Creating a "Distributed Learning Environment" using WebCT

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ABSTRACT

The "distributed learning environment" as contrasted to the teacher centered classroom, is growing at all levels of education. Today, the existing lecture model is changing. Emphasis is on skills needed in today's workplace, such as collaboration, sharing and group activity. The WWW Course Tools (WebCT) was used in the Fall of 1997, to provide supplementary material to a second year electrical engineering course called "Electric Circuits". The objective of this paper is to show that providing supplementary material using the WWW greatly enhances the students' learning. The class average grade for the students who received supplementary material using the web was higher than for those who received traditional classroom instruction. The use of WebCT facilitated and increased teamwork between the students because it provided them with a common forum where they could easily exchange information with each other. The use of web based instruction allows the students to come to class prepared. This allows the instructor to use classroom time for more advanced and detailed instruction. Finally, WebCT allows the instructor to closely monitor student performance and track their progress.

Introduction

Recently, discussion has occurred regarding the relative merits of lecture-based versus World Wide Web (WWW)- based courses. The concern is the loss of interaction or student participation in the WWW-based courses. Currently, there are several software packages on the market that try to address that problem. WebCT, which is developed in the Department of Computer Science at the University of British Colombia, provides a large set of tools and an authoring interface that allows the creation of sophisticated WWW-based courses. It also comes with built in student tracking tools that allow the instructor to closely monitor student participation and progress.

The remainder of this paper is organized as follows. First, a brief overview of WebCT is presented. That will be followed by a discussion of the effects of the use of the software in the "Electric Circuit" Course. Emphasis will be on increased class participation and student collaboration. Finally, conclusions and future work will be outlined.

Overview of WebCT

WebCT can be used to create complete on-line courses or to provide supplementary material for courses. Since the software comes with built-in interactive educational tools, all that the course designer or administrator has to provide is the course content. A WebCT course is centered around one main homepage, which provides the links to all the different course contents (notes, homework, quizzes, etc…), and the course tools. The course tools are divided into two groups: the student tools which are available to the students, and the designer tools, which are available to the course designer or administrator. Here is a brief overview of the different features found on WebCT. More information can be obtained at the following URL: http://homebrew.cs.ubc.ca/webct .

There are four types of users in WebCT: the administrator, the designer, the markers and the students. There is only one administrator account. The designer is the instructor of the course, and each course has one designer account. Hence, the designer is the person responsible for creating the course contents, and manipulating the format of the course in any way. Each course can have several markers. Although markers have the same privileges as a student, they can also grade quizzes and enter students' grades. The course designer creates marker accounts. Each course can have many students. The course designer creates student accounts. Students cannot change the course content, except in the student presentation sections defined by the designer.

Use of WebCT in the "Electric Circuit" Course

The biggest concern with most WWW based courses is the loss of interaction and student participation. WebCT was developed to address those issues. Experiments were conducted at the University of British Columbia to evaluate the student acceptance and the effectiveness of course content delivery with and without the use of WebCT. Students

enrolled in a third year computer science course were divided in three groups. The first group took the course using the traditional lecture only format. The second group took the course entirely on-line using WebCT. The third group took the course using both the lecture format, and the on-line supplementary materials using WebCT. The result at the end of the semester [2], indicated that the students in the third group had the best academic performance while the performance of the students in the first and second groups was the same. Using that information, the lecture-based format that utilizes supplementary material using WebCT was adopted for the Electric Circuit course (for more information, see: http://mack.eng.morgan.edu:8900/public/Circuits/index.html). The use of WebCT improved the performance of the students enrolled in the Electric Circuit course. The key reasons for the improvements are outlined below.

Students come to class prepared because the lecture information is available online and can be accessed from anywhere at anytime. This increases student participation in the classroom. They learn more in the classroom because they are not seeing the material for the first time, and they get the chance to ask detailed questions. A vast majority of the students indicated that they prefer to use the online lectures to prepare for the class instead of using the textbook. Having students that come to class prepared makes teaching the course easier. It gives the instructor the time to go over detailed and more advanced concepts that would otherwise be impossible because of time constraints. The online notes come with solved examples and additional problems that the students can use to reinforce what they have learned in the classroom. It is also an excellent source of information for students who miss class because of illnesses and other problems.

