

E-learning Experiences and Lessons Learned: Case Studies from Hawaii

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Abstract: Lessons learned and techniques used in two graduate computer science courses offered as part of the online Masters of Science degree in the department of Information and Computer Sciences (ICS) at the University of Hawaii (UH) are discussed. These courses differed both in the number of instructors and in the number of universities contributing to the student teams. The Advanced Data Management (ADM) professor resides in Norway, while the Human-Computer Interaction (HCI) course was taught in parallel at two geographically distant universities by professors in California and Hawaii. We highlight the techniques used to synchronize student learning and support collaborative learning in predominantly asynchronous course structures.

Introduction

The Department of Information and Computer Sciences (ICS) at the University of Hawaii (UH) has practiced some form of e-learning for over 30 years. In 1998 all of the ICS courses were approved for online delivery by The Western Association of Schools and Colleges (WASC). Interactive online courses loosen the geographic requirement, while fully online Asynchronous Learning Network (ALN) courses offer the advantage of 24/7 availability at locations and times convenient for students. Foundational course components of these classes are provided through written, audio, or video presentation, question and answer forums, and online posting and submission of assignments. These features support transfer of knowledge from teacher to student but do not address the educational paradigms of collaborative learning, due to the lack of a common place and time. Monitored, inter-student discussions can be mandated through the use of discussion forums and synchronous chat sessions, and encouraged through project assignments requiring collaboration. However, these techniques diverge from the asynchronous mode of the ALN environment, requiring that all students progress at the same pace and “meet” at predefined times – requirements that conflict with the primary advantage of the ALN format and potentially conflict with the student’s time and space requirements.

We describe techniques used in two graduate computer science courses offered as part of the UH online Masters of Science in computer science. The first course discussed is Advanced Data Management (ADM), taught by a professor residing in Norway. The second course is Human-Computer Interaction (HCI), taught in parallel at two geographically distant universities in California and Hawaii. Both the ADM and HCI courses had additional complexity as some students were not only geographically distant, but also traveled during the course. We highlight the techniques used to synchronize student learning and support collaborative learning in a predominantly ALN course structure. Specifically, the designs of the two ALN courses are based on lessons learned from our e-learning experiences.

A ‘Moderated’ Online Course in Advanced Data Management (ADM)

History and Geography

The Advanced data management (ADM) course (Norbotten, 2006) is a fully on-line course for which the instructor has been located in Norway. Most of the 80 students who have taken this course reside in Hawaii, though not necessarily on the island of Oahu, the location of the main UH campus. Most of these students also attend traditional face-to-face courses. Individual students have participated from such places as Boston, Virginia, Wisconsin, Oregon, California, Japan and Shanghai. In addition, active military personnel have taken the course from ship or on military assignments around the world.

The ADM is held yearly since 2001 and evolved from a traditional seminar-style course with Internet-based assignments. UH’s installation of WebCT is the “location” for student activities, including the course schedule which links to session descriptions, topic discussion forums, chat sessions, grades, and general information.

Structure

The ADM course is predominantly an ALN course, allowing students freedom of physical location and study time. Class progression is synchronized through weekly session presentations and assignments.

The course duration is 15 weeks, plus an exam preparation period which is used for completion of an individual course project. Weekly topic sessions “open” for student access by Monday morning, usually sometime during the weekend. Each session consists of a commentary of the week’s topic and an assignment that is to be posted on an open bulletin board by the Friday of that week. Subject matter is presented in two textbooks providing background for the topic commentaries. Additionally, the professor provides approximately two written pages with embedded links to relevant reference and example sites on the Internet. The schedule for the current course can be found at <http://www.nordbotten.com/ics/624/courseschedule.cfm>.

Each student posts individual assignments on an open bulletin board. All but the first assignment are graded. The instructor posts general comments and critique of each assignment on the discussion board. The assignments constitute half of the grade for the course. The other half of the course grade is based on a project developed throughout the course, starting in the fourth week. The project is divided into three sections, which are submitted in weeks six, nine, and 12 for critique and grading. The final version of the project is submitted as the course’s “final exam”, two weeks after conclusion of the session presentations.

Addressing Collaborative Learning in the ADM Course

In a strictly online course, students communicate with the instructor via e-mail or other electronic means. Two known problems can arise. First, students may feel isolated, and a fairly high dropout rate has been reported (Sherry, 1996). Second, the focus on individual tempo and activity hinders collaborative learning. A common approach used to address these problems is to include some synchronization in the online course in order to support peer to peer information and knowledge exchange.

