Improving Student Interaction with Internet and Peer Review

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INTRODUCTION

In the last few years, education has gone through an important change—the introduction of information technology in the educational process. Many efforts have been conducted to realize the benefits of technologies like the Internet in education. As a result of these efforts, there are many tools available today to produce multimedia educational material for the Web, such as WebCT (WebCT, 2004). However, teachers are not sure how to use these tools to create effective models for teaching over the Internet. After a teacher puts classroom slides, schedules, and other static information in his or her Web pages, what more can this technology offer? A possible response to this question is to use Internet technologies to promote collaborative learning.

Collaborative Learning (CL) is an educational strategy based on social theories in which students joined in small groups are responsible for the learning experience of each other (Gokhale, 1995; Panitz, 2002). In CL, the main goal of the teacher is to organize collective activities that can stimulate the development of skills such as creativity, oral expression, critical thinking, and others. When supported by computers and Internet technologies, collaborative learning is referenced as Computer Supported Collaborative Learning (CSCL). The main goal of CSCL is to use software and hardware to support and increase group work and learning. The peer review method, known by almost everyone in the academic world, when applied as an educational tool, can be considered a kind of collaborative learning activity.

This article describes an educational method that uses peer review and the Internet to promote interaction among students. This method, which has been used and refined since 1997 (by the first author), is used currently in different computer science courses at the ICMC-USP. A software tool—the WebCoM, Web Course Manager (Silva & Moreira, 2003)—is also presented. It supports the peer review method to improve interaction among students. The main advantages of the use of the peer review method and the WebCoM tool over other works in this context are that they:

- allow debate between groups (workers and reviewers) to improve interaction and social abilities among students;
- focus on the interaction among students and their social skills; and
- offer support for group activities (such as reports and assignments) without peer review.

Results generated by the experience of managing classes with the WebCoM tool are also presented.

THE STUDENT GROUPS WITH PEER REVIEW METHOD

The peer review process is commonly used in the academic world; an article, project, or course is proposed, and peers judge the merits of the work. It is used in the educational context with a variety of goals, but almost always it is focused on communication and writing skills (Helfers et al., 1999; Kern et al., 2003; Nelson, 2000).

In the educational peer review method presented here, students join in groups to carry out an assignment. After that, each assignment is made public using the Internet and is judged by another group of fellow students. These reviewers write a review report presenting their opinions about the work. Once the

reviewers' work becomes public, the teacher schedules a class debate. At this debate, each group presents its work and has a chance to defend it from the criticisms of the reviewers. The two groups debate the work in front of their classmates and teacher. Usually, the teacher is able to grade the assignment based on the review and the debate.

Trying to do all these tasks by hand would greatly reduce the benefits of the method because of the work needed to implement it. A software tool is necessary to manage the assignment process. So, few authors have developed Web-based software to assist it, such as:

- The PG (Peer Grader), a system that offers support to peer review activities in which students submit work, review other works, and grade the reviewed work. The final grade of each work is determined by the system, based on the grade of the reviewers (Gehringer, 2000).
- The WPR (Web-Based Peer Review) system is mentioned in Liu et al. (2001) as a tool for peer review management. Although some results of experiments using this tool are presented, there is only a brief explanation about the tool and no references to specific information about the system.

There are other Web-based tools that can be adapted for classroom use, such as CyberChair (CyberChair, 2004) and WIMPE (Nicol,1996), which support the review process for technical contributions to conferences.

The major problem with these tools is the kind of review they support, one not targeted to promote interaction in educational environments. A new tool, WebCoM (Web Course Manager), was developed specifically to address this issue. Its main objective is to provide graphical interfaces to get, store, manipulate, and present information generated by both student groups and teachers during a course. Using the WebCoM tool, the teacher can:

- define assignments and deadline dates;
- define other activities such as reports and tests;
- define which group a reviewer will review; and
- associate grades to students or groups.

The students can:

- create groups;
- turn in assignments and reports;
- view and access works of others groups; and
- access their grades.

As a practical example, the next section shows how a very common kind of assignment for computer science courses—a software project—can be handled using WebCoM and peer review to promote interaction among students.

SOFTWARE PROJECT ASSIGNMENT

The software project is a classic assignment in computer science courses. Commonly, in this type of activity, students are required to put into practice all concepts taught in class. There are two ways to conduct the software project activity: first, all students (or groups) develop a project from the same subject; and second, each student (or group) develops a project from a different subject. In either way, students are limited to explore and learn only about the project they are working on, mainly because of the individualism from traditional education methods (Panitz & Panitz, 1998). The presented peer review method minimizes this limitation, because students (or groups) are required to learn about their colleagues' projects. When required to review projects and to participate in debates about other projects, students have an opportunity to extend their knowledge about other subjects, expanding the experience they would have using traditional individual learning.

The development of a software project under the peer review process has five steps: group formation, assignment upload, choosing review groups, review upload, and classroom debate.

At the beginning of the course, the students have access to the course Web pages, where they can find the usual material (lecture slides, course calendar, etc.) and a list of available software projects. These projects are previously defined by the teacher and relate to the subject being taught in the course. In addition, students have access to the WebCoM tool, in which the course and its activities (assignments

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