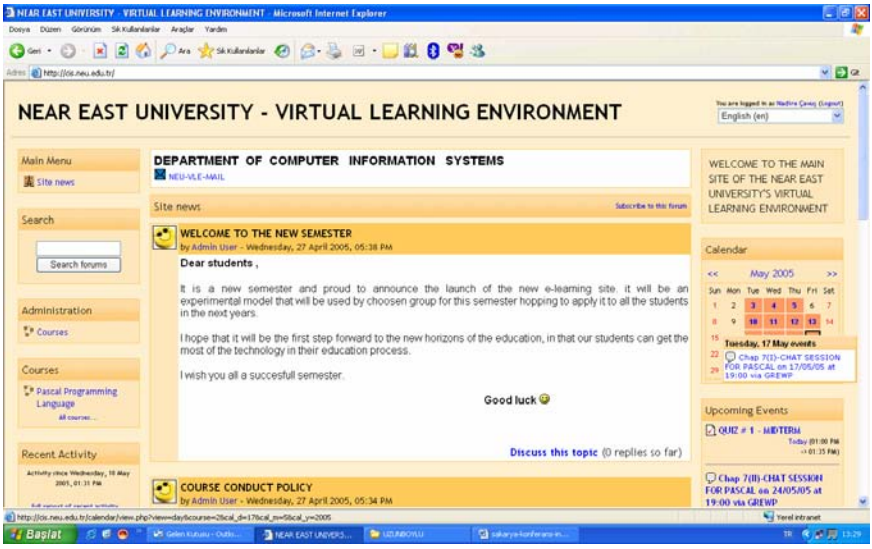

Fig. 1. A typical Moodle session

Students are given fixed dates and times where they are required to login to the web for the collaborative GREWPtool sessions and the main topic of each session has been specified in advance by the instructor. A typical collaborative session could involve the following:

- Students login to GREWPtool.
- The instructor describes with examples how the FOR loop can be used in PASCAL programs.
- Students are then asked to develop program codes to calculate the sum of the numbers from 1 to n using a FOR loops.
- Progress of the students is observed by the instructor interactively and the instructor can provide instant help whenever required.
- At the end of the session students are asked to work collaboratively in groups to develop a more complete program using FOR loops and this program is expected to be completed before the end of the GREWPtool session. Again the students are free to ask questions either to the instructor or to their friends in other groups.

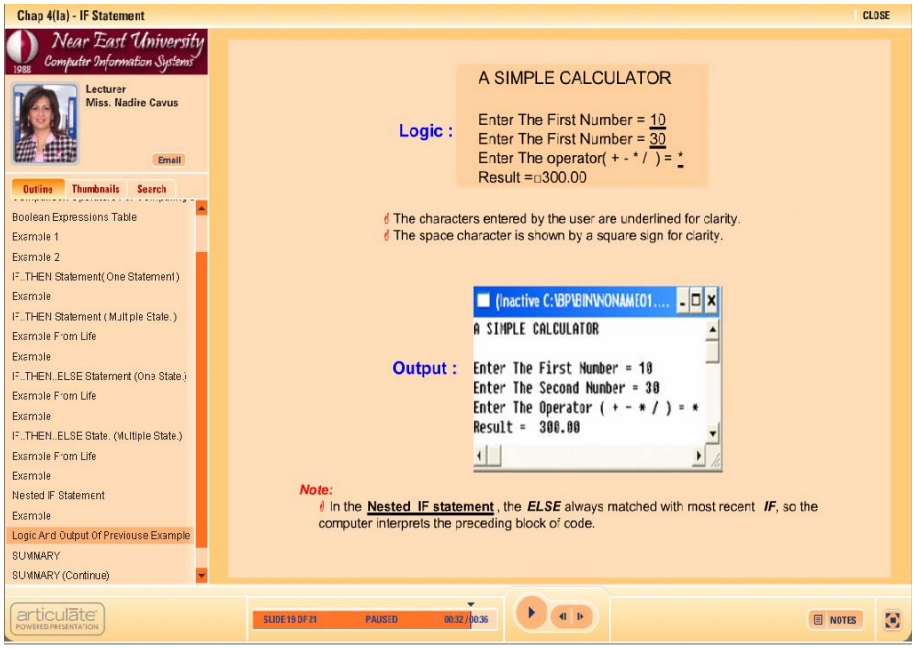

Fig. 2. Section of PASCAL lecture notes

One of the nice things about GREWPtool is that it records a precise history of every key stroke of the students, including the delete key. The history file can then be played back using the built-in VCR at variable speeds, both forward and reverse. The *event analysis* tool of GREWPtool provides an instantaneous view of various statistics, including the number of key strokes each user has typed, the number of chat messages each user has sent, and the detailed activity of each user.

During the pilot study we have found that the students needed very little instruction on how to use the Moodle or the GREWPtool. Most of the students are regular users of internet and chat programs and this was probably the main reason they had no trouble learning to use new tools.

A summary of the results of the two groups were as follows:

- The average attendance of the students taking the traditional classes was over 95%. The attendance of the students taking the courses using the online NEU-VLE system was considerably less, at around 70%.
- The average mark of the students attending the Java course in traditional classes was 66.98%. Similarly, the average mark of the students using the online NEU-VLE system and taking the same course was 66.08%. Both groups of students were examined in the class, at the same time, with the same exam questions. It is interesting to note that the success rates of both groups are nearly the same.
- It was noticed that the students taking the online Java course performed considerably better than the students taking the online Pascal course. This was expected and was not a surprise. The main reason for the success of the Java class is because of the online Java program compilation and debugging facilities provided by the GREWPtool. Students could develop and run Java programs collaboratively within GREWPtool and this have given them a better understanding and more practice of Java program development. This was not the case for the Pascal students since online development or running of a Pascal program is not supported by GREWPtool.
- An analysis of the students' study patterns has shown that only a few students have repeated the lecture notes many times, most went through the notes only a few times.

CONCLUSIONS

The results of the pilot study showed that a Learning Management System can be made more efficient if it is enhanced by a collaborative learning tool. In this paper we have used the Moodle together with the GREWPtool for the teaching of PASCAL and JAVA languages at the department of Computer Information Systems. It appears that in common with other LMS systems, although Moodle on its own is sufficient and successful to deliver the lecture notes, it lacks the *instructor-student* and *student-student* interaction which exists in a normal class-room environment. It is our recommendation that the current and the future LMS systems should incorporate a collaborative editor so that the benefits of learning in a class-like group environment can be achieved.

Our results have shown that the success rates of the students taking the online courses were virtually same as those taking the traditional classroom style courses. Although this may be true in teaching a programming language, or a business studies course, or a law course, the teaching of an engineering course could show different results because of the need in an engineering course to perform practical laboratory experiments which could only be carried out using the equipment at the university laboratories.

Although our pilot study has lasted for a term only and we have just began to explore the pedagogical opportunities of the LMS tools, we can make the following observations on the advantages and disadvantages of these tools in distant learning courses:

The advantages of the NEU-VLE system are:

- Students can have access to the system from any geographical location in the world.
- Communication with the students can be on an individual basis as well as on a group basis.
- Lessons can be studied at the comfort of your home or alongside friends in an internet cafe. This also encourages group involvement.
- Group learning increases the learning process and allows students to benefit from each other's experiences. Students are encouraged to join in and also to participate in every collaborative session.
- Students can assess their own progress by carrying out quizzes any time they are ready.
- Instructors have better understanding of progress of the students as they can analyze the VCR in play-back mode. For example, instead of only looking at the final results, the instructor can find out how a student reached that final result.

The disadvantages of the NEU-VLE system are:

- Little can be done about performance and technical problems related to the network.
- There is no visible body reaction and the instructor is not clear if the students have understood the topics. It is recommended by the authors that the LMS systems should incorporate live video interface as a means of increasing the instructor-student and the student-student interaction.
- Students must have a computer and internet connections at their places of study. This may be beyond the budgets of some students. One solution here could be for the institution to lend the necessary equipment to such students during the term time.

Based on the results of our study and survey, the authors recommend the collaborative teaching environment described in this paper to other universities and technical colleges engaged in teaching programming languages.

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