In the ADM course, student inclusion into the class is done through posting of a self introduction as the first assignment. Student and lecturer introductions include background, reason and expectations for joining the course, and optional personal information. Since all postings are open, individuals are “visible” several times a week and group identification is built.

Synchronization of student progression is accomplished through weekly topics and required assignments. Support for collaborative learning is provided through required commentary and discussions. In addition, three real-time chat sessions are scheduled prior to project submissions.

In the ADM course, assignments and the course project are individually developed. Each student is required to comment on at least one submission by another student every other week, and to defend their own project presentations. Since these commentaries are seen by the class, students may question and discuss problems and proposals. Both assignments and discussion postings are graded according to a published point system in which negative or derogatory comments reduce the points assigned (Nordbotten, 2005). Following each assignment and its discussion, the instructor posts an assignment summary.

Real-time chat sessions are scheduled immediately prior to project submission when students are focused on the project tasks and there are numerous questions. These chats give immediate feedback and often lead to sharing of references that have been located by individual students. Logs from the chat sessions are also posted for reference.

Experiences

Evaluations of the course have been primarily positive. Most students are very open in their presentations and maintain a friendly and constructive tone throughout the course.

Of the 70 students who have taken the ADM course, six withdrew and one failed. This gives a 90 percent completion rate which compares well with reported completion rates as low as 60 percent for general distance learning and online courses (Sherry, 1996). Though the reasons are unknown, one may be that this is an optional graduate course with highly motivated students. Other reasons may include the relatively high level of interaction required of the students and the frequent feedback from peers and the instructor.

A Course in Human-Computer Interaction (HCI)

A graduate course in HCI has been taught three times in parallel at the University of Hawaii and California State University, Fresno. Although the UH class predominately uses WebCT, and the Fresno State class uses Blackboard, the course content and assignments are identical. Students are not told of their counterparts at the other campus until the last part of the semester when inter-university collaboration is required.

Both synchronous collaboration (e.g., teams from each university making online presentations to each other), and asynchronous collaboration (e.g., students from the universities are paired and use discussion forums for presentation and critique of work) are used by instructors.

Previous Work

Analysis of the most thoroughly-studied of the three HCI course offerings are published in several venues. For example, the cross-institutional effect on student satisfaction are described in (Vick et al., 2003a). Characteristics of the culturally and geographically diverse team pairings are described. Thousands of lines of real-time chat were coded for interactivity and satisfaction.

Indicators of effective collaboration are described in (Vick et al., 2003b). Again, chat transcripts were coded and analyzed, this time for intra-team interaction. For example, transcripts can be analyzed temporally, by speaker, and type of comment. We concluded (Vick et al., 2003b):

“There were significant differences among the nine teams with respect to type and quantity of contribution. ... one team might, for example, persist in attempting to lighten the presentation, much to the annoyance of a more formal and businesslike counterpart team. One team might have developed strong cohesiveness through regular, focused, online work sessions while another team had fewer and less focused online sessions developing little apparent cohesion.”

The analyses are synthesized and summarized in (Vick, 2006, p. 281). We concluded:

“In this study, all students were exposed to greater diversity of thinking and different ways of working than they would have been within the context of an individual university’s cultural and cultural mix of students. The highly interactive nature of the course and the real-time work context of the final project worked together to leverage multiple learning contexts through activity to create and enhanced learning environment. This was not due to having the latest educational software and hardware technology available. Rather it was due to (1) putting considered (and considerable) effort into the design of the course, (2) conducting meticulous and constant follow-through during delivery of the course, and (3) performing ongoing formative assessment of individual student and team social, cognitive, and metacognitive performance ...”

Student Evaluations

In addition to the formal analyses described above, traditional end-of-term student evaluation data is available for one of the parallel UH and Fresno State classes. The Fresno State professor also used the two hours scheduled at the end of that term for final examination instead for an informal evaluative student activity. The class was divided into eight pairs of two students per group and given a list of seven topics related to their course.

1. Syllabus
2. Asynchronous discussion forums
- 3 Course documents area (reading, commentaries, videos)
- 4 Synchronous chat
- 5 Group upload and file area (shared “sandbox”)
6. Course Announcements area
7. Bb user interface in general

The pairs were given a few minutes to brainstorm “pluses and minuses” for each topic based on the semester’s experience. Pairs wrote their “best ones” on sticky notes, and posted the notes on the classroom walls under the topic headings provided by the professor.