The use of the online supplementary materials has greatly improved the students' performance. The class average for the circuits class was compared before and after the use of WebCT . Before the use of WebCT (Spring '96 and Fall '96), the class average at the end of the semester was 82 . After the use of WebCT (Fall '97), the class average increased to 86. A greater improvement was obtained in the class distribution of grades. In the Spring and Fall 96 semesters, 62% of the students received an 'A", 16 % received a 'B", 11% received a "C", and 11 % received an "F" grade. After the use of WebCT, the class grade distribution improved significantly: 74 % of the students received an "A', 13 % received a "B", 10% received a "C", and 3 % received an "F".
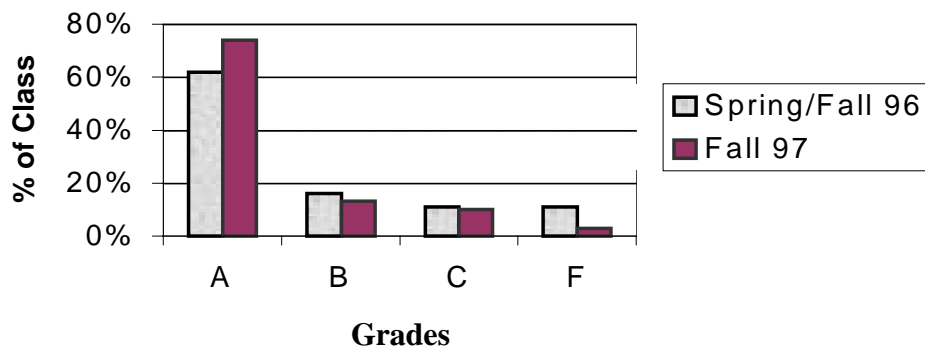
Figure 1: Grade Distribution for Students Enrolled in Electric Circuits

As shown by the grade distribution in Figure 1, high improvements were obtained in the group of "A" students which increased by 13 %, and the number of students failing the course which decreased by 8 %. This can be attributed to the use of the WebCT software, which facilitates student interaction, teamwork, and allows the students to come to class prepared.

Another advantage of WebCT, is that it facilitates interaction between the students and the instructor. Without WebCT, students need to use the instructor's office hours to ask any additional questions. The uses of the built-in chat room and bulletin board facilitate the interactions between the students, and between the students and the teacher. If students have a question related to the course, they can post the question on the Bulletin-Board. Any other student enrolled in the course can answer that question. To promote student participation, extra credit is given to the first student who correctly answers the question. With that in mind, students do their best to answer each other's questions and help each other. If none of the students can answer the question, then the instructor answers it. With the use of the bulletin board, students expect to get answers to their questions within 24 hours. This gives the students the confidence that they can get help from anywhere at any time. Students' interactions with the teacher outside of the classroom are not anymore limited to the office hours only.

WebCT also facilitates and promotes teamwork. The students can use the chat room and the bulletin board to exchange information on their projects. They also post meeting dates and times for study sessions so that other students can participate. Note that all of these things can be done without WebCT. However, the use of the online bulletin board makes it very easy for the students to post and access information from anywhere at anytime. It provides the instructor and the students a common place where all information related to the course can be exchanged.

WebCT helps the instructor in properly tracking student performance. The built in tracking tools allow the instructor to closely monitor each student's participation and progress. The student progress report is available to both the student and the instructor. Hence, every student can see what information WebCT is compiling about his or her access to the on-line course material. Each student can also check the grades they have obtained on the exams and quizzes. They can also see a chart that indicates the maximum mark, minimum mark, mean and median grades for a certain quiz or test. This allows them to rank themselves as compared to the rest of the class. Using that information, they can discuss with the instructor what they need to do in order to improve their performance.

Conclusion

Today, the use of Asynchronous Learning Networks (ALN) such as WebCT is becoming more and more popular. They allow the instructor to promote skills needed in today's workplace, such as collaboration, sharing and group activity. They also enhance the

learning experience of the students enrolled in the courses. The use of ALN in the Electric Circuit course confirmed the facts outlined by the designers of WebCT [2] . The use of on-line supplementary course material greatly improves student performance and class participation. Plans are on the way to add some audio, video and "white-board" sharing utilities to make the use of WebCT by the students more attractive.

Most of the students who pass the "Electric Circuit" course enroll in the "Introduction to Digital Logic Design" course. While teaching the Digital Logic Design course (Spring 1998), I was pleased to hear that the students' question on the first day of class was if WebCT would be used to provide online supplementary course material. I was disappointed when I indicated to them that it would not be available at this time. However, I was very happy to hear that the students really enjoyed and valued the online course materials they used in the Circuit course. Hence, there are also plans to utilize WebCT to provide supplementary materials for the Digital Logic Design course.

Acknowledgments

References

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[2] Murray W. Goldberg, "Student Participation and Progress Tracking for Web-Based Courses using WebCT", Proceedings of the Second International N.A. WEB Conference, October 5 – 8, 1996, Fredericton, NB, Canada.

Biographical Information

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