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# Collaborative Team Learning Approach for Web Development

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## Abstract

This paper presents a collaborative team learning model for integrating student learning in a graduate IS course and a graduate HCI course. Through coordinated project schedules of partnering teams, an emphasis on social interaction, and the use of collaborative technologies, students expanded their experience in developing Internet commerce Web sites. For the HCI teams, they learned realistic consulting experience. For the IS teams, HCI support led to high quality Web site prototypes. This paper reviews the motivation, approaches, evaluation methods, findings, and implications of this innovative teaching method.

## Introduction

This paper discusses our experiment in combining team projects and technology supported collaborative learning across two different graduate courses. Team project is a common approach used in Information Systems courses to model application development environment in the workplace. In team projects students learn group problem solving and team dynamics. Collaborative learning emphasizes cooperative learning, student-directed learning, and student interactions. Technology, Internet in particular, plays a supportive role in facilitating teamwork and collaboration, allowing sharing, using, adapting, and locating information and communication. In the workplace, groupware and Internet technologies support virtual collaboration, and asynchronous communication between teams.

We developed a collaborative team learning approach last year and applied the approach by linking student learning experience in two separate graduate courses at DePaul University's School of Computer Science, Telecommunications, and Information Systems. This "extended" collaborative learning builds on three levels of teamwork: a) project-based team learning within each course, b) collaborative team learning across partnering teams between two courses, and c) collaboration between two instructors. Since both courses are focused on Web design, we used Internet and WWW technologies to support such collaboration

## Motivation

This experimentation stems from our mutual interests in providing students rich and realistic learning

experience in Web site development in two separate courses:

- IS 555 (Design and Strategies for Internet Commerce) covers the full spectrum of E-Commerce business models and Internet technologies. Students follow a Web engineering process to develop an e-commerce Web site. Most students in this course are IS majors who already had a firm grip of systems analysis and design, database, programming, and competitive strategies.
- HCI 440 (Introduction to Human Computer Interaction) emphasizes user interface design principles, user/task/work environment analysis, and low fidelity prototyping techniques. Most students in this course had extensive graphic design experience or course work and also take several courses in ergonomics and other related psychology topics.

For IS 555, the goal is to guide students to integrate business strategies and technical knowledge in their team project of prototype Web sites. Many teams work with real clients. While students are capable of developing sound business models and database driven Web sites, many lack graphic design training and interface design skills. Furthermore, it is difficult to cover HCI methods, such as usability testing, in a ten-week course. Some of the design problems encountered by project teams include:

- Shortage of graphic design and HCI skills in project teams;
- Starting the project coding before testing content and interface design;
- Reliance on the instructor for feedback; and
- Inflexibility in changing the design, which may result in less satisfactory quality of project prototype.

For HCI 440, the goal is to motivate students to become advocates for the users of a system. While it is possible to teach the course with textbook case studies, students find it enormously appealing to grapple with a "real world" problem. Further, it is critical that HCI students understand the context in which they perform their work upon graduation. Rarely will HCI students experience ideal conditions for designing or evaluating

interfaces once they are hired. Some of the real world problems not covered in textbooks include:

- Creating a design or alternative designs when a client has given incomplete specifications;
- Communicating results in a form that is quickly understood by a client;
- Delivering “bad news” in a way that will not offend the client; and
- Realizing that authoring a set of recommendations (consulting) does not comprise ownership of a project.

Our mutual interests led us to create a collaborative team learning model for students in these two courses. Therefore, HCI students could work with “clients” in realistic environment, while complementing the skill sets of the IS team. As a result, IS teams were able to produce prototypes of higher quality.

### **Approach**

How did we orchestrate team collaboration between two courses? First, we paired up project teams from each course into partnering teams. Second, we coordinated the schedule of two courses to allow timely flow of information between the IS and HCI groups. Assignment due dates for two courses were closely synchronized as shown in Table 1.

