Work In Progress - An Interactive Teaching-Learning World Wide Web System For A Classroom Instruction

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Abstract - Distance and asynchronous learning systems can provide a possibly unlimited time and space merit for teacher’s teaching and student’s learning. However, to learn effectively a professional course in Engineering, the teaching and learning interaction in classroom is still an essential element in most universities. To overcome the problem of short time space in classroom, the web technology can be embedded in an interactive teaching-learning system to improve and assess the teaching-learning performance for a classroom instruction. Based on the interactive teaching-learning system, the teaching-learning assessments including teaching quality, learning quality, student’s participation degree, individual and global learning performance, can be easily analyzed and visualized.

Index Terms – Classroom instruction, Interactive learning environments, Performance-based assessment.

INTRODUCTION

Many distance and asynchronous learning systems have been widely discussed due to the popularity of World Wide Web systems. However, despite the continued growth and popularity, distance education suffers from a number of problems such as a much higher course ‘dropout’ rate in online courses compared to traditional campus-based education. King [1] listed a number of negative factors that contribute to course noncompletion in web-based distance education: feelings of isolation, frustrations with the technology, anxiety, and confusion. Another question on distance education is ‘whether or not students are still engaged and actually learning when not actively involved in online discourse with other students and faculty’ [2]. This may include about how much learning actually occurs, how it does or why it does not, and what factors most influence learning outcomes in online formats. Even though there are many arguments on distance learning, one conclusion made by Beaudoin [2] is that essentially the same ‘witness learning’ phenomenon occurs in both formats: classroom and online. Accordingly, since the teaching and learning interaction in classroom-based education is still an essential element in most universities to learn effectively a professional course in Engineering, in this paper an interactive teaching-learning (ITL) system based on web technology is presented for overcoming the problem of short time space in classroom and for improving the teaching-learning effectiveness in classroom environment.

Liber, Olivier, and Britain [3] presented a TOOMOL (Toolkit for the Management of Learning) system, which includes two main theories: conversation theory and organizational cybernetics. The former is concerned with the interactions that take place between participants in the learning and teaching process, whereas the latter with the organizational constraints under which learning and teaching takes place. In addition, as pointed by Tuckman [4], web-based instruction should not become more mainstream in campus courses, not merely as an occasional alternative for convenience purposes, but as an integral part of the instructional design. He presented a hybrid instructional model, called ADAPT (Active Discovery And Participation through Technology) system combining the important features of traditional classroom instruction with those of computer-mediated instruction, which can be employed in campus labs. The TOOMOL system and ADAPT model support us to design our ITL system for improving the performance of classroom instruction, especially for a professional course which is not easily instructed by merely in computer labs or distance learning environments.

ITL SYSTEM

The proposed ITL system has being experimented and supported for some professional courses, e.g., logic circuit design and microcomputer, in Electrical Engineering during past five years in Yuan Ze University. The capabilities of the proposed ITL system possess: course materials, online teaching progress and in-class audio/video materials, examinations and history preservation, real-time individual and global assessment, convenient re-learning and feedback, easy maintenance and response, and a good trade-off among classroom, distance, and asynchronous learning.

Traditionally, the main components of classroom-based instruction include: instructor teaching the key contents in a textbook, students paying attention to follow the instructor’s guidance, and examinations for evaluating the learning performance of students. Some issues of the traditional...
classroom-based instruction are usually faced with: short time space, uncertain learning motivation and responsibility, and less real-time instructor’s monitoring. To overcome these issues, our ITL system is designed as the diagram shown in Figure 1. The time space of teaching-learning activities has been extended from classroom to the web site, which can be accessed anywhere and anytime via an internet. Teacher provides his/her course materials for teaching activities, grades and monitors the effectiveness for learning activities. Students play the role for learning and will be pushed to pay attention to the course after class.

The accessible contents of the ITL system are divided into three categories as listed in Table 1. They are ‘access by any one without password’, ‘access by students with password’, and ‘access by teacher with password’.

<table>
<thead>
<tr>
<th>Access by Any One Without Password</th>
<th>Access by Students With Password</th>
<th>Access by Teacher With Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Teaching project</td>
<td>1. Inquire individual grades for all examinations</td>
<td>1. Edit the related basic courses’ information for a semester</td>
</tr>
<tr>
<td>2. Teacher’s information</td>
<td>2. Answer the questions given from teacher</td>
<td>2. Edit key topics and their related contents for a course</td>
</tr>
<tr>
<td>3. Teaching assistant’s information</td>
<td>3. Write a letter or propose a problem to teacher (or teaching assistant)</td>
<td>3. Print a desired form listing students’ names</td>
</tr>
<tr>
<td>4. Key topics and their related contents of the course</td>
<td>4. Read the response from teacher (or teaching assistant)</td>
<td>4. Input grades for an examination</td>
</tr>
<tr>
<td>5. History of teaching progress</td>
<td>5. Calculate and preview the grades for individual and the statistics for whole class</td>
<td>5. Calculate and preview the grades for individual and the statistics for whole class</td>
</tr>
<tr>
<td>6. Learning media for streaming or downloading</td>
<td>6. Import the course’s media for streaming and downloading</td>
<td>6. Import the course’s media for streaming and downloading</td>
</tr>
<tr>
<td>7. Discussion between teacher and students</td>
<td>7. Post the contents taught in class</td>
<td>7. Post the contents taught in class</td>
</tr>
<tr>
<td>9. Accumulative statistic grades of whole class</td>
<td>9. Reply an answer for the problem proposed by a student or write a letter to students</td>
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</tr>
</tbody>
</table>

According to the brief description mentioned above, our system has the following potential properties.

- The ITL system enhances the interaction between teacher and students.
- Students can easily access the most recent course information including highlighted key topics, in-class media, teaching progress, etc, provided from teacher.
- Students can understand his/her accumulated learning performance from the real-time grading information provided from teacher, and can be pushed to pay attention to the course.
- The ITL system can shorten the distance between teacher and students, thus the discussion as well as communication become easy.
- Teacher can easily maintain his/her course material using this system. This convenience is very important for most teachers who teach in class.
- The most important thing is that the proposed ITL system can link teacher and students to participate and cooperate fully a course from both time and space viewpoints to increase learning effectiveness and evaluate whole teaching-learning performance. All the teaching-learning activities can be completely recorded.

**Conclusions**

To enhance the performance of classroom-based education, an interactive teaching-learning (ITL) system has been presented. Our research concludes that a good ITL system can link closely teacher and students to participate and cooperate fully a course from both time and space viewpoints, which can increase the learning effectiveness via the performance-based assessment.
REFERENCES