Seven of the pairs were then assigned a topic to organize (the eighth pair was used to help the professor record the results of the activity at the end of the two hours). Team members arranged sticky notes, putting similar notes together, and moving miscategorized notes to other topics. Students then voted individually using colored dots. Multiple votes per person on a sticky note were allowed.

Topic 4 (synchronous chat) is clearly relevant to this discussion, although students also categorized relevant comments under topic 5 (group upload area). By far the sticky note getting the most votes in topic 4 noted the “plus” of automatic archiving of chat transcripts by the system. Notable in topic 5 were comments about the real-time chatroom. In fact, the top vote-getter of any sticky note, in any of topic, was about the chatroom used for the inter-university team presentations. Comments noted the poor user interface, that space for typing replies was too small, that there were too many people in the chatroom (up to 11, including instructors), and that some participants typed too slowly.

The traditional anonymous end of term student evaluations also provide insights. One of the Fresno State students noted under the heading “organization of the course”: “There were parts near the end where I was not sure if I was to follow Hawaii Bb or Fresno Bb and if I was to do assignments on Hawaii Bb” and another student said “Everything online this [sic] takes some getting used to.”

Curiously, under the heading “overall teaching effectiveness”, a student notes “It might be fun to give projects to groups on real life usability testing for some interfaces.” This is in fact what the students did for the final project.

After being informed of their pairings, the UH-Fresno State teams were to find their own times to meet for synchronous online presentations. One pairing had trouble finding a mutually agreeable time and appreciated instructor intervention: “Prof. Auerheimer being able to arrange interactions with Fresno for [the Hawaii team]. I am so glad this happened.”

Some student comments about the team interactions were quite insightful. A UH student reflected about the course’s inter-university experience:

“Knowing that the final project was a new attempt on your part, I suspect you would like to have some comments about it. I thought the idea of the final project was a good idea, but I would have preferred a mixed group of 2 Hawaii and 2 Fresno students. This would have forced us to do everything on-line. Instead, as I mentioned in a private email to [the TA], because of the [insistence of one of the students], our group was forced to meet face to face a couple times. I was not in favor of the idea, but because of [the student’s] busy schedule [the student] insisted.

The interaction with Fresno went very well I feel. They were very accommodating to our schedule, and with the 3 hour time difference did not start till 10pm their time. Each of our presentations went well, though I felt slide changes were slow. There were no technical glitches [sic] thank God.”

Another student summarizes the experience: “I Like The Final Project. It Is Challenging And Interesting. It Is So Special. It Is Typical Long Distance Learning. And We Have To Learn How To Cooperate Within A Team And Coordinate Between Teams. Different Time Zones Make Things Complicated And Challenging. In Addition To The High Tech Tools, Teamwork Spirit Played A Very Important Role Here.”

Summary

Finding, measuring, and adjusting on-the-fly for an optimal mix of synchronous and asynchronous communication techniques is an active research area. However, Dawson (2006, p.154) notes problems with the data usually collected: “given that the education literature suggests that communication amongst community participants is essential for the development of a sense of community ... educational research concerning community has often adopted non-scaleable methodologies that analyse the artifacts of student discourse, such as forum contributions and chat logs.” Dawson notes (2006, p.159) that these traditional techniques do not scale well and “lack the capacity to guide practitioners in a ‘just-in-time’ environment”.

Relationships between instructor’s behavior, course design, and student’s “sense of learning community” are explored by Shea et al. (2006) using a Teaching Presence Scale (TPS) that looks much like traditional end-of-term student evaluation of instruction. After their study at the end of the fall 2004 term of over 1,000 student participants, Shea et al. (2006, p. 185) state:

“This study reveals that a strong and active presence on the part of the instructor – one in which she or he actively guides and orchestrates the discourse – is related both to students’ sense of connectedness and learning. This does not discount the importance of good instructional design and organization. Student [sic] who reported more effective instructional design and organization also reported higher levels of learning community—the contribution to the regression equation was more modest however.”

Shea’s conclusions complement the experiences in our courses discussed above. Although course design and organization are important, success of the course depends on the instructor’s ability to use synchronous and asynchronous communication techniques to draw students into a collaborative community. As we’ve recommended previously (Iding, 2002), we “should play to students strengths, not to the weaknesses of human nature.” Online courses can be rewarding for students and faculty. As one of the UH students concluded about our shared online experience: “This course had a significant impact on my life.”

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