The four HCI assignments provided input into the deliverables of IS projects. Deliverables in IS projects, in turn, also served as the basis for HCI assignments. This interaction enhanced the iterative nature of Web site development. Specifically, task and user analysis validated the business case statement. Card sorting exercise presented user mental model of site content organization. Low fidelity usability testing evaluated interface design prior to prototyping. In addition, we held a joint class meeting to build rapport, required posting of project deliverables on Internet, expected timely communication between teams via email and HyperNews discussion

### **Evaluations**

We monitored student interactions continuously. HyperNews discussion groups made it easy to detect

potential problems in collaboration. Students were encouraged to contact instructors if there was any breakdown in communication. At the end of the quarter, we also administered a Collaboration Evaluation Form (see Table 2). The data we collected from the first trial helped us to restructure the collaboration process and to increase the use of Internet to distribution information about project deliverables and team reports. We will share the evaluation results at the conference.

### **Findings and Implications**

As expected, effective collaboration led to satisfactory, rich learning experience and high quality prototypes. Teams, which did not build rapport, couldn't follow the tight schedule, or had poor social interactions, found this experience less satisfactory.

The interactive nature of Web development led to cooperative and self-directed learning between two student teams. Internet played a pivotal role in supporting asynchronous teamwork and communication in HyperNews discussion and posting of deliverables. However, we found face-to-face interactions, particularly at the onset of the collaboration, helped build trust. Instructors must actively coach student teams, model collaboration process, and manage the overall process in order to facilitate collaborative learning across teams. Although this study covers two courses with overlapping content, a similar approach may be applied to courses in sequence, such as analysis and design. Most of the findings in this study have relevance to virtual teamwork in the IT workplace.

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**Table 1. Synchronized Schedule**

	IS 555	HCI 440
Week 2	Deliverable A: Team organization	
Week 4	Deliverable B: Business case statement	Assignment #1: User and Task Analysis
Week 5		Assignment #2: Card Sort (content analysis)
Special Meeting for IS 555 and HCI 440		
Week 6	Deliverable C: Requirements analysis	Assignment #3: Alternative Graphic Designs
Week 7	Deliverable D: Design, interface, screen	
Week 8	Deliverable E: Budget, feasibility,	Assignment #4: In-class Testing ; Usability
Week 11	Deliverable F: Prototype and Presentations	Final Presentation

**Table 2 Collaboration Evaluation Form**

A. Importance	Factors	B. Your Team's
5 4 3 2 1	A Clear Understanding of Benefits of Collaboration	5 4 3 2 1
5 4 3 2 1	Trust Between Two Teams	5 4 3 2 1
5 4 3 2 1	Clarity in Roles and Responsibilities	5 4 3 2 1
5 4 3 2 1	Confidence in the Counterpart Team	5 4 3 2 1
5 4 3 2 1	Online Access to Deliverables	5 4 3 2 1
5 4 3 2 1	Meeting with Everyone in Teams	5 4 3 2 1
5 4 3 2 1	Clear Guidelines for Collaboration	5 4 3 2 1
5 4 3 2 1	Face-to-Face Meetings	5 4 3 2 1
5 4 3 2 1	Clear Interpretation of Evaluation Results	5 4 3 2 1
5 4 3 2 1	Synchronized Project Timetable	5 4 3 2 1

- Listed above are 10 factors, which measure collaborative teamwork. How important are these factors in determining successful collaborative experience? What has been your team's experience during this quarter? For each factor, circle an appropriate number in column A to indicate **importance** (5=most important, 1=least important), and a number in Column B to indicate your team's **experience** (5= most satisfactory; 1= least satisfactory).
- How did this collaboration benefit your team project? Please address the general benefits as well as benefits related to Deliverable C (Card Sorting) and Deliverable D (Alternative Designs and Usability Testing).
- How did your team participate in this collaboration process?
- What are the major difficulties your team experienced in this collaboration?
- How could this collaboration effort be improved in the future?
- Other Comments or Suggestions: